



**A MODEL TO ENHANCE
STUDENTS' PERCEPTION OF EMPLOYABILITY
OF UNIVERSITY-ENTERPRISE COOPERATION
IN SHANDONG PROVINCE**

**Liu Jie
6419000016**

**A Dissertation Submitted in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy in
Educational Administration Innovation
Graduate School of Education
Siam University
Academic Year 2025
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Researcher Liu Jie

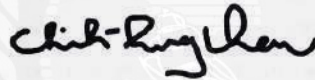
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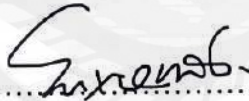
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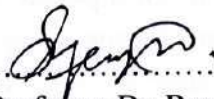
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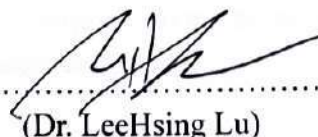
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Abstract

Title A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province

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Degree Doctor of Philosophy

Major Educational Administration Innovation

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This study developed a comprehensive strategic management model for University-Enterprise Cooperation (UEC) to enhance students' perception of employability in Shandong Province, China, addressing the gap between educational provision and employment expectations in vocational education. This study adopted a quantitative research method using a questionnaire survey. The investigation integrated four theoretical perspectives: Human Capital Theory, Constructivist Learning Theory, Self-Determination Theory, and Social Cognitive Career Theory. Using Structural Equation Modeling (SEM), data were collected from 561 students across five private vocational colleges through stratified random sampling, with the research instrument assessing seven constructs via 34 five-point Likert scale items: Disciplinary and Industry Knowledge, Practical and Problem-solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability. The research offers actionable recommendations for policymakers, universities, and enterprises. The validated model demonstrates that effective UEC requires systematic integration of high-quality university preparation, meaningful enterprise practice experiences, and active student engagement, providing a robust framework for optimizing cooperation outcomes and enhancing students' employability perception.

Keywords: university-enterprise cooperation, employability perception, vocational education, strategic management model

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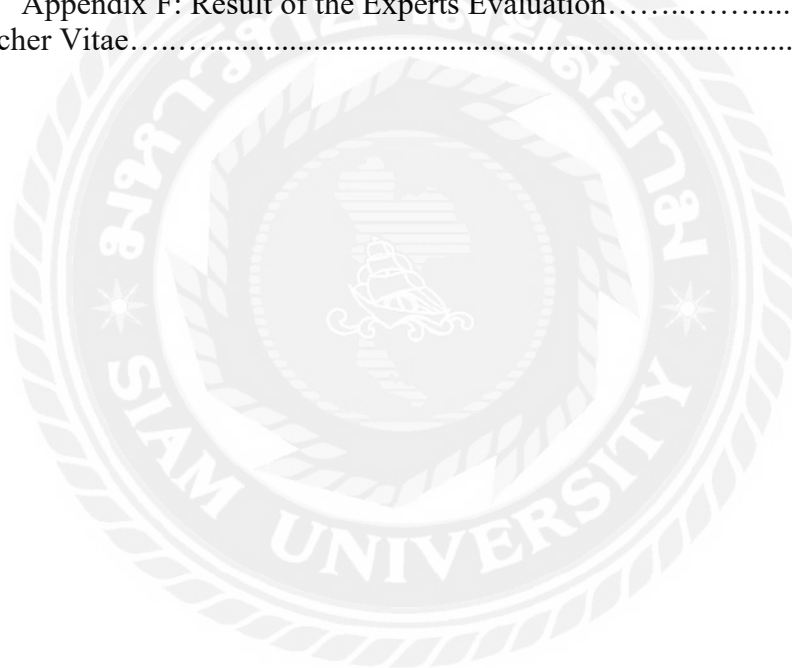
Liu Jie

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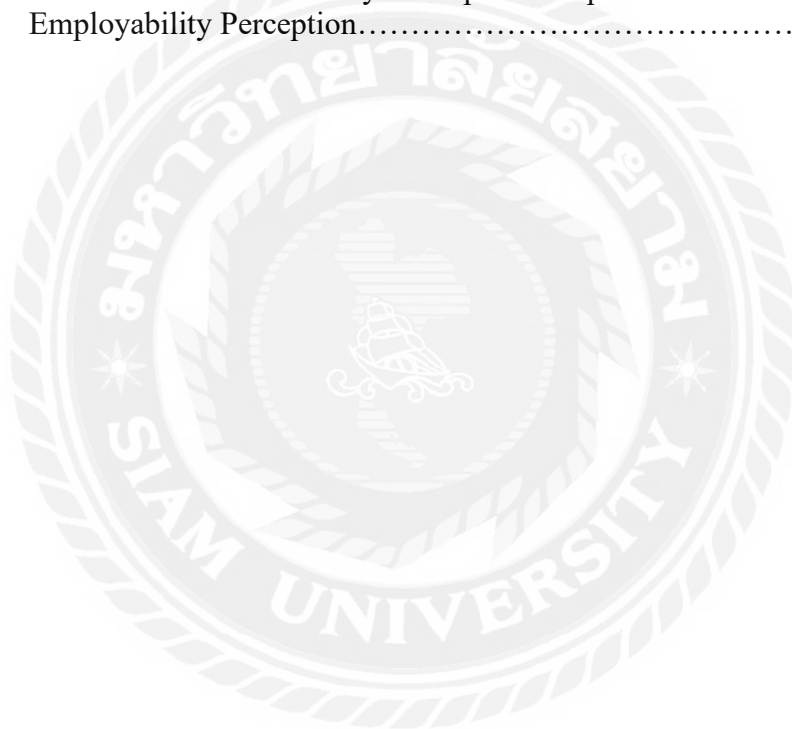


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CHAPTER 1

INTRODUCTION

1.1 Research Background

In the context of globalization and rapid technological advancement, competition in the labor market has intensified, making students' perception of their own employability a decisive factor in securing successful employment. With the restructuring of the global economy and the widespread adoption of automation and artificial intelligence, routine and low-skilled positions are increasingly affected by technological change, while demand continues to grow for workers with advanced technical knowledge, adaptive capabilities, and professional competence (Autor, 2022). The International Labour Organization (ILO, 2020) also highlights that technological change is reshaping job characteristics, sectoral demand, and the skills required of young people in the labor market.

The twenty-first-century labor market is characterized by complexity, uncertainty, and rapid technological disruption. The convergence of globalization, digitalization, and automation has redefined the nature of work and employability (World Economic Forum, 2023). In this changing context, employability is no longer determined solely by what students know or can do; it is also shaped by how students understand, evaluate, and navigate their career potential within dynamic labor-market environments (Tomlinson & Holmes, 2017).

As the world's second-largest economy, China is undergoing a continuing transformation from a manufacturing-based system toward one increasingly shaped by services, advanced manufacturing, and technology-intensive industries. Shandong Province, one of China's important economic regions, faces the pressing task of cultivating a skilled workforce that can support this transformation. Data from the Shandong Provincial Bureau of Statistics (2021) indicate that the tertiary sector accounted for more than half of the province's GDP in 2021, suggesting that employment opportunities are increasingly concentrated in service-oriented and technology-related sectors. This structural shift creates new career opportunities for students while also requiring higher education institutions to strengthen graduates' professional competence, practical ability, and career readiness.

Structural changes in the labor market compel higher education institutions to adjust educational strategies to meet evolving demands. As automation displaces routine work, the need for professionals capable of performing complex and non-routine tasks has grown sharply (Frey & Osborne, 2017). In China, the demand for skilled labor is especially evident in services, information technology, and advanced manufacturing (Chen et al., 2016). However, many students in vocational education still lack sufficient practice-based learning experience and systematic career guidance, which may leave them uncertain when facing an increasingly complex employment environment. This gap reflects the continuing mismatch between curriculum design, employer expectations, career planning, and industry engagement (Bridgstock, 2009).

In China, higher education institutions are being encouraged to align talent cultivation with innovation-driven development and high-quality employment outcomes. For vocational and private colleges, the challenge is not only to improve employment rates but also to enhance students' confidence in their readiness for work. Many students continue to experience a gap between academic learning and perceived workplace readiness, particularly when they equate employability only with grades or technical certificates while underestimating the importance of self-efficacy, communication, professional identity, and career management skills (Tomlinson, 2017).

Against this backdrop, university-enterprise cooperation (UEC) has been promoted as a key mechanism for bridging academic training and industry needs. UEC can provide students with authentic workplace exposure, industry-oriented learning opportunities, and practical experience, thereby supporting the development of employability-related confidence and competence (Arranz et al., 2022). Research on employability emphasizes that effective education – workplace collaboration should align learning experiences with labor-market requirements so that students can transfer knowledge, skills, and professional attitudes into workplace contexts (Yorke & Knight, 2004).

Nevertheless, UEC practices may remain limited when cooperation is focused mainly on institutional agreements rather than on students' learning outcomes and employability perceptions. If enterprise participation is weak, practice tasks are superficial, or teacher guidance is insufficient, UEC may fail to improve students' practical skills and employment confidence. For this reason, employability-oriented UEC should systematically integrate disciplinary and industry knowledge, problem-solving skills, professionalism, teacher guidance, enterprise practice experience, and learning engagement (Arranz et al., 2022).

Enhancing students' employability perceptions has therefore become a central issue in vocational education reform. Yorke and Knight (2004) argue that employability requires a holistic approach that combines knowledge, skills, understanding, and personal attributes. Bridgstock (2009) further emphasized the importance of career management skills and sectoral awareness in preparing graduates for labor-market transitions. Building on these perspectives, this study sought to develop and validate a strategic management model of UEC in Shandong Province, with the ultimate aim of enhancing vocational college students' perception of employability. The proposed model integrates key dimensions including disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, teacher guidance and feedback, enterprise practice experience, and learning engagement.

1.2 Research Significance

Theoretical significance. From a theoretical perspective, this research addresses gaps in the literature on UEC and employability perception. Existing research has often examined employability through skills, work experience, or institutional support, but comparatively less attention has been given to the mechanism through which UEC influences students' own perceptions of employability. Employability encompasses not only technical knowledge but also soft skills, professional identity, career management, and psychosocial resources (Fugate et al., 2004). By proposing an integrated model that combines disciplinary and industry knowledge, practical and problem-solving skills,

professionalism and work attitude, teacher guidance and feedback, enterprise practice experience, and learning engagement, this study provides a comprehensive framework for understanding how employability perceptions are shaped within UEC contexts.

Practical significance. Practically, this study has direct implications for education reform and regional development. As Shandong's economy continues to shift toward services, advanced manufacturing, and technology-related industries, employers increasingly expect graduates to possess not only academic knowledge but also practical competence, problem-solving ability, workplace adaptability, and professional attitudes (Yorke & Knight, 2004). By developing a model for optimizing UEC, the study offers guidance for curriculum development, internship design, teacher support, and enterprise participation. It also provides a basis for policymakers and institutions to strengthen employability-oriented evaluation systems and improve alignment between educational outcomes and labor-market demands.

Integrated significance and innovation. This study distinguishes itself by integrating human capital theory, constructivist learning theory, self-determination theory, and social cognitive career theory into a UEC-based framework. The proposed model encompasses knowledge, skills, professional literacy, practice experience, and learning engagement, thereby offering a multidimensional approach to employability perception. This cross-theoretical integration advances scholarly inquiry into vocational education and provides a practical model for higher education institutions, enterprises, and policymakers seeking to enhance students' employability confidence and support sustainable regional development.

1.3 Research Problem

Despite the increasing emphasis on employability in higher education, a gap remains between the competencies demanded by employers and the preparation offered by universities in China. In Shandong Province, where economic restructuring is accelerating, enterprises require graduates who not only possess academic knowledge but also demonstrate practical problem-solving skills, professional attitudes, and strong industry awareness. However, many vocational colleges continue to emphasize theoretical instruction at the expense of applied learning, leaving some students underprepared for the realities of the labor market (Yorke & Knight, 2004).

Although UEC has been widely promoted as a mechanism to bridge the gap between education and employment, existing initiatives may remain fragmented when they do not systematically integrate disciplinary knowledge, workplace practice, teacher guidance, and student engagement. As a result, students' perception of their employability (SPE)—that is, their self-assessment of readiness and confidence to obtain and maintain employment—may remain weak or inconsistent (Rothwell et al., 2008).

Moreover, much of the existing literature focuses on objective employability, such as actual skills and employment outcomes, while relatively less attention has been paid to perceived employability and its determinants in vocational education contexts. Few empirical studies have examined how UEC influences SPE, or how learning engagement moderates the relationship between enterprise practice experience and employability perception. Therefore, the central research problem addressed in this

study is: How can a strategic management model of university – enterprise cooperation be developed and validated to enhance students' perception of employability in vocational colleges in Shandong Province?

1.4 Research Questions

This study aimed to examine the current state and influencing factors of employability perceptions among vocational college students in Shandong Province under the UEC framework. The guiding research questions are as follows:

1. What is the current status of employability perceptions among vocational college students in Shandong Province under the UEC framework?
2. How do university-related factors (disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback) affect students' employability perceptions?
3. How do enterprise-related factors (enterprise practice experience) affect students' employability perceptions?
4. Does learning engagement moderate the relationship between enterprise practice experience and students' employability perceptions?
5. What are the overall implications of the findings for improving UEC-based strategies to enhance vocational college students' employability perceptions?

1.5 Research Objectives

The overarching objective of this study is to develop and validate a strategic management model of UEC to enhance students' employability perceptions in Shandong Province. Specific objectives include:

1. To investigate the current status of employability perceptions among vocational college students under UEC;
2. To examine the impact of university-related factors (disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback) on employability perceptions;
3. To examine the impact of enterprise-related factors (enterprise practice experience) on employability perceptions;
4. To investigate the moderating role of learning engagement in the relationship between enterprise practice experience and employability perceptions;
5. To derive implications from the research findings for the design and implementation of a UEC strategic management model aimed at strengthening vocational college students' employability perceptions.

1.6 Research Scope

This research was delimited by the following boundaries:

Participants: The sample consisted of students from five private vocational colleges in Shandong Province, spanning juniors to graduating students. As the study focuses on private institutions, caution should be exercised when generalizing findings to public colleges or comprehensive universities.

Methodology: A quantitative research design was adopted, with data primarily collected through questionnaires and analyzed using statistical techniques to test relationships among variables. This study does not involve interviews or qualitative data collection.

Focus: The study investigated how university-related factors (disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback) and enterprise-related factors (enterprise practice experience) influence employability perceptions, with particular attention to the moderating effect of learning engagement.

Contextual scope: The research aimed to develop and validate a management model that reveals how academic and enterprise-related factors interact through practice and engagement to shape employability perceptions. Given the regional and institutional focus, generalization beyond Shandong Province should be made with caution.

1.7 Definition of Key Terms

1.7.1 Disciplinary and Industry Knowledge (DK)

Theoretical and practical knowledge related to a specific academic discipline, combined with an understanding of industry operations and trends. This knowledge provides the foundation for professional skills and enables students to adapt their expertise to industry contexts (Bridgstock, 2009).

1.7.2 Practical and Problem-Solving Skills (PS)

The ability to apply academic knowledge in real-world settings, address complex issues, and develop effective solutions. These skills draw upon both theoretical understanding and hands-on experience (Yorke & Knight, 2004).

1.7.3 Professionalism and Work Attitude (PA)

Non-technical attributes demonstrated in workplace contexts, including professional ethics, responsibility, initiative, adaptability, and teamwork. These qualities strongly influence long-term career adaptability and success (Fugate et al., 2004).

1.7.4 Teacher Guidance and Feedback (TK)

Instructional support and constructive feedback provided by teachers during the learning process. Such guidance aids academic progress and supports problem-solving, self-regulated learning, and career development (Hattie & Timperley, 2007).

1.7.5 Enterprise Practice Experience (EP)

Practical experience acquired through internships, apprenticeships, or collaborative projects within real organizational environments. These experiences allow students to apply classroom learning, understand industry operations, and adapt to workplace requirements (Billett, 2001).

1.7.6 Learning Engagement (LE)

The investment of time, effort, and emotional energy in the learning process, encompassing classroom participation, assignment completion, internship participation,

and self-directed learning. Engagement is a key determinant of learning outcomes and employability development (Fredricks et al., 2004).

1.7.7 Students' Perception of Employability (SPE)

Students' self-assessment of their ability to obtain and sustain employment, including confidence in their skills, knowledge, and experiences, as well as the belief that these competencies meet employer expectations (Rothwell et al., 2008).

Table 1.1 Definition of Key Terms

No.	Variable	Definition	Literature Source
1	Disciplinary and Industry Knowledge (DK)	The integrated understanding of theoretical concepts, methodological frameworks, and practical applications within a specific academic discipline, combined with awareness of industry-specific practices, trends, regulations, and operational dynamics. It includes foundational academic knowledge and contextual industry intelligence that support effective professional practice and decision-making in real work environments.	Bridgstock (2009)
2	Practical and Problem-Solving Skills (PS)	The cognitive and behavioral capabilities that enable students to identify, analyze, and resolve complex problems in authentic work contexts through the application of theoretical knowledge, analytical reasoning, creative thinking, and adaptive problem-solving methods.	Yorke & Knight (2004)
3	Professionalism and Work Attitude (PA)	The behavioral standards, ethical principles, interpersonal competencies, and attitudinal dispositions that characterize effective professional conduct, including responsibility, integrity, reliability, teamwork, communication, adaptability, and continuous learning orientation.	Fugate et al. (2004)

No.	Variable	Definition	Literature Source
4	Teacher Guidance and Feedback (TK)	The systematic and developmental support provided by educators through mentoring, instructional guidance, constructive feedback, career advice, and personalized learning support. It includes academic guidance for knowledge acquisition as well as professional guidance for career preparation and employability enhancement.	Hattie & Timperley (2007)
5	Enterprise Practice Experience (EP)	Authentic and structured workplace learning experiences that provide students with direct exposure to professional work environments, industry practices, and real-world application opportunities through internships, work placements, cooperative education, project-based collaborations, and industry partnerships.	Billett (2001)
6	Learning Engagement (LE)	A multidimensional construct representing the quality and intensity of student investment in learning activities, including cognitive engagement, behavioral engagement, and emotional engagement. It reflects students' active participation, effort, persistence, interest, and commitment to achieving learning objectives.	Fredricks et al. (2004)
7	Students' Perception of Employability (SPE)	Students' subjective assessment and confidence regarding their capability to secure, maintain, and progress in employment within their chosen career field. It includes perceived competence, job-seeking confidence, belief in relevant skills and qualifications, and readiness for labor-market participation.	Rothwell et al. (2008)

CHAPTER 2

LITERATURE REVIEW

This chapter provides a comprehensive review of the theoretical and empirical foundations of the study. It synthesizes four major theories—Human Capital Theory, Constructivist Learning Theory, Self-Determination Theory, and Social Cognitive Career Theory—followed by an extensive examination of the key variables. The main purpose of this review is to synthesize current knowledge about key variables including Disciplinary and Industry Knowledge, Practical and Problem Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, Students' Perception of Employability, and explore how these factors interact within the UEC framework to influence students' perceptions of their employability. The logical connections among variables are then articulated to support the development of the conceptual framework and research hypotheses.

2.1 Theoretical Foundations

This study is grounded in four complementary theories—Human Capital Theory (HCT), Constructivist Learning Theory (CLT), Self-Determination Theory (SDT), and Social Cognitive Career Theory (SCCT). Together, these theories explain how institutional, pedagogical, and psychological factors contribute to students' perception of employability.

2.1.1 Human Capital Theory (HCT)

Human Capital Theory (Becker, 1964) posits that individuals' knowledge, skills, and competencies represent forms of capital that increase productivity and enhance labor-market outcomes. Education and training function as strategic investments that yield long-term economic and career returns. In the context of vocational education, university-related factors—such as disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance—represent essential components of human capital accumulation.

Recent studies emphasize that students with stronger academic foundations, cognitive skills, and professional behaviors display higher adaptability, performance, and employability perceptions (Clarke, 2018). Teacher guidance further enhances learning readiness and self-efficacy by providing feedback that clarifies expectations and supports academic and professional development (Hattie & Timperley, 2007).

In this study, university-related factors are conceptualized as antecedent inputs shaping students' preparedness for enterprise practice, consistent with HCT.

Human Capital Theory and Student Factors

In the context of university-enterprise cooperation, human capital theory can well explain how the skills acquired by students through practical work experience and academic learning are transformed into perceived employability. University-enterprise cooperation provides students with a practical platform, and students can gain substantial work experience through these projects, thereby enhancing their employability competitiveness (Tomlinson, 2008). In addition, human capital theory also emphasizes the long-term return on educational investment, that is, by accumulating human capital, students can obtain continuous benefits in their future careers (Becker, 1993). In the university-enterprise cooperation in Shandong Province, students accumulate knowledge and skills through a combination of academic courses and enterprise practice. This model is in line with the core idea of human capital theory, that is, education is an important source of human capital and can provide long-term benefits for students' future career development. Through university-enterprise cooperation, students can not only master subject and industry knowledge in theory, but also apply this knowledge in practical operations, thereby enhancing their confidence in future employment ability (Tomlinson, 2017).

Disciplinary and industry knowledge are an important part of human capital. It refers to the theoretical knowledge and practical industry-related skills accumulated by students in their disciplines (Bridgstock, 2009). In the context of university-enterprise cooperation, students master basic disciplinary knowledge through academic courses, and deepen their understanding of industry operation modes, market demands and technological trends through enterprise practical activities. This dual learning method not only improves students' professional knowledge, but also helps them combine theoretical knowledge with the actual working environment, thereby improving their employability (Billett, 2011). Through university-enterprise cooperation, students can directly contact the latest technologies and tools in the industry and enhance their understanding of disciplinary and industry knowledge. For example, engineering students can learn the actual design and production processes through projects in cooperation with enterprises. This learning method enables them to not only master the theory, but also accumulate valuable industry experience (Yorke & Knight, 2004). This accumulation of disciplinary and industry knowledge helps students better understand the needs of jobs, thereby improving their employment perception (Tomlinson, 2017).

Practical and problem-solving skills are an important component of employability, which not only rely on the theoretical knowledge students acquire in the classroom, but also include their experience in dealing with problems in real work (Rothwell et al., 2008). University-enterprise cooperation provides students with valuable practical opportunities. Through cooperation with enterprises, students can apply the knowledge they have learned in a real work environment and develop the ability to deal with complex problems. Practical and problem-solving abilities are

enhanced through university-enterprise cooperation. For example, students can face real-life problems and challenges by participating in actual projects in companies, such as product development or marketing, and this experience helps them improve their ability to solve practical problems (Arranz et al., 2022). Research shows that hands-on experience gained in this way significantly improves students' perceived employability because they are able to demonstrate their ability to solve real-world problems during the job search process (Tomlinson, 2008).

Professionalism and work attitude refers to the sense of responsibility, teamwork ability, and dedication to work that students demonstrate at work. These soft skills play an important role in the modern workplace. Employers not only value employees' professional skills, but also their professional qualities and work attitude (Yorke & Knight, 2004). University-enterprise cooperation helps students develop professional qualities and a good work attitude by allowing them to directly contact the work environment. In university-enterprise cooperation, students can learn how to collaborate with colleagues, how to manage time, and how to communicate effectively through daily contact with the company (Bridgstock, 2009). These experiences help students better adapt to the workplace environment in their future careers. Through corporate practice, students can understand the sense of responsibility and teamwork required in the workplace. These professional qualities directly affect their career development.

Teacher guidance and feedback play an important role in guiding students' learning process, especially in university-enterprise cooperation, where teachers can provide students with academic support and career development advice (Hattie & Timperley, 2007). Teacher feedback not only helps students make academic progress, but also improves their practical ability and professional quality by guiding them on how to apply what they have learned to actual work.

In the context of university-enterprise cooperation, teachers can act as a bridge between students and enterprises, helping students better understand the needs of enterprises and making students aware of their shortcomings and strengths through feedback (Billett, 2011). This guidance and feedback helps students adapt to the work environment more quickly and improve their self-efficacy and employment confidence (Arranz et al., 2022). Studies have shown that after receiving positive feedback from teachers, students can be more confident in their work practice, thereby enhancing their perception of employability (Rothwell et al., 2008).

Human Capital Theory emphasizes that education and training are important investments to improve individual productivity. Higher vocational education provides students with knowledge and skills through curriculum teaching and university-enterprise cooperation, thus enhancing their value in the labor market.

Human Capital Theory (HCT) posits that education and training represent purposeful investments that enhance individuals' productivity and competitiveness in the labor market. Within the higher vocational education context, disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback can be considered as critical forms of human capital. These elements equip students with the cognitive, technical, and social competencies needed to successfully participate in enterprise practice.

Scholars have consistently argued that the accumulation of human capital through formal education is positively related to employment outcomes (Becker, 1993). Recent studies further demonstrate that students who acquire broader professional knowledge, stronger problem-solving abilities, and better professional dispositions are more likely to adapt to workplace demands and achieve higher employability perceptions (Tomlinson, 2017). Teacher guidance and constructive feedback also play a central role by enhancing students' self-efficacy and readiness to apply classroom learning in professional settings (Hattie & Timperley, 2007).

For this study, HCT provides the rationale for positioning university-related factors as antecedents in the conceptual model. These factors strengthen students' preparedness to engage with enterprise practice experiences, thereby shaping their subsequent perceptions of employability.

2.1.2 Constructivist Learning Theory (CLT)

Constructivist Learning Theory asserts that learning is an active, situated, and socially mediated process (Vygotsky, 1978). Knowledge is constructed through learner interaction with real-world contexts, reflection on experiences, and social collaboration. Work-integrated environments—such as internships and enterprise projects—are ideal constructivist contexts, providing authentic and complex tasks that require students to integrate and apply classroom knowledge.

Contemporary research highlights that real-world experiences promote deep learning, professional identity formation, and higher-order problem-solving abilities (Billett, 2011). Social interaction with supervisors and colleagues provides scaffolding essential for skill development and reflection.

This study adopts CLT to explain how enterprise practice experience functions as a transformational mechanism that converts university inputs into employability-related outcomes.

Constructivist Learning Theory and Enterprise Practice Experience

According to CLT, learners construct their understanding of the world through active participation, practice, and interaction with others. The core of this theory is "Contextual learning" means that the acquisition of knowledge and skills must be carried out through real situations in order to be better understood and applied (Vygotsky, 1978).

In university-enterprise cooperation, constructivist learning theory provides a powerful framework for students' learning process. Students no longer rely solely on theoretical learning in the classroom, but actively build their understanding of the industry and work by participating in actual projects and tasks in enterprise practice. This learning model helps students combine theoretical knowledge with experience in the actual work environment, thereby deepening their understanding of knowledge and improving their ability to solve practical problems (Vygotsky, 1978). In particular, in the university-enterprise cooperation model in Shandong Province, students can directly apply what they have learned in real work situations through enterprise practice. This active knowledge construction process helps them better adapt to the needs of the job market (Billett, 2011).

Constructivist Learning Theory also emphasizes the importance of "social interaction" in learning. Vygotsky (1978) proposed that learners can construct knowledge at a higher level through cooperation and communication in interaction with more experienced individuals (such as teachers or colleagues). This interaction helps students improve their professional quality and practical ability through communication and cooperation with corporate mentors and colleagues in corporate practice. For example, engineering students can learn new skills and methods in the process of solving practical problems and improve their sense of employability by cooperating with experienced engineers in corporate practice.

As the core link of university-enterprise cooperation, Enterprise Practice Experience can provide students with a real working environment and opportunities for practical operation, which plays an important role in improving students' employment perception (Billett, 2011). Enterprise practice experience refers to the process in which students acquire industry knowledge, professional skills and work experience by participating in the actual work tasks of the enterprise (Billett, 2011). Through this experience, students can not only apply academic knowledge to actual work, but also learn how to deal with complex problems in the workplace and cultivate professional qualities and work attitudes (Kolb, 1984). Enterprise practice experience provides students with a platform for combining theory with practice. In the classroom, students learn basic knowledge and theoretical frameworks through academic courses, and in enterprise practice, they can learn how to apply this knowledge to work through actual operations and observation. For example, students majoring in marketing can learn how to conduct market research, product promotion and other practical operations during their internships in enterprises. By personally participating in the work process, students can have a deeper understanding of the enterprise operation model and market laws (Billett, 2001). This practical work experience not only enhances their professionalism, but also helps them improve their perception of employability, because they can test and improve their abilities in real work scenarios (Billett, 2011). Studies have shown that corporate practice experience can effectively improve students' perceived employability. By participating in corporate practice, students can develop

stronger problem-solving, teamwork and time management skills (Rothwell et al., 2008). These "soft skills" learned in corporate practice are crucial for students' future career development, and employers are more inclined to recruit graduates with rich practical experience (Tomlinson, 2008). Corporate practice experience can not only improve students' employment opportunities, but also help them better demonstrate their practical skills and professionalism in the job search process (Arranz et al., 2022). In addition, corporate practice experience can also help students build industry networks and enhance their social capital (Bourdieu, 1986). In corporate practice, students have the opportunity to establish connections with professionals in the industry, and these networks can help them obtain more employment opportunities and career advice. For example, many students have established long-term cooperative relationships with companies through internships and eventually obtained full-time job opportunities through such internship experiences (Tomlinson, 2008). This kind of social capital built through practice not only enhances students' professional confidence, but also lays a solid foundation for them to enter the workplace.

Constructivist Learning Theory and enterprise practice experience play a complementary role in improving students' employment perception. Constructivist learning theory emphasizes that students learn by actively constructing knowledge, while enterprise practice experience provides students with a real working environment, enabling this active learning to be realized in actual situations (Vygotsky, 1978). In university-enterprise cooperation, students can apply the theoretical knowledge learned in class to actual work through enterprise practice, and constantly reflect on and adjust their cognition and skills at work, which is the core of constructivist learning.

Constructivist Learning Theory points out that knowledge construction is a process of interaction with real situation. As a real learning situation, enterprise practice can promote students to "learn by doing", and then transform the theory into operational ability. Constructivist Learning Theory (CLT) emphasizes that knowledge is actively constructed by learners through authentic experiences, social interaction, and reflection (Vygotsky, 1978). In vocational education, enterprise practice experience (EP) serves as a prototypical constructivist learning environment. Through internships, project-based collaborations, and workplace simulations, students are exposed to complex, real-world problems that require them to integrate theoretical concepts with practical applications. Research has shown that such authentic contexts allow learners to reorganize prior knowledge, test their skills in uncertain situations, and refine their professional identity (Billett, 2011). Social interaction with mentors, colleagues, and peers provides the scaffolding needed to facilitate higher-order learning and reflection (Lave & Wenger, 1991). Through this process, students develop practical competencies, critical thinking, and adaptive problem-solving skills, which directly enhance their employability perceptions.

In this study, CLT supports the conceptualization of EP as the central mediating mechanism linking university-based human capital to students' perception of employability.

2.1.3 Self-Determination Theory (SDT)

Self-Determination Theory (Ryan & Deci, 2000) emphasizes that the satisfaction of three fundamental psychological needs—autonomy, competence, and relatedness—nurtures intrinsic motivation and sustained engagement. When students perceive their learning and practice environments as autonomy-supportive, competence-enhancing, and socially connected, they demonstrate stronger behavioral, cognitive, and emotional engagement.

Recent evidence shows that learning engagement significantly influences students' performance in work-integrated learning (WIL) settings. Engaged students actively seek feedback, reflect more deeply, and derive greater benefits from workplace learning (Fredricks et al., 2004).

Thus, learning engagement is conceptualized as a moderator that influences the strength of the relationship between enterprise practice experience and students' perception of employability.

Self-Determination Theory and Learning Engagement

In the education and career development environment, students' learning participation and motivation are mainly affected by these three basic psychological needs. In university-enterprise cooperation, students can obtain autonomy, competence and belonging in practice, which can stimulate their higher learning participation and show stronger confidence and adaptability in facing future employment challenges. First of all, autonomy means that individuals have certain control and decision-making power over their action choices. When students feel that they can independently decide how to complete work tasks and choose learning paths and practice methods that suit them in university-enterprise cooperation, they are more likely to develop intrinsic motivation and actively participate in work and learning (Deci & Ryan, 1985). Research shows that the satisfaction of autonomy needs can effectively improve students' learning motivation and performance because they feel a sense of responsibility and accomplishment in the learning tasks they choose independently (Ryan & Deci, 2000). For example, the university-enterprise cooperation model in Shandong Province allows students to freely choose different projects and work tasks in enterprise practice, enabling them to learn according to their own interests and abilities. This independent choice enhances their learning enthusiasm and participation.

Secondly, competence refers to the ability of an individual to feel competent and able to cope with challenges when completing tasks. In university-enterprise cooperation, students gradually increase their confidence in their own abilities by participating in actual projects. The satisfaction of competence can not only improve

students' learning effects, but also increase their competitiveness in the future job market (Vansteenkiste et al., 2004). Through cooperation with corporate mentors, students can obtain positive feedback and recognition through the completion of tasks, which further enhances their self-efficacy and competence. For example, students face complex problems in practice and gradually increase their confidence in their abilities by applying academic knowledge to solve challenges in actual work (Deci & Ryan, 1985). This improvement in competence not only helps students perform better in work tasks, but also increases their confidence and enthusiasm for their future careers. In addition, corporate practical experience can help students improve their practical skills, making them more calm when facing future work. This sense of achievement and successful experience in practice enhances students' perception of employability and makes them more confident in coping with competition in the job market after graduation.

A sense of belonging refers to an individual's need to feel accepted and recognized in a group or social environment. In the process of learning and practice, the satisfaction of a sense of belonging plays an important role in improving students' learning motivation and participation (Baumeister & Leary, 1995). In university-enterprise cooperation projects, students can feel the importance of themselves as team members through cooperation with colleagues and mentors, which increases their sense of belonging and teamwork ability. The satisfaction of a sense of belonging makes students more active in learning and work, and more willing to cooperate and interact with team members (Ryan & Deci, 2000). For example, students can feel their contribution to the team and gain support and recognition from the team through cooperation with different departments and colleagues in the enterprise. This sense of belonging not only enhances students' enthusiasm at work, but also helps them better adapt to the future workplace environment. In addition, the satisfaction of a sense of belonging can also enhance students' emotional participation and enable them to have stronger positive emotional responses in learning and work (Fredricks et al., 2004). Research shows that when students feel a sense of belonging during learning and practice, they will show higher motivation and resilience when facing learning tasks and career challenges, thus further enhancing their perceived employability. Self-determination theory and learning engagement play a complementary role in improving students' perceived employability. The satisfaction of the needs for autonomy, competence, and belonging emphasized by self-determination theory can stimulate students' intrinsic motivation, and this intrinsic motivation directly affects students' learning engagement (Ryan & Deci, 2000). When students feel that their needs for autonomy, competence, and belonging are met in university-enterprise cooperation, they will show higher levels of behavioral, emotional, and cognitive engagement in learning and practice (Ryan & Deci, 2000). University-enterprise cooperation provides students with a platform to meet these psychological needs, thereby promoting their learning engagement and accumulating professional skills and practical experience through practical operations.

The satisfaction of autonomy can stimulate students' behavioral participation in the learning and practice process because they can freely choose learning tasks according to their interests and abilities and actively participate in learning and practice activities (Ryan & Deci, 2000). By freely choosing tasks and projects in the enterprise, students can experience the joy of autonomous learning and improve their learning motivation and performance by independently deciding work tasks. For example, the university-enterprise cooperation project in Shandong Province allows students to choose different work tasks according to their interests, thereby enhancing their learning participation and behavioral performance. In addition, the satisfaction of competence enhances students' cognitive participation in learning by improving their confidence in their own abilities, prompting them to adopt more in-depth learning strategies when facing complex tasks (Vansteenkiste et al., 2004). In corporate practice, students gradually accumulate experience and confidence in dealing with complex problems by solving actual work tasks and projects. This enhancement of competence prompts them to be more confident and positive in their future careers. The satisfaction of belongingness helps students to have positive emotional responses in teamwork, thereby improving their emotional participation (Baumeister & Leary, 1995). University-enterprise cooperation projects help students establish close connections with mentors and colleagues in work practice by providing opportunities for teamwork, and enhance their sense of belonging through interaction with others. For example, by participating in team projects in the enterprise, students can feel their value as a member of the team, and further enhance their emotional participation and learning enthusiasm through cooperation with others. In addition, the satisfaction of a sense of belonging can also enhance students' sense of professional belonging, making them more confident and calm when facing professional challenges. Research shows that the satisfaction of a sense of belonging can significantly improve students' learning motivation and perceived employability, because they have established a stable social network through enterprise practice and obtained more career opportunities and support through these networks (Fredricks et al., 2004).

Self-Determination Theory and learning engagement play an important role in improving students' perceived employability. University-enterprise cooperation stimulates students' intrinsic learning motivation by satisfying their needs for autonomy, competence and belonging, and helps them accumulate valuable professional skills and work experience by improving their learning engagement. Through the combination of behavioral, emotional and cognitive engagement, students not only improve their academic performance, but also enhance their competitiveness and confidence in the future job market.

Self-Determination Theory suggests that learning motivation comes from three psychological needs: autonomy, competence and belonging. When students experience autonomous choice, task competence and group belongingness in university-enterprise cooperation, their learning commitment level will be significantly improved.

Self-Determination Theory (SDT) explains how the satisfaction of three basic psychological needs—autonomy, competence, and relatedness—drives intrinsic motivation and sustained engagement (Ryan & Deci, 2000). In university–enterprise cooperation, students' learning engagement (LE) reflects the extent to which these needs are fulfilled during enterprise practice.

When students experience autonomy through meaningful tasks and discretion, they are more likely to display strong behavioral engagement. Perceptions of competence gained from successful problem-solving and constructive feedback foster cognitive engagement by encouraging deeper learning strategies. Relatedness, derived from supportive relationships with mentors and peers, enhances emotional engagement and strengthens persistence (Fredricks et al., 2004).

Consequently, students with higher levels of learning engagement are more motivated to invest effort in practice activities, which amplifies the positive effects of enterprise practice on employability perception. In this study, SDT provides the theoretical justification for modeling LE as a moderator of the relationship between EP and SPE.

2.1.4 Social Cognitive Career Theory (SCCT)

Social Cognitive Career Theory (SCCT) (Lent et al., 1994) provides a psychological explanation for career development by emphasizing three key constructs:

1. Self-efficacy—beliefs about one's capability to perform tasks
2. Outcome expectations—beliefs about the consequences of actions
3. Career goals—intentions that guide behavior

Enterprise practice provides mastery experiences, realistic feedback, and social persuasion—core influences on self-efficacy (Lent et al., 1994). Empirical studies confirm that workplace experiences significantly shape students' perception of employability by enhancing self-efficacy and clarifying career expectations (Jackson, 2016).

In this study, SCCT explains why enterprise practice experience enhances students' perception of employability.

Social Cognitive Career Theory and Students' Perception of Employability

Based on Bandura's social cognitive theory, emphasizing the importance of individual self-efficacy, outcome expectations, and personal goals in the career development process. Students' employability perception refers to students' subjective assessment of their competitiveness and adaptability in the job market. By combining the perspectives of SCCT and employability perception, this study aims to explore how university-enterprise cooperation in Shandong Province affects students' perception of employability and help them get better opportunities in the job market by enhancing their self-efficacy and career confidence.

Self-efficacy is one of the core concepts in social cognitive career theory, which refers to an individual's belief in his or her ability to complete a specific task. Self-efficacy not only affects students' confidence in career choices, but also directly affects the behaviors they adopt in the process of career development. SCCT emphasizes that self-efficacy is continuously formed through students' learning and practical experience, and through the strengthening or weakening of this belief, it affects their career decisions and performance (Lent et al., 1994). In the context of university-enterprise cooperation, students gain practical work experience through enterprise practice, which helps to enhance their self-efficacy because they can verify and improve their skills in a real work environment. For example, the university-enterprise cooperation project in Shandong Province enables students to apply the theoretical knowledge learned in the classroom to practical operations by providing actual enterprise work tasks. When students successfully solve problems at work and receive positive feedback from enterprise mentors, their self-efficacy will be enhanced (Bandura, 1997). Research shows that the improvement of self-efficacy is closely related to students' career decisions and career behaviors. When students are confident in their own abilities, they are more likely to actively seek career opportunities and show positive job-seeking behaviors (Hackett & Betz, 1981). Through university-enterprise cooperation, students can gain this improvement in self-efficacy, thereby being more confident and active in the job market.

Outcome expectations are another important concept in SCCT, which refers to an individual's expectations of the results of his or her behavior. When students believe that they can obtain the expected career returns through their own efforts and abilities, they are more likely to take positive career development behaviors (Lent et al., 1994). In university-enterprise cooperation, students can clearly see the match between their skills and industry needs by participating in actual projects of enterprises, and verify their expected career results through practice. For example, students are highly praised by the enterprise through their performance during the internship period and have the opportunity to stay in the enterprise to work after graduation. This positive outcome expectation will further stimulate students' career motivation. Outcome expectations not only affect students' career choices, but also their expectations and confidence in career development. Studies have shown that when students believe that their efforts can bring positive career returns, they are more willing to make more efforts on their career path and take more positive actions (Lent et al., 2000). University-enterprise cooperation provides actual career scenarios, allowing students to intuitively experience their work results and career development prospects, thereby enhancing their outcome expectations. This positive outcome expectation can not only improve students' learning participation, but also help them more confidently demonstrate their abilities during the job search process. Personal goals are the third important factor in SCCT, which refers to the specific goals and pursuits that individuals set for their career development. Personal goals play a guiding role in career decision-making and development. They help students determine the direction of their career development

and motivate them to take action to achieve these goals (Lent et al., 1994). In the context of university-enterprise cooperation, students can more clearly understand industry needs through interaction with corporate mentors and set realistic career goals accordingly. For example, after participating in corporate projects, engineering students may adjust their future career direction based on project experience, thereby preparing to enter a specific field. The setting of personal goals is closely related to students' career confidence. Research shows that when students set specific career goals, they will show stronger motivation and resilience in the process of achieving these goals (Betz & Hackett, 2006). University-enterprise cooperation not only provides students with practical experience, but also helps them verify and adjust their career goals through actual operations, thereby enhancing their decision-making ability and confidence in career choices. By participating in university-enterprise cooperation, students can better understand the match between their own abilities and industry needs, and set more realistic career goals based on practical experience.

Students' perceived employability refers to students' subjective assessment of their competitiveness, adaptability and chances of success in the job market. Rothwell et al. (2008) pointed out that perceived employability is a key factor affecting students' employment performance and career development. It not only reflects students' confidence in their own skills and abilities, but also reflects their understanding of the job market. Students' perception of their own employability will directly affect their job-seeking behavior, career decisions and career achievements. In the context of university-enterprise cooperation, students can not only accumulate valuable work experience by participating in actual enterprise projects, but also improve their cognition and confidence in their own employability. University-enterprise cooperation helps students combine classroom knowledge with practical operations by providing a real working environment, thereby improving their cognition of their own abilities. For example, by participating in project management, market research or product development in an enterprise, students can learn how to cope with challenges in actual work and verify and improve their own professional abilities by solving these problems (Tomlinson, 2008). Research shows that students have accumulated valuable professional skills through this practical experience and have formed a more positive cognition of their employability (Rothwell et al., 2008).

University-enterprise cooperation also helps students build professional networks by providing network resources within the industry, thereby enhancing their employment opportunities. Bourdieu's (1986) Social Capital theory shows that social capital can significantly affect an individual's career success. In university-enterprise cooperation, through interactions with corporate mentors and colleagues, students can not only obtain career advice within the industry, but also increase their own employment opportunities through these professional networks. For example, many students have obtained formal job opportunities after graduation through the close connections they established with companies during their internships. The establishment of this kind of

professional network enhances students' perceived employability and helps them gain more competitive advantages in the job market. In addition, school-industry partnerships help students understand the needs and expectations of the job market by providing practical industry feedback. When students participate in corporate projects, they can understand their performance and ability gaps at work through feedback from corporate mentors. This feedback not only helps students identify their strengths and weaknesses, but also prompts them to more confidently demonstrate their skills during the job search process (Tomlinson, 2017). Through this practical feedback, students can gain a clearer understanding of their employability when applying for jobs, thus improving their competitiveness in the job market. Social cognitive career theory and students' perceptions of employability play complementary roles in enhancing students' employment competitiveness. Self-efficacy, outcome expectations and personal goals in SCCT jointly influence students' career behavior and decision-making, and these factors are strengthened through university-enterprise cooperation. For example, students' self-efficacy and career confidence are enhanced through practical work experience accumulated in corporate practice, thus prompting them to be more active and autonomous in their career choices (Lent et al., 1994). This enhanced sense of self-efficacy makes students more comfortable facing the challenges of the job market and enhances their perceived employability through practical career experience. In addition, outcome expectations and the achievement of personal goals are reinforced through university-enterprise collaboration. By participating in corporate projects, students can clearly see the results of their work and verify their career expectations through these results. When students see real career rewards for their efforts, their career confidence and perceived employability increase significantly. For example, students gain high recognition from the company by participating in project management during their internship period, and have the opportunity to stay in the company to work after graduation. This positive career outcome not only enhances their professional confidence, but also improves their Perceptions of one's own employability (Betz & Hackett, 2006). By combining the perspectives of SCCT and perceived employability, this study can more comprehensively explore how university-enterprise cooperation in Shandong Province enhances students' perceived employability by improving their self-efficacy, outcome expectations, and career goals. This theoretical framework provides an important theoretical basis for the design and implementation of university-enterprise cooperation projects, and provides practical guidance for improving students' competitiveness in the job market.

Social Cognitive Career Theory (SCCT) posits that self-efficacy beliefs, outcome expectations, and career goals are central determinants of career-related behavior (Lent et al., 1994). Enterprise practice experience influences these determinants by providing mastery experiences, vicarious learning opportunities, and credible social persuasion, all of which enhance self-efficacy. At the same time, exposure to real workplace conditions allows students to form more accurate outcome expectations regarding career prospects and role fit.

A growing body of research highlights that students' perceptions of employability (SPE) are shaped not only by their actual skills but also by their confidence in meeting employer expectations and their beliefs about labor market opportunities (Rothwell et al., 2008). SCCT provides a robust framework for explaining why EP has a direct impact on SPE: successful practice experiences strengthen self-efficacy and refine outcome expectations, which in turn enhance students' self-assessment of employability.

Social Cognitive Career Theory emphasizes that self-efficacy, outcome expectation and goal have a core role in career choice and development. Positive experience gained in enterprise practice and teacher feedback can improve students' self-efficacy, thus enhancing their perception of employability.

For the present study, SCCT underscores the cognitive mechanisms through which enterprise practice experience influences employability perception, thereby reinforcing the central role of EP in the conceptual framework.

2.1.5 Comparative Summary of Theories

In this study, the four theories respectively explain knowledge and skill accumulation, practical learning style, motivation activation mechanism and career development psychological path, which complement each other and jointly support the strategic management model of this study. Taken together, the four theoretical perspectives provide complementary explanations for the relationships among university factors, enterprise practice experience (EP), learning engagement (LE), and students' perception of employability (SPE). Human Capital Theory (HCT) highlights the role of prior educational investments in shaping readiness for practice. Constructivist Learning Theory (CLT) emphasizes how authentic practice environments enable students to transform and apply knowledge. Self-Determination Theory (SDT) explains the motivational conditions under which students engage deeply in practice. Social Cognitive Career Theory (SCCT) elucidates the cognitive mechanisms through which practice experiences shape employability perceptions.

By integrating these perspectives, the study establishes a multilayered framework: HCT clarifies who benefits from enterprise practice (students with stronger human capital), CLT explains how learning occurs through authentic engagement, SDT specifies when and under what motivational conditions practice yields maximum benefit, and SCCT demonstrates why perceptions change in terms of self-efficacy and outcome expectations.

Table 2.1 Comparative Summary of Theories

Theory	Core Focus	Link to Research Variables	Role in Conceptual Model
Human Capital Theory (HCT)	Education and training as investments that enhance productivity and employability	University factors (disciplinary knowledge, problem-solving skills, professionalism, teacher guidance)	Antecedents: explain how university-based inputs prepare students for EP
Constructivist Learning Theory (CLT)	Knowledge constructed through authentic experiences, reflection, and social interaction	Enterprise Practice Experience (EP)	Mediator: explains how practice environments transform academic knowledge into employability outcomes
Self-Determination Theory (SDT)	Autonomy, competence, and relatedness drive intrinsic motivation and engagement	Learning Engagement (LE)	Moderator: explains when and under what conditions EP has stronger effects on SPE
Social Cognitive Career Theory (SCCT)	Self-efficacy, outcome expectations, and goals shape career behavior	Students' Perception of Employability (SPE)	Outcome mechanism: explains why and how practice experiences translate into employability perceptions

2.2 Literature Review of Key Variables

2.2.1 Disciplinary and Industry Knowledge (DK)

Disciplinary and industry knowledge refers to students' understanding of core academic concepts, professional practices, and industry-specific norms that shape work processes, organizational standards, and labor market expectations. Such knowledge represents a central component of human capital and is increasingly recognized as a precursor to employability in contemporary higher education, where graduates are expected to demonstrate both theoretical literacy and contextual awareness (Clarke, 2018). The rapid transformation of work environments further heightens the demand for graduates who can interpret domain-specific problems, adapt to technological change, and understand professional standards in their respective industries (Jackson & Bridgstock, 2021).

Within vocational and applied disciplines, disciplinary knowledge provides cognitive tools for analyzing complex issues, while industry knowledge supports students in understanding the practical relevance and constraints of professional work. Research shows that stronger disciplinary foundations enhance problem-solving, critical thinking, and reflective judgment, which are essential capabilities for navigating workplace complexity (Clarke, 2018). At the same time, awareness of industry expectations supports students in aligning their learning with organizational needs, improving decision-making, and anticipating workplace challenges (Tomlinson, 2017).

University–enterprise cooperation (UEC) plays a critical role in contextualizing disciplinary learning by exposing students to authentic industry conditions. Through internships, collaborative projects, and enterprise-based assignments, students are able to connect theoretical constructs with real-world problems, observe industry practices, and internalize professional standards (Arranz et al., 2022). Such experiences enhance students' understanding of how disciplinary knowledge is applied in practice and highlight the competencies valued by employers, including technical expertise, analytical capability, and problem-solving aptitude.

Recent empirical studies demonstrate that students with strong disciplinary and industry knowledge achieve better outcomes in work-integrated learning environments, engage more effectively in task performance, and receive more favorable evaluations from supervisors (Clarke, 2018). These outcomes contribute to students' confidence in their professional capabilities and shape their career-related self-perceptions, which are central to employability development. Moreover, students' ability to articulate industry knowledge has been associated with stronger job search intentions, career adaptability, and labor market success (Tomlinson, 2017).

Industry-oriented knowledge also enables students to recognize labor market dynamics, emerging technologies, and sector-specific trends, fostering adaptability and proactive career planning. Scholars have highlighted that graduates who understand industry transformations and skill demands are more likely to navigate transitions

successfully and pursue viable career pathways (Tomlinson, 2017). Within UEC environments, exposure to enterprise ecosystems allows students to observe shifts in organizational processes and market conditions that influence career opportunities and work practices.

In this study, disciplinary and industry knowledge is conceptualized as a foundational educational input that shapes students' capacity to engage meaningfully in enterprise practice. Students who possess stronger knowledge bases are better positioned to interpret workplace tasks, apply theoretical insights, and respond to performance expectations. Consequently, disciplinary and industry knowledge is expected to facilitate positive enterprise practice experiences and contribute to students' perception of employability. This perspective aligns with contemporary research emphasizing that employability emerges not only from skill possession but from students' ability to connect disciplinary knowledge with industry contexts through authentic practice.

2.2.2 Practical and Problem-Solving Skills (PS)

Practical and problem-solving skills refer to students' ability to apply theoretical knowledge to real-world tasks, interpret complex situations, and generate effective solutions in uncertain and dynamic environments. These skills encompass analytical reasoning, decision-making, creativity, problem identification and resolution, and the capacity to transfer knowledge across contexts (Clarke, 2018). In contemporary labor markets characterized by technological disruption and work complexity, employers increasingly value graduates who can integrate theoretical knowledge with practical judgment and adapt to emerging workplace challenges (Jackson & Bridgstock, 2021).

Higher education plays a central role in cultivating practical and problem-solving skills, yet research suggests that classroom instruction alone is insufficient for developing workplace-ready competencies. Students often struggle to translate abstract academic concepts into practical solutions without exposure to authentic tasks and real constraints (Billett, 2011). This gap underscores the importance of experiential learning environments that support students in applying, testing, and refining their skills through iterative practice, feedback, and reflection.

University–enterprise cooperation (UEC) provides a critical context for developing practical and problem-solving skills by embedding students in professional environments where they must navigate responsibility, uncertainty, and performance expectations. Through internships, industry-based projects, and collaborative tasks, students confront real problems, negotiate solutions with stakeholders, and adapt strategies based on outcomes (Arranz et al., 2022). These experiences help students understand the contextual nature of problem-solving, move beyond rote application of knowledge, and develop work-relevant judgment.

Empirical research indicates that students who engage in authentic practice tasks demonstrate improved cognitive flexibility, resilience, and self-efficacy, as well as greater confidence in their ability to meet professional demands (Clarke, 2018). The development of these skills is strongly associated with positive evaluations from supervisors, enhanced workplace performance, and greater readiness for employment. Moreover, participation in problem-solving activities has been shown to foster reflective capacity and self-regulation, which further reinforce employability-related outcomes (Tomlinson, 2017).

Practical and problem-solving skills are particularly consequential in enterprise settings because they enable students to function autonomously, cope with uncertainty, and contribute value to organizational processes. Adaptive responses to unfamiliar situations signal professional maturity and enhance students' credibility in workplace interactions (Clarke, 2018). Scholars have noted that employers frequently assess graduates not only on technical expertise but on their capacity to diagnose problems, evaluate alternatives, and execute solutions under time and resource constraints (Tomlinson, 2017).

From an employability perspective, the development of practical skills contributes to students' ability to perceive themselves as capable and competitive in labor markets. Successful engagement in problem-solving tasks strengthens students' self-efficacy and career-related beliefs, which are central to their perception of employability (Rothwell et al., 2008). Additionally, students who demonstrate strong problem-solving capacity are more likely to identify career opportunities, navigate transitions, and achieve positive labor market outcomes (Clarke, 2018).

In this study, practical and problem-solving skills are conceptualized as a key educational resource that enables students to derive value from enterprise practice experiences. Students with stronger skills are more likely to engage actively in authentic tasks, manage performance expectations, and internalize professional learning. Therefore, these skills are expected to facilitate positive practice experiences and contribute to students' development of employability-related perceptions within UEC contexts.

2.2.3 Professionalism and Work Attitude (PA)

Professionalism and work attitude refer to the behavioral, cognitive, and affective orientations that shape how individuals approach work, interact with others, and respond to challenges in professional contexts. These orientations commonly include responsibility, initiative, adaptability, work commitment, teamwork, and ethical conduct, which reflect an individual's ability to function effectively in organizational settings (Clarke, 2018). Employers increasingly prioritize such attributes because they signal not only job readiness but also the potential for long-term performance, professional growth, and workplace integration (Jackson & Bridgstock, 2021).

Higher education plays an important role in shaping professionalism by developing students' self-regulation, interpersonal communication, and adaptability through academic coursework, group projects, and extracurricular activities. However, traditional classroom environments often struggle to cultivate work-related attitudes authentically because they lack the social dynamics, performance expectations, and power relations that characterize professional environments (Tomlinson, 2017). As a result, researchers argue that professionalism is best developed when students are placed in authentic work contexts where they can observe workplace norms, enact professional roles, and receive evaluation from supervisors and peers (Clarke, 2018).

University–enterprise cooperation (UEC) provides such contexts by embedding students in organizations where they must manage responsibility, cooperate with colleagues, and navigate social expectations. In enterprise practice, students learn to regulate behavior, maintain professional standards, handle pressure, and adapt to uncertainty. Studies show that participation in authentic work settings enhances students' professional identity, interpersonal competence, and career-related attitudes, which are essential for employability (Arranz et al., 2022).

Recent research indicates that students who demonstrate professionalism in work environments often receive more support, mentorship, and learning opportunities, contributing to stronger capability development and career confidence (Tomlinson, 2017). Positive evaluations from supervisors reinforce students' self-efficacy, while social inclusion promotes a sense of belonging and professional identity formation. These experiences not only influence organizational outcomes but also shape students' beliefs about their future career prospects, which are central to employability development (Rothwell et al., 2008).

In addition, professionalism is closely related to adaptability, resilience, and emotional regulation, which facilitate effective performance in uncertain or high-pressure situations. Scholars note that the ability to cope with complexity, navigate interpersonal conflict, and sustain motivation under challenging conditions is a critical attribute of employable graduates (Clarke, 2018). Students who exhibit proactive and adaptive attitudes are more likely to succeed in enterprise practice, access developmental opportunities, and internalize professional competencies.

Professionalism also contributes to employability by influencing how students perceive themselves and are perceived by others. Students who display initiative, work ethic, and professionalism are more likely to be trusted, given responsibility, and recognized for potential, which shapes their self-efficacy, outcome expectations, and career motivation (Clarke, 2018). These cognitive and affective mechanisms play an important role in employability development, as students evaluate their strengths, envision future opportunities, and build confidence in their capability to succeed.

In this study, professionalism and work attitude are conceptualized as essential personal resources that foster active engagement in enterprise practice and support the development of employability-related beliefs. Students who demonstrate professionalism are more likely to adapt to workplace norms, participate effectively in collaborative work, and capitalize on learning opportunities. Therefore, professionalism is expected to shape the quality of practice experience and contribute to students' perception of employability within UEC environments.

2.2.4 Teacher Guidance and Feedback (TK)

Teacher guidance and feedback refer to instructional support, mentoring, evaluation, and reflective dialogue that facilitate students' learning, skill development, and adaptation to professional contexts. In higher education, teachers play a pivotal role in shaping learning processes by designing tasks, clarifying expectations, modeling professional behaviors, and providing feedback that enhances students' understanding and performance (Boud & Molloy, 2013). Effective guidance enables students to link theoretical knowledge with practical application, develop critical thinking, and refine professional competencies, all of which are essential for employability.

Recent studies highlight that teacher guidance functions not merely as information transmission but as a mechanism that influences students' motivation, self-regulation, and identity formation (Fredricks et al., 2004). Constructive and timely feedback has been shown to strengthen competence beliefs, increase goal clarity, and support the internalization of learning outcomes (Boud & Molloy, 2013). Conversely, ineffective or ambiguous feedback can hinder confidence, reduce engagement, and impede skill development, particularly in complex learning environments.

Within vocational and applied disciplines, teacher guidance provides cognitive, emotional, and social support that helps students navigate uncertainty, manage performance expectations, and develop professional attitudes. In addition to technical knowledge, teachers often mediate workplace norms, industry expectations, and tacit practices that are not easily conveyed through formal curriculum (Tomlinson, 2017). These forms of support are especially important for novice learners who may struggle to interpret professional standards and evaluate their own performance.

University–enterprise cooperation (UEC) amplifies the importance of teacher guidance by placing students in authentic work environments where they must apply theoretical knowledge under real constraints. Teachers serve as mediators between academic and workplace cultures, supporting students in understanding work tasks, managing challenges, and interpreting feedback from industry supervisors (Arranz et al., 2022). Scholars note that teacher involvement increases students' capacity to cope with complex tasks, internalize professional expectations, and achieve higher quality learning outcomes (Clarke, 2018).

Feedback is particularly critical in enterprise practice, where performance outcomes are often uncertain, socially mediated, and context dependent. Effective feedback helps students recognize strengths and weaknesses, refine strategies, and develop reflective learning habits (Boud & Molloy, 2013). Recent empirical work indicates that feedback characterized by clarity, specificity, and constructiveness contributes to higher motivation, self-efficacy, and professional confidence among students engaged in work-integrated learning (Billett, 2011). These psychological outcomes have been consistently associated with stronger employability perceptions and career adaptability (Tomlinson, 2017).

Furthermore, teacher guidance supports students' socialization into professional roles by fostering a sense of belonging, legitimacy, and identity. Supportive teacher–student relationships have been shown to improve emotional well-being, reduce anxiety, and encourage proactive learning behaviors in practice environments (Boud & Molloy, 2013). These socio-emotional outcomes are essential for navigating interpersonal dynamics and organizational cultures, both of which influence students' ability to perform effectively and perceive themselves as employable.

In the context of this study, teacher guidance and feedback are conceptualized as critical educational resources that enable students to interpret, manage, and benefit from enterprise practice. Students who receive constructive guidance and meaningful feedback are more likely to engage actively in professional tasks, improve performance, and internalize learning. As a result, teacher support is expected to shape the quality of enterprise practice experiences and contribute to the development of employability-related perceptions.

2.2.5 Enterprise Practice Experience (EP)

Enterprise practice experience refers to students' participation in authentic workplace activities that expose them to professional tasks, organizational processes, and social interactions within industry settings. Such experiences typically occur through internships, work placements, industry-based projects, or cooperative education programs that allow students to integrate academic knowledge with real-world performance requirements (Billett, 2011). Enterprise practice is regarded as a core component of work-integrated learning and a primary mechanism through which employability is developed in higher education.

A key feature of enterprise practice is the opportunity for students to apply theoretical knowledge to authentic tasks, observe professional behaviors, and receive feedback from practitioners. Research consistently shows that students who engage in real-world tasks develop stronger practical competence, problem-solving ability, and professional confidence than those who rely solely on classroom-based instruction (Arranz et al., 2022). Such experiences promote cognitive flexibility, reflective capacity, and work readiness, which are central to employability development (Clarke, 2018).

Enterprise practice also provides social and cultural exposure to organizational norms, role expectations, and interpersonal dynamics, enabling students to understand the implicit rules of professional behavior and workplace interaction. Scholars emphasize that students' ability to navigate workplace culture, negotiate roles, and manage collaborative relationships is essential for long-term employability (Tomlinson, 2017). These socio-cultural dimensions of practice contribute to professional identity formation and shape students' beliefs about their fit within particular careers.

Empirical evidence demonstrates that enterprise practice enhances employability not only through skill acquisition but also through psychological processes such as self-efficacy, outcome expectations, and career adaptability (Rothwell et al., 2008). Successful engagement in professional tasks reinforces students' sense of competence and motivates them to pursue career goals, while feedback from supervisors and peers influences confidence, recognition, and goal clarity. These experiences strengthen employability-related cognitions and increase motivation to participate in work-related activities.

The quality of enterprise practice plays an important role in determining learning outcomes. Studies have shown that structured supervision, supportive feedback, and opportunities for reflection lead to higher levels of capability development, satisfaction, and career readiness (Billett, 2011). In contrast, poorly designed or unsupported practice experiences may lead to disengagement, stress, and reduced confidence, undermining employability development (Boud & Molloy, 2013). Thus, the educational value of practice depends on both the opportunities presented and the support available.

Within university–enterprise cooperation (UEC), enterprise practice functions as a platform for aligning academic instruction with labor market demands. Students are exposed to emerging technologies, industry innovations, and organizational routines, which help them understand market trends and anticipate career opportunities (Tomlinson, 2017). UEC frameworks therefore support both immediate learning and long-term career planning by situating students within evolving industry ecosystems.

In this study, enterprise practice experience is conceptualized as a central experiential mechanism that links university-based factors to students' perception of employability. Students who are able to apply knowledge effectively, manage professional tasks, and receive meaningful support are more likely to perceive themselves as competent, adaptable, and prepared for employment. Accordingly, enterprise practice is expected to serve as a key pathway through which educational inputs translate into employability-related beliefs and outcomes.

2.2.6 Learning Engagement (LE)

Learning engagement refers to students' behavioral, cognitive, and emotional investment in learning activities, reflected in effort, persistence, deep processing, and adaptive strategies used to achieve academic and professional goals (Fredricks et al., 2004). Engagement represents not only observable participation but also underlying motivational states that drive learners to actively construct knowledge, regulate learning, and overcome challenges. In higher education, learning engagement has been consistently linked to improved academic performance, skill development, and psychological well-being (Fredricks et al., 2004).

Self-Determination Theory (SDT) provides a theoretical foundation for understanding engagement as a product of psychological need satisfaction. When students experience autonomy, competence, and relatedness, they are more likely to exhibit intrinsic motivation and sustained engagement (Ryan & Deci, 2000). Conversely, environments that frustrate these needs may lead to superficial engagement, avoidance, or disengagement. Recent research confirms that need-supportive learning environments predict higher levels of engagement across behavioral, cognitive, and emotional dimensions (Boud & Molloy, 2013).

In vocational and practice-based education, engagement is especially important because students must integrate theoretical knowledge with authentic performance demands, manage uncertainty, and collaborate effectively with others. Scholars note that engagement enables students to apply knowledge flexibly, seek feedback proactively, and persist in challenging tasks, which are critical for the development of work-relevant competencies and employability (Jackson & Bridgstock, 2021). Engagement thus serves as both an indicator of learning quality and a mechanism through which students achieve positive developmental outcomes.

Enterprise practice environments provide unique opportunities for engagement by exposing students to meaningful tasks, social interaction, and experiential learning. However, such environments can also present new challenges, including ambiguity, responsibility, and emotional pressure. Students who demonstrate higher engagement are more likely to embrace these challenges, utilize available support, and transform experience into professional growth (Billett, 2011). Research indicates that engaged learners display greater reflective capacity, adaptability, and self-regulation, which contribute to career readiness and employability perception (Tomlinson, 2017).

The degree of engagement influences not only performance but also the psychological interpretation of learning experiences. Engaged students are more likely to interpret difficult tasks as learning opportunities, process feedback constructively, and attribute success to effort, which in turn strengthens self-efficacy and outcome expectations (Rothwell et al., 2008). These cognitive processes are essential for employability development because they shape students' confidence in their capabilities, evaluation of future opportunities, and intention to pursue career goals.

Within university–enterprise cooperation (UEC), engagement acts as a critical factor determining the educational value of enterprise practice experience (EP). Although EP provides opportunities for authentic learning, students vary in how actively they participate in tasks, seek support, and reflect on experience. Emerging evidence suggests that engagement moderates the effect of experiential learning on employability-related outcomes, such that highly engaged students benefit more from practice experience than those with low engagement (Fredricks et al., 2004). Engagement therefore functions as a psychological condition that influences whether and how EP translates into perceived employability.

In this study, learning engagement is conceptualized as a motivational and behavioral resource that shapes students' capacity to learn from enterprise practice and interpret experiences positively. Students with higher engagement are expected to derive greater developmental and psychological benefits from practice, leading to stronger perceptions of employability. By contrast, disengaged students may fail to capitalize on available opportunities, resulting in weaker employability outcomes. This conceptualization provides the theoretical basis for examining the moderating role of engagement in the relationship between enterprise practice experience and employability.

2.3 Interactions between Variables

2.3.1 Effects of University-Related Factors on EP

Within the framework of University–Enterprise Cooperation, enterprise practice experience does not occur in isolation but is shaped by students' prior academic preparation and institutional support. According to Human Capital Theory, students' knowledge, skills, and professional attributes constitute essential inputs that determine their capacity to engage effectively in workplace learning. At the same time, Constructivist Learning Theory emphasizes that meaningful experiential learning depends on learners' existing cognitive structures and learning readiness.

Disciplinary and industry knowledge provides students with the theoretical foundation and industry awareness necessary to understand workplace tasks and organizational contexts. Students who possess stronger disciplinary grounding and industry knowledge are better able to integrate into enterprise practice environments and extract learning value from practical experiences. Therefore, higher levels of such knowledge are expected to enhance the quality and effectiveness of enterprise practice experience.

H1: Disciplinary and industry knowledge has a significant positive effect on enterprise practice experience.

Practical and problem-solving skills reflect students' ability to apply knowledge to real-world situations, address challenges, and adapt to dynamic work environments. Prior studies suggest that students with stronger practical competencies

are more capable of engaging actively in enterprise tasks and learning from hands-on experiences. As a result, practical and problem-solving skills are expected to positively influence students' enterprise practice experience.

H2: Practical and problem-solving skills have a significant positive effect on enterprise practice experience.

Professionalism and work attitude, including responsibility, initiative, and adaptability, play a crucial role in determining how students approach workplace learning opportunities. Students who demonstrate positive professional attitudes are more likely to participate proactively, seek feedback, and persist in enterprise practice activities, thereby enhancing their experiential learning outcomes.

H3: Professionalism and work attitude have a significant positive effect on enterprise practice experience.

Teacher guidance and feedback serve as important institutional support mechanisms that prepare students for enterprise practice and facilitate the connection between academic learning and workplace application. Through guidance, mentoring, and feedback, teachers help students clarify learning objectives, reflect on practice experiences, and overcome difficulties encountered in enterprise settings. Consequently, effective teacher guidance and feedback are expected to promote more meaningful enterprise practice experiences.

H4: Teacher guidance and feedback have a significant positive effect on enterprise practice experience.

2.3.2 The Impact of DK on EP

Disciplinary and industry knowledge refers to students' theoretical mastery of disciplinary content combined with an understanding of industry structures, standards, and technological trajectories. In vocational and professional education, this knowledge base functions not merely as abstract content but as "applied human capital" that becomes meaningful when enacted in authentic work settings (Becker, 1993). Recent studies argue that strong disciplinary foundations equip students with analytical frameworks to interpret work tasks, while industry knowledge enables them to anticipate employer expectations and respond to rapidly changing labor-market conditions (Clarke, 2018).

Within the Human Capital Theory perspective, disciplinary and industry knowledge represent core components of intellectual capital that enhance students' preparedness to enter work-integrated environments (Becker, 1993). Students who possess robust conceptual knowledge and familiarity with industry norms demonstrate stronger readiness to navigate complex workplace tasks, which in turn shapes their practice engagement and performance. Empirical research shows that higher levels of domain knowledge predict greater confidence, faster adaptation, and stronger performance in enterprise placements, especially in knowledge-intensive sectors (Clarke, 2018).

From a task-performance perspective, disciplinary knowledge enables students to diagnose work problems, generate solutions, and justify their decisions based on analytical reasoning and theoretical principles (Tomlinson, 2017). Recent evidence indicates that students with stronger foundational knowledge are more capable of handling ill-defined problems, demonstrating professional autonomy, and contributing to team-based innovation during practice (Billett, 2011). Such competence is especially critical in work-integrated learning environments that place high value on independent problem solving and evidence-based judgment.

Industry knowledge contributes an additional layer of practical understanding that helps students contextualize work tasks within broader organizational, regulatory, and market environments. Studies demonstrate that students who are informed about industry dynamics are more capable of anticipating client needs, evaluating technological opportunities, and adapting to organizational contingencies (Arranz et al., 2022). This form of contextual awareness is crucial for alignment between academic preparation and workplace expectations, particularly in rapidly evolving industries such as information technology, engineering, and digital media (Clarke, 2018).

Importantly, the interaction between disciplinary and industry knowledge has been found to facilitate innovation, task engagement, and professional identity formation. Students who can flexibly integrate theoretical knowledge with industry-specific insights are more likely to generate novel solutions, identify strategic opportunities, and add value beyond routine task execution (Clarke, 2018). A systematic review of work-integrated learning literature highlights that students with both conceptual understanding and industry awareness demonstrate stronger engagement, faster professional socialization, and higher workplace performance (Billett, 2011).

Furthermore, contemporary studies emphasize that such knowledge supports adaptive expertise, enabling students to transfer and reconfigure skills across novel contexts (Billett, 2011). This adaptability not only enhances individual performance but also improves students' capacity to cope with uncertainty, ambiguity, and cognitive complexity in enterprise practice settings (Billett, 2011).

Recent research in vocational education confirms that strong disciplinary and industry knowledge significantly enhances students' participation, learning outcomes, and supervisor evaluations during enterprise practice placements, and those benefits translate into stronger employability perceptions post-placement (Clarke, 2018).

Synthesizing these findings, disciplinary and industry knowledge can be understood as a critical antecedent to effective enterprise practice engagement, because it provides the cognitive, analytical, and contextual resources necessary for students to actively construct meaning, manage professional tasks, and demonstrate value in workplace settings.

Consistent with this rationale, this study proposes that higher levels of disciplinary and industry knowledge facilitate stronger enterprise practice experiences among vocational students:

2.3.3 The Impact of PS on EP

Practical and problem-solving skills refer to students' capacity to apply theoretical knowledge to authentic work situations, analyze complex issues, and generate feasible solutions. These skills are widely recognized as central components of employability because they determine students' ability to cope with uncertainty, respond to workplace complexity, and adapt to rapidly changing labor demands (Clarke, 2018). In contemporary vocational education, these skills are not simply dispositional attributes but "actionable capacities" that shape how learners engage with work tasks and how they are perceived by employers (Clarke, 2018).

Within enterprise practice environments, practical application and problem solving serve as core mechanisms through which academic learning is transformed into professional competence. Work-integrated activities such as internships, project-based assignments, and collaborative tasks require students to diagnose problems, manage uncertainty, and implement solutions under time and resource constraints. Constructivist Learning Theory posits that such authentic, situated contexts force learners to reorganize cognitive structures, test strategies, and develop adaptive reasoning, resulting in deeper learning and enhanced performance (Billett, 2011).

Recent empirical studies demonstrate that higher levels of practical skill are associated with improved adjustment, faster task completion, and stronger supervisor evaluations during workplace placements (Billett, 2011). Students with strong practical abilities are more capable of transferring academic knowledge into operational procedures, performing technical tasks, and independently managing work responsibilities. These competencies facilitate smoother transition into organizational workflows, reduce onboarding time, and enhance contribution to work outcomes (Clarke, 2018). Such early effectiveness is consequential, as initial performance strongly shapes employer perceptions and post-graduation opportunities.

Problem-solving skills further enhance students' learning and performance in enterprise practice by supporting analytical reasoning, decision making, and innovation. Research from higher education and vocational settings highlights that students with strong problem-solving skills exhibit stronger tolerance for ambiguity, greater creativity, and more effective information integration when addressing work tasks (Clarke, 2018). Based on Social Cognitive Career Theory, mastery experiences derived from solving complex workplace problems increase self-efficacy, which subsequently improves motivation, persistence, and job performance (Lent et al., 1994). These processes not only support short-term task success but also catalyze long-term professional development.

Importantly, the interaction of practical and problem-solving skills yields synergistic effects on workplace performance. Students who can both operationalize knowledge and creatively resolve problems are better positioned to manage variability, anticipate risks, and develop innovative solutions (Clarke, 2018). Several studies show that such students demonstrate stronger adaptive expertise, higher leadership potential, and greater workplace resilience, especially in industries characterized by volatility and technological disruption (Billett, 2011). Moreover, employers consistently rank these competencies as among the most desirable attributes of graduates, outweighing traditional academic credentials (Clarke, 2018).

Recent research in China and other developing economies further reveals that practical and problem-solving skills not only enhance students' performance in enterprise placements but also influence organizational innovation capacity and productivity outcomes (Clarke, 2018). Organizations hosting students with advanced skills report higher task efficiency, reduced training costs, and increased implementation of improvement initiatives. These benefits, in turn, foster stronger school-enterprise partnerships and accelerate the institutionalization of work-integrated learning models.

Synthesizing these findings, practical and problem-solving skills can be regarded as central antecedents of enterprise practice experience, as they enable students to participate actively, perform effectively, and contribute meaningfully to workplace tasks. These skills function as the primary mechanisms through which human capital is translated into observable workplace behaviors, thereby enhancing the quality of enterprise practice experiences.

2.3.4 The Impact of PA on EP

Professionalism and work attitude encompass a range of non-technical attributes including responsibility, integrity, adaptability, communication, collaboration, and commitment to task performance. These attributes reflect students' readiness to function effectively within organizational contexts and are consistently recognized as core determinants of employability and workplace success (Clarke, 2018). In the context of vocational education, professionalism and work attitude form part of students' socio-emotional human capital, which complements technical competencies and strengthens their capacity to transition into professional roles (Tomlinson, 2017).

Enterprise practice exposes students to authentic workplace expectations, social norms, and performance standards, requiring them to demonstrate professional conduct in areas such as punctuality, communication, teamwork, and ethical behavior. Studies show that students who exhibit high professionalism are evaluated more positively by supervisors, receive greater mentoring support, and experience stronger professional identity development (Billett, 2011). These positive experiences contribute to improved self-efficacy, more positive outcome expectations, and stronger perceptions of career readiness (Lent et al., 1994).

Professionalism functions as an adaptive mechanism through which students manage task complexity, interpersonal interactions, and organizational routines. Recent empirical evidence indicates that professionalism predicts workplace adjustment, task performance, and learning outcomes during internships and work-integrated learning programs (Clarke, 2018). Students with high professionalism are more likely to engage in continuous learning, proactively solve problems, and contribute to team effectiveness, which enhances both their short-term performance and long-term employability (Billett, 2011).

Work attitude adds a motivational and affective dimension to workplace behavior. A positive work attitude—characterized by enthusiasm, initiative, perseverance, and organizational commitment—has been shown to support adaptive coping, innovation, and collaborative performance in enterprise settings (Arranz et al., 2022). According to Social Cognitive Career Theory, positive work attitudes shape professional behavior by reinforcing self-efficacy and goal-directed actions, which in turn influence performance and career decision-making (Lent et al., 1994). Students who display positive work attitudes are more likely to take responsibility for their tasks, seek feedback, and persist through challenges, resulting in stronger workplace performance and improved evaluations from employers (Billett, 2011).

The combined effect of professionalism and work attitude produces significant advantages for students' enterprise practice experience. Research shows that individuals who demonstrate both professional conduct and proactive attitudes adapt faster, collaborate more effectively, and contribute to organizational innovation (Clarke, 2018). These students are also more likely to engage in reflective learning, identify development opportunities, and translate experience into career-relevant competencies (Billett, 2011). Organizations hosting such students report reduced supervision demands, enhanced productivity, and stronger workplace climate, which incentivizes sustained engagement in university-enterprise partnerships (Clarke, 2018).

In dynamic work environments characterized by uncertainty and rapid change, professionalism and positive work attitudes serve as buffers that enhance students' resilience, adaptive expertise, and problem-solving capabilities (Billett, 2011). They enable students not only to cope with workplace stressors but to transform challenges into opportunities for innovation and professional growth. These attributes, therefore, play a central role in shaping the quality and outcomes of enterprise practice experiences.

Collectively, recent empirical research suggests that professionalism and work attitude function as key antecedents of successful workplace engagement, performance, and development outcomes in enterprise practice (Billett, 2011). By influencing behavioral, cognitive, and affective responses to workplace challenges, these attributes significantly improve the quality of students' enterprise practice experience.

2.3.5 The Impact of TK on EP

Teacher guidance and feedback refer to forms of academic, professional, and emotional support provided by instructors to facilitate students' learning and development. In higher and vocational education, effective guidance not only transmits knowledge but also supports skill acquisition, metacognitive growth, and career preparedness. Feedback, in turn, facilitates reflection, identifies gaps, and motivates improvement by helping students recognize strengths and address developmental weaknesses (Hattie & Timperley, 2007). Recent studies confirm that feedback that is constructive, timely, and dialogic has strong positive effects on student performance, self-efficacy, and professional identity formation (Hattie & Timperley, 2007).

Within university–enterprise cooperation, teacher guidance acts as a bridge between academic learning and workplace application by preparing students cognitively, affectively, and professionally for enterprise practice. Teachers help students translate theoretical knowledge into practical strategies, anticipate workplace demands, and develop realistic expectations of organizational contexts. Recent studies demonstrate that instructor support contributes to student readiness for work-based learning, enhances goal clarity, and promotes professional agency (Billett, 2011). Such preparation reduces anxiety and enhances students' capacity to manage uncertainty when entering workplace environments, thereby improving the quality of their enterprise practice experience.

Teacher guidance also plays a developmental role during and after enterprise practice. Through mentoring conversations, reflective coaching, and career-focused dialogue, instructors support students' meaning-making processes and help them construct professional identities (Tomlinson, 2017). According to experiential learning theory, learning is optimized when practice is accompanied by reflection and conceptual framing (Kolb, 1984). Thus, teacher guidance provides the scaffolding necessary for students to interpret workplace experiences, evaluate their own performance, and develop adaptive strategies for future tasks (Boud & Molloy, 2013).

Feedback represents a complementary mechanism that influences enterprise practice by promoting continuous improvement and psychological readiness. Feedback helps students identify performance gaps, develop corrective strategies, and build confidence in their ability to solve problems in professional settings. Recent studies highlight that feedback that is supportive and formative predicts higher learning outcomes, stronger motivation, and improved self-regulated learning in work-integrated contexts (Hattie & Timperley, 2007). In vocational education settings, students who receive structured feedback demonstrate higher levels of performance, adaptability, and persistence during enterprise practice (Clarke, 2018).

From the perspective of Social Cognitive Career Theory, teacher feedback contributes to the development of self-efficacy by providing mastery support and verbal persuasion, which increase students' confidence in performing workplace tasks (Lent et

al., 1994). Increased self-efficacy, in turn, enhances professional engagement, workplace persistence, and willingness to take on new challenges (Arranz et al., 2022). Similarly, Self-Determination Theory suggests that feedback that affirms competence and supports autonomy strengthens intrinsic motivation and facilitates deeper engagement in practice (Ryan & Deci, 2000). These motivational benefits are particularly relevant in enterprise practice environments where students must cope with uncertainty, performance pressure, and social evaluation.

Teacher guidance and feedback also generate relational benefits that positively influence the enterprise experience. Supportive teacher–student relationships foster psychological safety, encourage help-seeking, and strengthen belongingness, which predicts students' adjustment and engagement in work-based learning (Billett, 2011). Students who perceive high relational support are more likely to share difficulties, seek clarification, reflect critically, and integrate feedback into practice, ultimately improving performance and professional growth.

Moreover, contemporary research highlights that teacher support contributes not only to students' learning outcomes but also to organizational outcomes within enterprise practice. Organizations hosting well-prepared and well-supported students report stronger work performance, more efficient task execution, and fewer supervision demands (Clarke, 2018). These benefits reinforce employer willingness to engage in university–enterprise partnerships and provide high-quality practice opportunities.

Synthesizing these findings, teacher guidance and feedback function as central antecedents of successful enterprise practice experience because they provide cognitive, behavioral, and socio-emotional resources that enable students to understand workplace demands, adapt to challenges, and continuously improve performance. Through these mechanisms, students become more effective contributors and derive greater learning value from enterprise practice.

2.3.6 EP versus SPE

Enterprise practice experience (EP) refers to structured opportunities for students to engage in authentic workplace activities, including internships, apprenticeships, cooperative projects, and simulations. These experiences provide a situated context in which students can apply theoretical knowledge, develop professional skills, and internalize workplace norms. EP is increasingly recognized as a central vehicle through which higher education institutions foster employability outcomes, particularly in vocational and professionally oriented programs (Billett, 2011).

From a theoretical standpoint, Constructivist Learning Theory posits that authentic contexts promote knowledge integration and skill construction because learners must interpret, adapt, and perform in response to real-world demands (Billett, 2011). Accordingly, EP supports students in transforming academic knowledge into practical capabilities, enhancing their readiness to participate in professional environments. Empirical research demonstrates that work-integrated learning programs

are strongly associated with improved task performance, confidence, and self-regulated learning, which subsequently influence employability perceptions (Billett, 2011).

Students' perception of employability refers to their confidence in their competitiveness, capability, and potential to secure employment in the labor market. This perception encompasses beliefs about personal effectiveness, adaptability, and career prospects (Clarke, 2018). Studies indicate that perceived employability is a significant predictor of job-search behavior, career resilience, and early-career outcomes (Billett, 2011). EP plays a central role in shaping this perception by providing mastery experiences, social validation, and exposure to workplace opportunities.

First, EP enhances perceived employability by fostering practical skills, industry-specific competencies, and professional adaptability. Students who translate academic concepts into operational tasks gain greater confidence in their ability to perform in work settings and handle occupational challenges (Clarke, 2018). Evidence consistently shows that students with substantial practice experience report stronger employability beliefs, are more proactive during job search, and achieve better employment outcomes compared to peers without such experience (Arranz et al., 2022).

Second, EP strengthens perceived employability by enabling students to build professional networks and acquire social capital. Work-integrated learning environments provide opportunities for students to engage with supervisors, mentors, and industry professionals, who can offer career advice, job referrals, and role modeling. Contemporary research confirms that professional networks positively influence employability perception by facilitating access to labor-market information, opportunities, and social support (Clarke, 2018). For vocational students, interaction with industry professionals fosters both career identity formation and realistic career expectations, which enhances employability beliefs (Billett, 2011).

Third, EP shapes perceived employability by providing feedback and reflection opportunities. In professional settings, feedback from supervisors and colleagues enables students to identify strengths, address performance gaps, and monitor personal development (Boud & Molloy, 2013). Positive evaluation and acknowledgment of competence function as forms of social persuasion that boost self-efficacy, a key predictor of employability perceptions (Lent et al., 1994). At the same time, constructive feedback enables students to change ineffective strategies and develop adaptive coping mechanisms, contributing to stronger professional confidence and career self-management (Hattie & Timperley, 2007).

Recent studies also highlight the emotional and motivational benefits of EP. Participation in varied workplace experiences can foster resilience, intrinsic motivation, and adaptive expertise, all of which contribute to higher employability belief (Billett, 2011). Students who experience success, recognition, or responsibility during practice often report stronger optimism about future employment, reduced career anxiety, and clearer career goals (Billett, 2011).

Importantly, EP not only enhances perceived employability directly but also serves as a mediating mechanism linking university factors—such as disciplinary knowledge, skill competencies, professionalism, and teacher support—to employability outcomes. As students apply their existing human capital in work contexts, they validate and refine their capabilities, which strengthens confidence and perceived value in the labor market (Tomlinson, 2017). This mediating function reinforces the position of EP as the key mechanism through which educational investments translate into employability perceptions.

Synthesizing these insights, EP provides students with experiential, relational, and psychological resources that enhance their perceptions of employability, contributing to stronger career confidence and better labor-market readiness.

Based on this rationale, the following hypothesis is proposed:

H5: Enterprise practice experience positively influences students' perception of employability.

2.3.7 The Mediating Role of EP in the Influence of DK on SPE

Disciplinary and industry knowledge provides students with conceptual frameworks and technical foundations that shape their understanding of professional tasks and workplace expectations. However, knowledge alone does not directly translate into employability perceptions without opportunities for application and contextualization. Enterprise practice experience (EP) functions as a mechanism through which students operationalize theoretical knowledge, transform cognitive resources into performance, and form beliefs about their employability. Accordingly, EP occupies a central position in mediating the relationship between academic preparation and students' perception of employability (SPE).

Human Capital Theory posits that the value of knowledge investment is realized when individuals apply competencies in productive settings (Becker, 1993). Constructivist Learning Theory further suggests that contextualized practice is essential for knowledge integration and skill development because learners must interpret information and solve problems in real-world situations (Billett, 2011). In higher vocational contexts, EP provides the authentic environment in which students consolidate disciplinary knowledge, adapt to organizational processes, and observe professional behaviors, thereby shaping their employability perceptions (Billett, 2011).

EP enables students to transform disciplinary and industry knowledge into applied competence by exposing them to authentic tasks, work routines, and performance expectations. Engagement in real workplace activities supports knowledge transfer, problem solving, and situated learning, which enhance students' sense of capability and effectiveness (Billett, 2011). Studies show that students who apply disciplinary knowledge in practice develop higher professional adaptability, increased cognitive flexibility, and stronger beliefs in their career potential (Tomlinson,

2017). These outcomes reinforce SPE by demonstrating that academic knowledge is valuable, actionable, and relevant to organizational performance.

EP also facilitates the conversion of knowledge into professional skills and performance outcomes, which strengthens employability beliefs. Students who apply theoretical concepts in professional settings experience accelerated skill acquisition, improved task performance, and enhanced decision-making abilities (Clarke, 2018). For example, students in engineering, business, and marketing programs report significant growth in technical competence and professional judgment when participating in industry projects that require them to implement discipline-specific knowledge (Billett, 2011). These performance improvements contribute to perceived employability by increasing confidence in one's ability to meet workplace demands and compete in labor markets.

Beyond skill development, EP contributes to SPE by enabling students to build industry awareness and professional networks. Interaction with professionals, access to organizational information, and exposure to industry practices enhance students' understanding of labor-market expectations and career pathways (Clarke, 2018). Social capital acquired during practice provides informational, reputational, and emotional resources that promote career optimism and employment confidence (Billett, 2011). In this sense, EP strengthens SPE not only by improving functional competence but also by shaping students' strategic positioning within labor markets.

Additionally, feedback and reflective processes during EP support the development of employability perception. Workplace feedback from supervisors and peers enables students to evaluate performance, identify developmental needs, and recognize strengths, thereby increasing perceived competence and agency (Boud & Molloy, 2013). Positive evaluations function as social persuasion, which Social Cognitive Career Theory identifies as a key driver of self-efficacy and career attitudes (Lent et al., 1994). These mechanisms contribute to SPE by fostering adaptive self-beliefs and future-oriented career expectations (Arranz et al., 2022).

Recent empirical research underscores the mediating role of EP in linking academic learning to employability outcomes. Studies across Europe, Asia, and Australia show that students who participate in work-integrated learning programs display higher perceived employability, and such effects are largely mediated by experiential learning, skills application, and workplace socialization (Billett, 2011). These findings highlight that academic knowledge influences employability not directly but via the experiential processes embedded in EP.

Synthesizing these findings, EP acts as a causal bridge that translates disciplinary and industry knowledge into employability perceptions by facilitating skill application, performance validation, industry integration, and reflective growth. Without practice-based experiences, students lack opportunities to verify competence, build confidence, and project themselves into future professional roles.

Based on this reasoning, the following hypothesis is proposed:

H7: Enterprise practice experience mediates the relationship between disciplinary and industry knowledge and students' perception of employability.

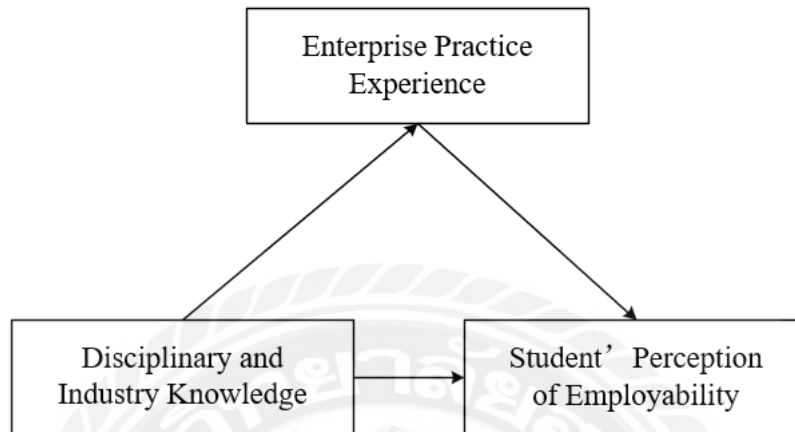


Figure 2.1 Mediating Role of EP in the Influence of DK on SPE

2.3.8 The Mediating Role of EP in the Influence of PS on SPE

Practical and problem-solving skills represent students' capacity to apply theoretical knowledge to real-world situations, identify problems, and devise effective solutions. While disciplinary and industry knowledge provides the cognitive foundation for such abilities, practical competence is developed and consolidated primarily through enterprise practice experience (EP). EP therefore functions as a core mechanism through which theoretical knowledge is transformed into actionable skills that contribute to students' perception of employability (SPE).

Contemporary employability research emphasizes that theoretical knowledge alone does not ensure successful transition to the workplace; instead, students must demonstrate the ability to operationalize knowledge within dynamic and uncertain settings (Clarke, 2018). Enterprise practice offers authentic contexts in which students confront complex tasks, collaborate with others, and exercise judgement under constraints, thereby developing adaptive problem-solving strategies and applied professional competence (Billett, 2011).

From a constructivist perspective, knowledge is meaningfully acquired when applied in real contexts and negotiated socially (Billett, 2011). Accordingly, during EP, students test theoretical assumptions, modify cognitive frameworks, and internalize professional routines, which enhances both competence and confidence (Billett, 2011). Students with strong practical and problem-solving skills often respond more effectively to workplace challenges, experience higher levels of task success, and receive more positive evaluations from supervisors, all of which contribute to strengthened perceptions of employability (Billett, 2011).

EP also mediates the relationship between practical skills and SPE by accelerating skill development and professional identity formation. Applied learning activities such as internships, industry projects, and simulations provide opportunities for students to refine technical competence, leadership, and collaborative problem-solving (Arranz et al., 2022). Evidence shows that students who actively practice problem solving in professional environments report stronger professional self-efficacy, greater market confidence, and clearer career aspirations (Tomlinson, 2017). These psychological gains are central to SPE because employability is not only determined by capability but also by belief in one's capability.

Another mechanism linking problem-solving skills to SPE through EP is feedback and iterative learning. Workplace environments typically provide continuous performance feedback, which supports adaptive learning and skill refinement. High-quality feedback enhances students' perceived competence, emotional resilience, and ability to regulate learning processes (Boud & Molloy, 2013). As students refine problem-solving strategies through practice and feedback, they develop stronger perceptions of competence and professional readiness, which translate to higher employability beliefs (Arranz et al., 2022).

Furthermore, EP facilitates the development of social capital, which strengthens the effect of problem-solving skills on employability. Students who demonstrate strong problem-solving capacity tend to receive more mentoring support, networking opportunities, and access to career resources in workplace settings (Billett, 2011). Participation in professional networks not only enhances students' learning but also fosters a sense of legitimacy and belonging within an occupational community, which positively influences SPE (Clarke, 2018).

Recent research consistently supports this mediating mechanism. For instance, longitudinal studies show that students with high practical and problem-solving skills benefit more from work-integrated learning experiences and exhibit greater gains in perceived employability over time, suggesting that EP converts skill potential into employability outcomes (Billett, 2011). Likewise, employers report that students capable of solving authentic workplace problems are more likely to be retained, recommended, or offered employment, reinforcing self-belief and labor-market confidence (Arranz et al., 2022).

Synthesizing these findings, practical and problem-solving skills influence SPE not directly but primarily through experiential mechanisms embedded in enterprise practice. EP provides a structured environment for skill application, feedback, network building, and identity formation, which collectively enhance employability perceptions.

Based on this reasoning, the following hypothesis is proposed:

H8: Enterprise practice experience mediates the relationship between practical and problem-solving skills and students' perception of employability.

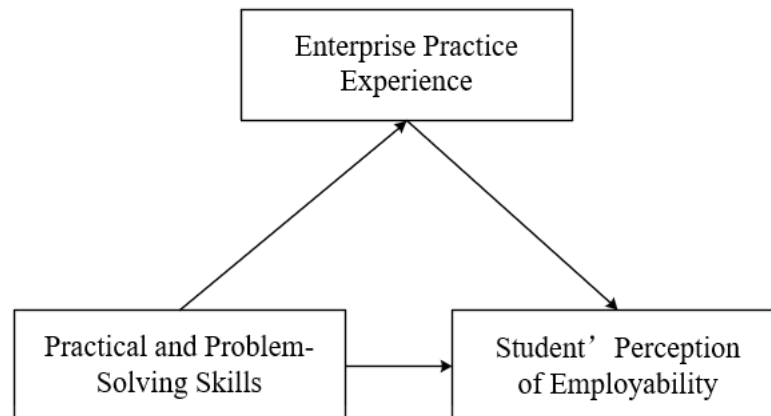


Figure 2.2 Mediating Role of EP in the Influence of PS on SPE

2.3.9 The Mediating Role of EP in the Influence of PA on SPE

Professionalism and work attitude reflect students' behavioral readiness for participation in organizational environments, encompassing attributes such as responsibility, ethical conduct, adaptability, commitment, and teamwork. While disciplinary and industry knowledge provide cognitive resources, professionalism and work attitude determine how individuals enact those resources in workplace settings. Contemporary research indicates that professionalism and positive work attitudes are strongly associated with employability outcomes, not only because they enable effective performance but also because they shape how students perceive their own labor-market value (Clarke, 2018).

Disciplinary and industry knowledge serve as antecedents to professionalism because knowledge acquisition influences students' confidence, performance capabilities, and professional identity development. Studies show that students with stronger academic and industry knowledge exhibit higher levels of professional self-efficacy, proactive behavior, and willingness to learn, which support the development of professionalism and adaptive work attitudes (Tomlinson, 2017). This suggests that knowledge may impact employability not directly but through behavioral dispositions that determine how individuals engage with work tasks and organizational contexts.

Professionalism and work attitude influence students' perceived employability by shaping how they navigate challenges, interact with others, and regulate performance. Students with strong professionalism demonstrate greater responsibility, collaborative capability, and ethical sensitivity, which predicts positive workplace adjustment and evaluation (Billett, 2011). Positive work attitude, in turn, enhances engagement, resilience, and career optimism, which increase perceived employability and influence job-search behavior (Billett, 2011). Employers consistently cite professionalism and attitude as critical indicators of future performance, often above technical skills (Boud & Molloy, 2013).

However, professionalism and work attitude are not developed in isolation; rather, they are reinforced, tested, and expressed in practice contexts. Enterprise practice experience (EP) provides the situated environment where these attributes are enacted, evaluated, and transformed into professional capital. During EP, students must collaborate with colleagues, manage workloads, and respond to feedback, all of which require professional conduct and adaptive responses (Billett, 2011). These experiences strengthen professional identity and self-beliefs by demonstrating capability in authentic settings.

EP mediates the relationship between professionalism and perception of employability through multiple mechanisms. First, professional conduct is validated through organizational feedback, which enhances perceived competence and confidence (Boud & Molloy, 2013). Second, positive work attitudes facilitate richer engagement in workplace activities, leading to learning gains and recognition that reinforce employability beliefs (Billett, 2011). Third, workplace interactions allow students to expand social capital, which supports career opportunities and enhances social legitimacy (Clarke, 2018). In this way, EP operates as a platform that transforms professional dispositions into employability perceptions.

Recent empirical research supports this mediating structure. Studies across Europe, China, and Southeast Asia show that professionalism predicts perceived employability largely through experiences of successful performance, feedback, and professional socialization in work environments (Billett, 2011). Students who demonstrate professionalism during internships report higher levels of confidence, perceived labor-market competitiveness, and career clarity, partly because they receive stronger organizational support and mentorship (Billett, 2011).

Similarly, positive work attitude predicts employability outcomes through enhanced engagement in work-integrated learning, proactive coping behaviors, and workplace recognition (Billett, 2011). Students who respond constructively to challenges and feedback are more likely to perceive themselves as capable, employable, and prepared for the demands of professional life.

Synthesizing this evidence, professionalism and work attitude influence SPE not merely through cognitive mechanisms but through experiential processes embedded in EP. EP serves as the context in which professional dispositions are enacted, consolidated, and validated, enabling their translation into employability perceptions.

Based on this theoretical reasoning and empirical evidence, the following hypothesis is proposed:

H9: Enterprise practice experience mediates the relationship between professionalism and work attitude and students' perception of employability.

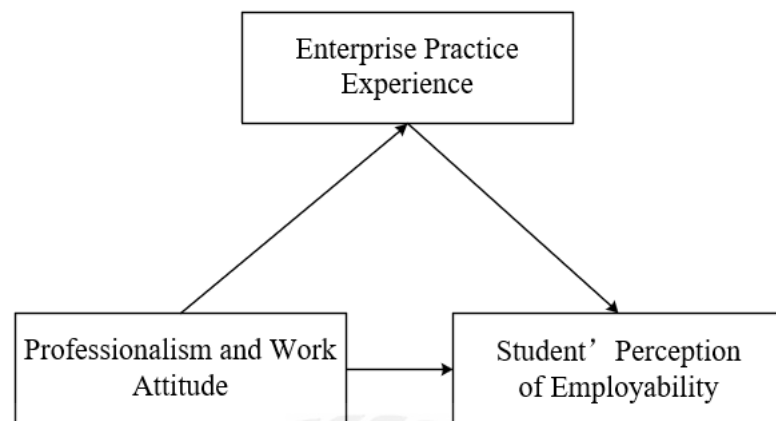


Figure 2.3 Mediating Role of EP in the Influence of PA on SPE

2.3.10 The Mediating Role of EP in the Influence of TK on SPE

Disciplinary and industry knowledge provide students with foundational cognitive resources for entering the labor market, but the development of employability perceptions depends significantly on how effectively students are supported in acquiring, applying, and reflecting on this knowledge. Teacher guidance and feedback constitute a critical enabling mechanism in this process because they facilitate learning, enhance performance, and shape students' beliefs about their professional capabilities. Recent research highlights that effective teacher support influences students' confidence, identity development, and career readiness, which subsequently contribute to perceived employability (Billett, 2011).

Teacher guidance supports employability development by helping students contextualize academic knowledge and understand its relevance to real-world professional tasks. Through instruction, coaching, and career advice, teachers strengthen students' capacity to interpret disciplinary and industry knowledge, anticipate workplace expectations, and engage in career planning (Tomlinson, 2017). This cognitive scaffolding enhances students' readiness for practice and fosters more positive attitudes toward future career pathways (Billett, 2011).

Feedback functions as a complementary mechanism that enhances competence perceptions, motivates improvement, and supports self-regulation. High-quality feedback clarifies performance expectations, identifies strengths and weaknesses, and encourages adaptive strategies for skill development. Empirical studies demonstrate that feedback perceived as constructive, supportive, and dialogic increases student motivation, academic persistence, and professional self-efficacy (Hattie & Timperley, 2007). Increased self-efficacy, in turn, predicts stronger perceived employability, because individuals who believe in their capabilities are more confident in pursuing career opportunities and managing professional challenges (Lent et al., 1994).

Teacher guidance and feedback influence students' perception of employability indirectly through enterprise practice experience (EP). As students enter professional environments, they must interpret task demands, apply knowledge, and navigate workplace dynamics; teacher support prior to and during practice enhances their ability to engage productively in these processes (Billett, 2011). Students who receive career-oriented preparation, performance coaching, and reflective feedback demonstrate stronger learning engagement, adaptive performance, and professional confidence in EP (Billett, 2011). These experiential gains facilitate the translation of academic knowledge into employability resources.

EP mediates the relationship between teacher support and SPE through several mechanisms. First, teacher support enhances students' readiness to apply knowledge, resulting in more effective performance, skill consolidation, and positive workplace evaluation (Billett, 2011). Second, feedback fosters reflective capacity, which enables students to learn from experience, revise ineffective strategies, and strengthen competence beliefs (Boud & Molloy, 2013). Third, teacher-facilitated reflection supports identity formation, helping students internalize professional roles and envision themselves as employable (Arranz et al., 2022).

Studies confirm that teacher guidance predicts employability outcomes most strongly when mediated through experiential learning contexts rather than through academic performance alone (Billett, 2011). Students who experience both strong teacher support and structured workplace engagement report higher levels of perceived competence, career optimism, and employment readiness than students who only receive academic support (Billett, 2011). These findings align with theoretical frameworks emphasizing that learning must be contextualized to generate meaningful changes in competence and perception.

Accordingly, EP functions as the causal mechanism that consolidates knowledge, skills, attitudes, and teacher support into employability perceptions. Human Capital Theory explains that educational investments yield outcomes when applied in productive contexts; Constructivist Learning Theory highlights the centrality of authentic practice in learning; and Social Cognitive Career Theory emphasizes that self-efficacy and expectations are shaped through mastery experiences (Becker, 1993). Together, these perspectives clarify why teacher guidance influences employability most effectively through experiential pathways.

Based on this reasoning, the following hypothesis is proposed:

H10: Enterprise practice experience mediates the relationship between teacher guidance and feedback and students' perception of employability.

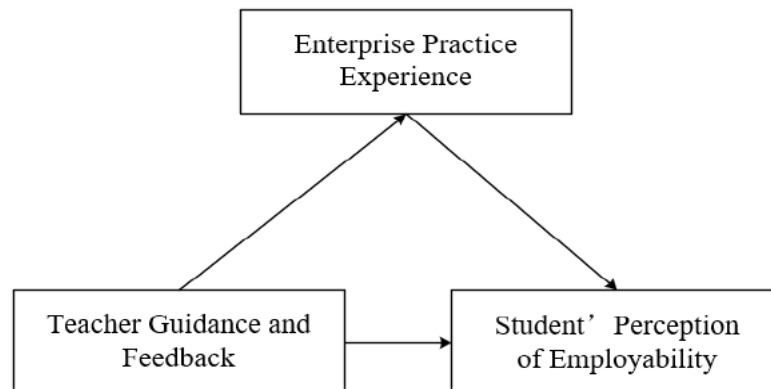


Figure 2.4 Mediating Role of EP in the Influence of TK on SPE

2.3.11 The Moderating Role of LE in the Impact of EP on SPE

Learning engagement (LE) refers to the behavioral, cognitive, and emotional investment students make in learning activities (Fredricks et al., 2004). It is commonly conceptualized as comprising three interrelated dimensions: behavioral engagement (effort, participation, persistence), cognitive engagement (deep learning strategies, self-regulation), and emotional engagement (interest, enjoyment, and sense of belonging). Contemporary literature suggests that LE is foundational to students' academic success, professional development, and psychological well-being (Fredricks et al., 2004).

Drawing from Self-Determination Theory (SDT), LE is driven by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). Students who experience autonomy in task choices, perceive competence in performance, and feel socially connected tend to exhibit higher levels of motivation and engagement (Fredricks et al., 2004). In work-integrated learning contexts such as enterprise practice experience (EP), the fulfillment of these needs is especially critical because students must navigate novel challenges, social dynamics, and performance expectations (Fredricks et al., 2004).

LE is theorized to moderate the relationship between EP and students' perception of employability (SPE). EP provides opportunities for students to apply knowledge, develop professional competencies, and receive workplace feedback; however, the extent to which students benefit from these experiences depends heavily on their level of engagement. Students with high engagement are more likely to seek feedback, reflect on performance, and actively explore career-relevant tasks, thereby maximizing the developmental impact of EP (Billett, 2011). In contrast, low engagement may limit learning gains, reduce motivation, and weaken the influence of EP on SPE.

Behavioral engagement influences how deeply students participate in workplace activities and how persistently they address challenges. Research indicates that students who demonstrate sustained behavioral engagement during internships achieve greater skills development, stronger performance outcomes, and higher perceived employability (Billett, 2011). Cognitive engagement shapes how students process new information and transfer learning across contexts. Those who utilize deep learning strategies and self-regulation mechanisms are more effective at integrating workplace experiences into their professional schemas (Fredricks et al., 2004). Emotional engagement supports resilience, motivation, and social integration; students who experience enjoyment and belonging in workplace settings are more likely to form positive professional identities and optimistic employability beliefs (Billett, 2011).

Recent empirical studies support the moderating role of LE in experiential learning contexts. Students with higher engagement derive greater benefits from internships and cooperative learning programs, reporting enhanced professional skills, career clarity, and employability confidence (Billett, 2011). In contrast, students with lower engagement, despite similar access to EP, may underutilize learning opportunities, fail to build professional networks, and develop weaker competence beliefs (Billett, 2011). These findings highlight that EP does not uniformly influence SPE; rather, its impact is contingent on students' motivational and emotional investment.

In addition to enhancing learning outcomes, LE influences the emotional interpretation of practice experiences, shaping how students construct meaning and appraise their future prospects. Students with higher engagement experience a stronger sense of accomplishment, professional identity, and efficacy, which positively influences employability perception (Billett, 2011). Moreover, engagement amplifies the psychological benefits of positive workplace interactions, including mentorship and feedback, which further strengthen students' confidence in career readiness (Fredricks et al., 2004).

Taken together, LE functions as a psychological amplifier that enhances the developmental value of EP. When students are actively, cognitively, and emotionally engaged, EP contributes more effectively to competence acquisition, identity formation, and confidence building, thereby strengthening perceived employability. Conversely, when engagement is low, students may fail to extract developmental value from practice experiences, resulting in weaker employability perceptions.

Based on this reasoning, this study proposes the following hypothesis:

H6: Learning engagement positively moderates the relationship between enterprise practice experience and students' perception of employability, such that the relationship is stronger when learning engagement is high.

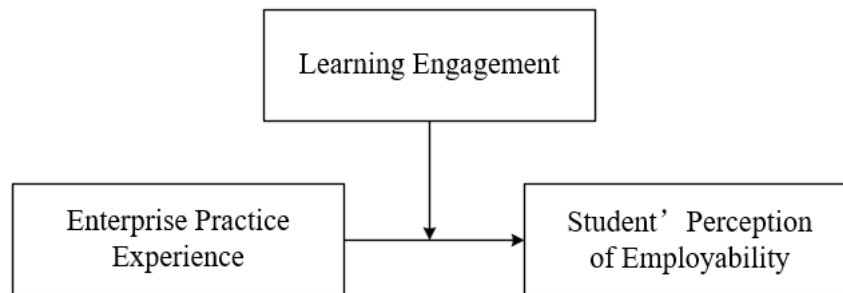


Figure 2.5 Moderating Role of LE in the Impact of EP on SPE

This section examines the theoretical mechanisms through which university-related factors shape students' perception of employability (SPE), emphasizing the central role of enterprise practice experience (EP) in transforming educational inputs into employability outcomes. Drawing from contemporary employability research, human capital theory, constructivist learning theory, and social cognitive career theory, the analysis demonstrated that the determinants of SPE are not static resources but dynamic developmental processes embedded within authentic learning environments.

First, disciplinary and industry knowledge provide students with foundational cognitive resources that facilitate understanding of workplace tasks, alignment with industry expectations, and adaptation to labor market demands. However, such knowledge becomes meaningful only when applied in situated contexts where students can transform conceptual understanding into professional capability.

Second, practical and problem-solving skills are identified as critical functional competencies that enable students to cope with uncertainty, manage complexity, and generate adaptive solutions. These skills are not fully developed through theoretical instruction alone but are strengthened through iterative application, feedback, and reflection in workplace settings.

Third, professionalism and work attitude represent core behavioral dispositions that influence students' workplace adjustment, collaborative performance, and career efficacy. These attributes are shaped by educational experiences and enacted in enterprise practice, through which students internalize professional norms and construct self-beliefs regarding their labor-market value.

Fourth, teacher guidance and feedback operate as enabling mechanisms that support learning, stimulate motivation, and bridge academic knowledge with workplace application. Effective teacher support enhances students' readiness for practice, facilitates reflective learning, and contributes to the formation of professional identity.

Across these antecedent variables, EP emerges as a pivotal mediating mechanism that consolidates knowledge, skills, attitudes, and support into employability perceptions. EP enables students to test theoretical assumptions, acquire practical competencies, develop social capital, and validate self-efficacy through mastery experiences and external feedback. Accordingly, this section conceptualizes EP as the primary pathway through which university factors exert direct and indirect effects on SPE.

Finally, learning engagement (LE) is proposed as a key moderating factor that amplifies or attenuates the developmental benefits of EP. Evidence suggests that when students exhibit high levels of behavioral, cognitive, and emotional engagement, they acquire deeper learning gains, stronger identity formation, and greater employability confidence from practice experiences. Conversely, low engagement diminishes the transformative potential of EP.

In summary, the conceptual framework developed in this section posits that university inputs—disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback—provide the human capital foundation for employability development. EP mediates these relationships by enabling the conversion of educational resources into competence, identity, and confidence, while LE moderates the strength of this conversion. This multi-layered mechanism provides the theoretical basis for the hypotheses proposed and forms the foundation for the empirical model to be tested in Chapter 3.

2.4 Theoretical Framework

The development of students' perception of employability (SPE) is a complex, developmental, and context-dependent process shaped by the interaction of educational experiences, psychological factors, and real-world professional engagement. Rather than treating employability as a static possession of human capital, this study views employability as the capacity to mobilize knowledge, skills, and dispositions in response to labor-market demands, accompanied by beliefs about personal capability and readiness for employment.

To explain how employability is formed within university–enterprise cooperation, this study integrates four influential theoretical traditions—Human Capital Theory (HCT), Constructivist Learning Theory (CLT), Self-Determination Theory (SDT), and Social Cognitive Career Theory (SCCT). Collectively, these theories provide a multi-layered, process-oriented explanation of how educational inputs are transformed into psychological outcomes through experiential and motivational mechanisms.

Human Capital Theory: University Factors as Foundational Inputs

Human Capital Theory (Becker, 1964) posits that investments in education, training, and experience increase individuals' productivity, adaptability, and long-term economic outcomes. In higher vocational education, four university-related factors constitute key forms of human capital:

Disciplinary and Industry Knowledge (DK) provides factual knowledge and conceptual understanding of professional domains and industry operations.

Practical and Problem-solving Skills (PS) enable students to perform tasks, resolve challenges, and adapt to uncertainty.

Professionalism and Work Attitude (PA) support ethical conduct, responsibility, and collaborative effectiveness.

Teacher Guidance and Feedback (TK) facilitate skill acquisition, career preparation, and performance improvement.

These resources collectively shape students' readiness for professional roles. However, HCT primarily explains the accumulation of human capital and not the conditions under which it is activated, utilized, or perceived as employability. This limitation necessitates examination of a mediating context.

Constructivist Learning Theory: Enterprise Practice Experience as the Mediating Context

Constructivist Learning Theory (Vygotsky, 1978) argues that learning is constructed through interaction with meaningful environments, social collaboration, and real-world application. In this framework, Enterprise Practice Experience (EP) is the central mediating mechanism through which university-based resources are converted into employability outcomes.

EP provides students with authentic opportunities to apply theoretical knowledge to real tasks, develop practical and problem-solving competencies, enact professional roles and workplace norms, receive feedback to support self-regulation, build social networks and industry relationships.

These situated experiences enable students to activate and transform educational inputs, developing competence, confidence, and career identity. Thus, EP serves as the bridge between educational preparation and employability-related perceptions.

Social Cognitive Career Theory: Employability as a Psychological Outcome

While employability can be assessed objectively, this study focuses on students' perception of employability, defined as beliefs about capability, competitiveness, and career readiness. Social Cognitive Career Theory (Lent et al., 1994) highlights the centrality of: self-efficacy, outcome expectations, and goal orientation in shaping career behavior and psychological outcomes.

EP contributes to these psychological mechanisms by providing:

mastery experiences, social persuasion, performance feedback, and role modeling.

Thus, SPE is shaped not only by what students know, but by what they believe they can do in professional contexts based on experiential evidence.

Self-Determination Theory: Learning Engagement as a Motivational Driver and Boundary Condition

Learning does not occur uniformly across individuals; it is influenced by motivation and engagement. Self-Determination Theory (Deci & Ryan, 1985) proposes that autonomy, competence, and relatedness fuel intrinsic motivation and sustained engagement.

Within this framework, Learning Engagement (LE) is conceptualized as a motivational resource that shapes the degree to which students benefit from EP. LE comprises:

Behavioral engagement (effort, persistence, participation), cognitive engagement (self-regulation, deep strategies), emotional engagement (interest, enjoyment, belonging).

Students with high engagement are more likely to:

immerse themselves in tasks, seek and utilize feedback, engage in reflective learning,

build meaningful relationships, translate experiences into confidence and competence.

Thus, LE serves as a boundary condition moderating the strength of the EP–SPE relationship. When engagement is high, EP yields deeper learning and stronger employability perceptions; when engagement is low, outcomes are weaker even in rich experiential environments.

Integrated Framework: A Multi-layered Process of Employability Formation

Synthesizing these theoretical perspectives, the framework proposes a sequential and interactive process:

University factors provide cognitive, technical, behavioral, and relational resources.

These inputs are activated and transformed through enterprise practice experience.

EP enables students to build competence, confidence, industry awareness, and career identity.

Learning engagement amplifies (or attenuates) the developmental benefits of EP.

As a result, students develop positive perceptions of employability grounded in self-efficacy and outcome expectations.

This model captures the interplay between:

educational inputs (human capital), experiential contexts (situated learning), motivational processes (self-determination), and psychological outcomes (self-efficacy).

Implications for the Hypothetical Model

This theoretical framework supports the structural model and hypotheses outlined in Section 2.6 by explaining:

How university education contributes to employability (via EP).

Why experiential learning matters (it transforms inputs into outcomes).

Under what conditions learning is most effective (moderated by LE).

Accordingly, the model predicts that:

University factors (DK, PS, PA, TK) positively influence SPE, both directly and indirectly through EP.

EP has a direct positive effect on SPE.

LE moderates the EP→SPE relationship, strengthening effects under high engagement.

EP mediates the effects of university factors on SPE.

This integrated framework positions employability development as a dynamic process driven by educational investment, contextualized practice, and psychological engagement, rather than as a static trait. It provides a robust conceptual foundation for the empirical investigation presented in Chapter 3.

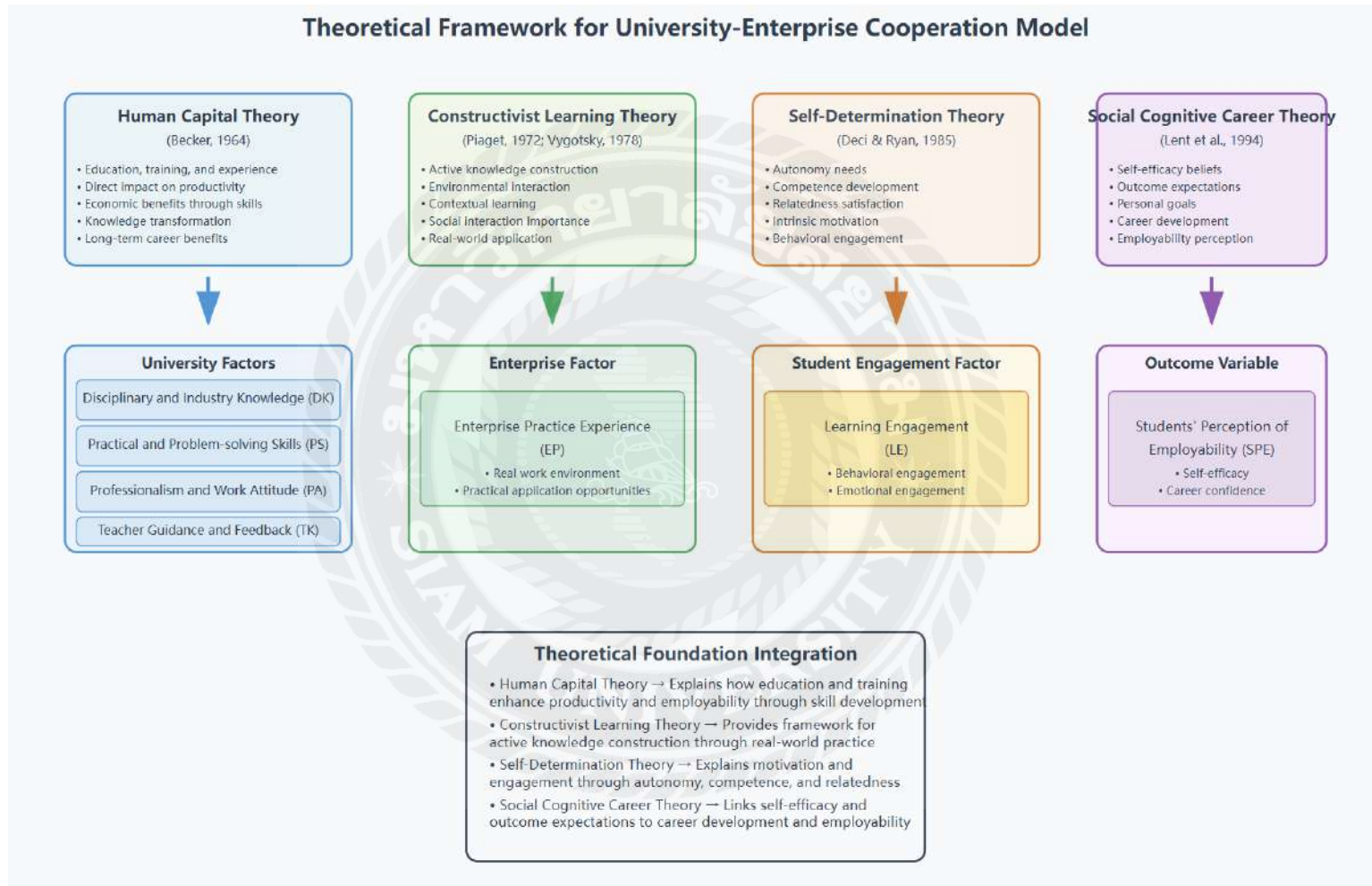


Figure 2.6 Theoretical Framework

2.5 Conceptual Framework

Building upon the theoretical foundations and variable relationships reviewed in the previous sections, this study proposes a conceptual model that integrates university factors, enterprise practice experience (EP), learning engagement (LE), and students' perception of employability (SPE).

In this model, university factors—disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback—are treated as antecedent conditions. Consistent with Human Capital Theory, these factors represent investments that prepare students for effective participation in practice.

Enterprise practice experience (EP) functions as the central mediating variable. Drawing from Constructivist Learning Theory, EP provides the authentic environment in which students apply, test, and expand their university-acquired knowledge and skills. It is within these situated learning contexts that theoretical inputs are transformed into practical competencies and employability outcomes.

Learning engagement (LE) is positioned as a moderating variable. Based on Self-Determination Theory, LE strengthens or weakens the impact of EP on SPE, depending on the degree to which students are behaviorally, cognitively, and emotionally invested in their learning. High engagement amplifies the benefits of practice, whereas low engagement diminishes them.

Finally, students' perception of employability (SPE) is conceptualized as the outcome variable. Social Cognitive Career Theory explains that employability perceptions are shaped by changes in self-efficacy and outcome expectations, which are influenced by the quality of practice experiences and moderated by students' engagement.

The entire model is based on Human Capital Theory, Constructivist Learning Theory, Self-Determination Theory, and the Social Cognitive Career Theory. Integrating empirical findings from existing research on education and employability, a causal pathway model centered on Enterprise Practice Experience (EP) was constructed. Learning Engagement was used as a moderating variable to explain the differential impact of different levels of learning engagement on practical experience and student perception of employability. Within the framework of human capital theory, disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback were considered key forms of human capital investment in higher education. These factors directly impact students' performance and gains in enterprise practice, namely, EP, by improving their knowledge, skills, and professionalism, as well as the guidance and feedback they receive during practice. According to constructivist learning theory, learning is a process in which individuals interact with their environment and actively construct

meaning. Enterprise practice provides authentic and complex contexts, enabling students to continuously reorganize and deepen their existing knowledge while solving real-world problems, thereby developing transferable skills. In this process, teacher guidance and feedback not only provide scaffolding support but also, through metacognitive inspiration, promote self-reflection and strategic adjustments during practice. Furthermore, self-determination theory suggests that individual learning motivation and behavioral persistence are driven by autonomy, competence, and relatedness. High-quality enterprise practice experiences often enhance students' sense of competence and professional identity, thereby stimulating higher levels of engagement and effort. Learning engagement is introduced here as a moderating variable, hypothesized to mediate the relationship between practical experience and perceived employability. Specifically, when students have high levels of learning engagement, they are more effectively able to transform practical experience into positive perceptions of employability. Conversely, low engagement may lead to a loss of the benefits of experience.

Figure 2.8 illustrates the hypothesized relationships among these variables. University factors serve as the foundation, EP acts as the mediator, LE moderates the strength of the EP–SPE link, and SPE emerges as the final outcome. This model reflects an integrated theoretical rationale: HCT clarifies who benefits from practice, CLT explains how practice facilitates learning, SDT specifies when practice is most effective, and SCCT demonstrates why practice influences perceptions of employability.

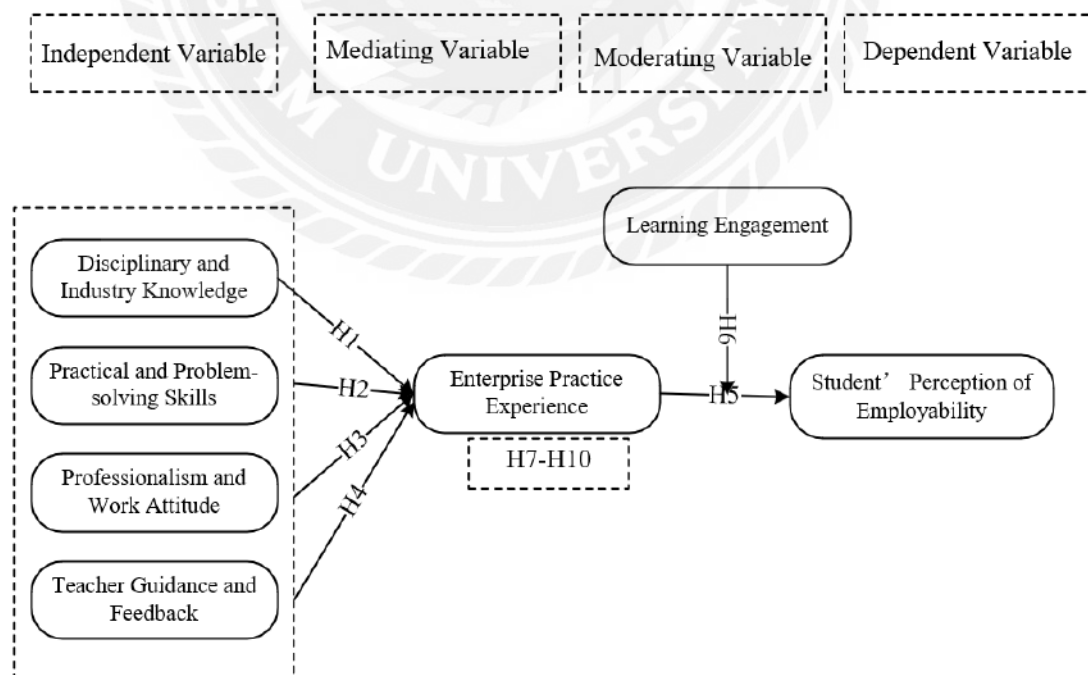


Figure 2.7 Conceptual Framework

2.6 Hypotheses

2.6.1 University Factors and Employability Perceptions

According to Human Capital Theory, university-related factors are essential investments that enhance students' productivity and competitiveness in the labor market (Becker, 1993). Disciplinary and industry knowledge provide the foundational expertise, practical and problem-solving skills enable adaptability, professionalism ensures workplace integration, and teacher guidance bridges classroom learning with practice. These are expected to positively influence SPE.

In employability framework theory, students' employability is influenced by four dimensions: understanding, skills, effectiveness beliefs, and metacognition. The four antecedent variables in this model correspond precisely to these dimensions and are integrated and transformed through enterprise practice experience. During model construction, research hypotheses were proposed based on the theory: H1-H4 hypothesize that each of the four antecedent variables positively impacts enterprise practice experience; H5 hypothesizes that enterprise practice experience positively impacts student perception of employability; and H6 hypothesizes that learning engagement significantly and positively moderates the relationship between enterprise practice experience and student perception of employability. This research model not only integrates the perspectives of pedagogy and management in theory, and reveals the interactive mechanism between corporate practical experience and learning input on the perception of employability, but also provides a valuable reference for colleges and universities to formulate practical teaching strategies and improve students' learning input and professional competitiveness.

H1: Disciplinary and industry knowledge has a significant positive effect on students' perception of employability.

H2: Practical and problem-solving skills has a significant positive effect on students' perception of employability.

H3: Professionalism and work attitude has a significant positive effect on students' perception of employability.

H4: Teacher guidance and feedback has a significant positive effect on students' perception of employability.

2.6.2 Enterprise Practice Experience and Employability Perceptions

Constructivist Learning Theory emphasizes that learning is consolidated in authentic, situated contexts (Billett, 2011). EP provides such contexts, enabling students to apply knowledge and refine skills. Social Cognitive Career Theory further suggests that mastery experiences and social persuasion gained through practice enhance self-efficacy and outcome expectations (Lent et al., 1994). Thus, EP is expected to have a direct impact on SPE.

H5: Enterprise practice experience positively influences students' perception of employability.

2.6.3 Moderating Role of Learning Engagement

Self-Determination Theory emphasizes that autonomy, competence, and relatedness foster intrinsic motivation and sustained engagement (Ryan & Deci, 2000). Students with higher engagement levels are more likely to maximize the benefits of EP by investing effort, reflecting critically, and interacting productively with mentors and peers. Thus, LE is expected to strengthen the EP–SPE relationship.

H6: Learning engagement positively moderates the relationship between enterprise practice experience and students' perception of employability, such that the relationship is stronger when learning engagement is high.

2.6.4 Mediating Role of Enterprise Practice Experience

While university factors provide students with human capital, their effects are most effectively realized through enterprise practice. CLT highlights that learning is situated in real-world contexts, while HCT suggests that educational investments are validated in practice. Therefore, EP is hypothesized to mediate the relationships between university factors and SPE.

H7: Enterprise practice experience mediates the relationship between disciplinary and industry knowledge and students' perception of employability.

H8: Enterprise practice experience mediates the relationship between practical and problem-solving skills and students' perception of employability.

H9: Enterprise practice experience mediates the relationship between professionalism and work attitude and students' perception of employability.

H10: Enterprise practice experience mediates the relationship between teacher guidance and feedback and students' perception of employability.

The hypotheses collectively establish a multi-layered framework. University factors (H1–H4) contribute to SPE both directly and indirectly. LE moderates the strength of the EP–SPE relationship (H5), EP exerts a direct effect (H6) and mediates the influence of university factors (H7–H10).

Summary

This chapter reviews the theoretical foundations, key variables, and the proposed conceptual model of the study. Four theoretical perspectives—Human Capital Theory, Constructivist Learning Theory, Self-Determination Theory, and Social Cognitive Career Theory—are introduced to explain the mechanisms underlying the development of students' employability. Collectively, these theories provide complementary lenses: HCT highlights the role of university factors as human capital investments, CLT emphasizes the importance of situated practice for knowledge transformation, SDT

clarifies the motivational conditions under which learning engagement amplifies outcomes, and SCCT explains how practice experiences shape employability perceptions through self-efficacy and outcome expectations.

The review of variables further demonstrates that university factors (disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback) constitute critical antecedents of employability development. Their influence is primarily realized through enterprise practice experience (EP), which functions as the mediating mechanism. Learning engagement (LE) was identified as a moderator that intensifies or weakens the effect of EP on students' perception of employability (SPE).

The conceptual model proposed at the end of this chapter integrates these variables and theoretical perspectives into a coherent framework. This model establishes a clear causal chain: university factors→EP→SPE, with LE moderating the EP–SPE relationship. It also highlights the multi-dimensional nature of employability, shaped by educational, experiential, and psychological factors.

By clarifying these relationships, the chapter provides the foundation for the empirical investigation presented in the following chapter. Chapter 3 outlines the research design, including the hypotheses derived from the conceptual model, the methodological approach, data collection procedures, and analytical strategies employed to test the proposed relationships.

CHAPTER 3

RESEARCH METHODOLOGY

This study adopted a quantitative research design to develop and validate a model of University – Enterprise Cooperation (UEC) aimed at enhancing students' perception of employability (SPE) among vocational college students in Shandong Province. Grounded in Human Capital Theory, Constructivist Learning Theory, Self-Determination Theory, and Social Cognitive Career Theory, the study quantitatively examined key factors influencing SPE and tested the hypothesized structural relationships among them. Data were collected through a stratified random sampling approach from students in selected private vocational institutions. The analyses included descriptive statistics, reliability and validity testing, structural equation modeling (SEM), and mediation and moderation testing to evaluate the proposed model. To ensure measurement quality, Cronbach's alpha was used to assess internal consistency, and factor-based validation procedures were applied to support construct validity. Overall, this methodological approach enabled a rigorous examination of how UEC contributes to strengthening students' confidence, competence, and perceived readiness for the labor market.

3.1 Research Design

This study adopted a quantitative research design to examine a model for enhancing students' perception of employability through University–Enterprise Cooperation (UEC) in Shandong Province. Quantitative methods were considered appropriate because they enable the systematic testing of hypothesized relationships among multiple latent variables and provide objective evidence to support model validation. Data were analyzed using SPSS 26.0 and AMOS 23.0 to test the proposed hypotheses and to examine the validity of the structural model.

The participants were students enrolled in higher vocational colleges in Shandong Province. A total of seven key variables were incorporated into the research framework: Disciplinary and Industry Knowledge (DK), Practical and Problem-Solving Skills (PS), Professionalism and Work Attitude (PA), Teacher Guidance and Feedback (TK), Enterprise Practice Experience (EP), Learning Engagement (LE), and Students' Perception of Employability (SPE). These variables were selected based on relevant theoretical foundations and prior empirical studies related to employability development and university–enterprise collaboration.

Data were collected using a structured questionnaire comprising 34 measurement items, all of which were assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Specifically, the constructs of DK, PS, PA, TK, EP, and SPE each contained five items, while Learning Engagement (LE) consisted of

four items, resulting in a total of 34 items. This item distribution ensured adequate coverage of each construct while maintaining respondent manageability.

Structural Equation Modeling (SEM) was employed as the primary analytical technique in this quantitative design. SEM was suitable for the present study because it allows for the simultaneous estimation of relationships among multiple latent variables and supports the testing of direct effects, mediating effects, and moderating effects within a single integrated framework. Moreover, SEM accounts for measurement error through the separation of measurement and structural models, thereby enhancing the reliability, validity, and interpretability of the empirical results.

3.2 Population

3.2.1 Research Population

As of 2024, 24 private vocational institutions in Shandong Province were identified for the population framework of this study. These institutions were distributed across multiple cities and represented diverse institutional characteristics, academic disciplines, and enrollment scales. The research population consisted of students enrolled in these private vocational institutions.

To ensure the representativeness of the sample and to reflect regional and institutional diversity, five private vocational colleges were selected from the total population using a stratified sampling approach. The selected institutions were Shandong Engineering Vocational and Technical University, Rizhao Maritime Engineering Vocational College, Weifang Environmental Engineering Vocational and Technical College, Shandong Cultural Industry Vocational College, and Dezhou Science and Technology Vocational College. These institutions were chosen to cover different geographic locations within the province as well as varying institutional orientations and program focuses.

3.2.1.1 Identification of the Research Subjects

The research population was defined as full-time students enrolled in private higher vocational colleges in Shandong Province. Given the wide distribution and heterogeneous characteristics of the 24 private vocational colleges, stratification was applied at the institutional level to ensure that the selected sample adequately represented the broader population in terms of geographic distribution, institutional scale, and disciplinary structure. This approach provided a solid foundation for subsequent sampling procedures and enhanced the generalizability of the study findings.

Table 3.1 List of Colleges and Universities

No	School	City	Level
1	Qufu Far East Vocational and Technical College	Jining	Junior College
2	Dezhou Science and Technology Vocational College	Dezhou	Junior College
3	Shandong Liming Science and Technology Vocational College	Taian	Junior College
4	Shandong Shenghan Finance and Trade Vocational College	Jinan	Junior College
5	Qingdao Flying Vocational and Technical College	Qingdao	Junior College
6	Dongying Science and Technology Vocational College	Dongying	Junior College
7	Qingdao Qianshi Vocational and Technical College	Qingdao	Junior College
8	Weifang Business Vocational College	Weifang	Junior College
9	Shandong Xilin Science and Technology Vocational College	Jinan	Junior College
10	Shandong Cultural Industry Vocational College	Qingdao	Junior College
11	Shandong Maritime Vocational College	Weifang	Junior College
12	Shandong Art and Design Vocational College	Jinan	Junior College
13	Yantai Gold Vocational College	Yantai	Junior College
14	Rizhao Marine Engineering Vocational College	Rizhao	Junior College
15	Qingdao Aviation Technology Vocational College	Qingdao	Junior College
16	Weifang Environmental Engineering Vocational College	Weifang	Junior College
17	Binzhou Science and Technology Vocational College	Binzhou	Junior College
18	Weifang Food Science and Technology Vocational College	Weifang	Junior College
19	Yantai Urban Science and Technology Vocational College	Yantai	Junior College
20	Dezhou Engineering Vocational College	Dezhou	Junior College
21	Rizhao Health and Wellness Vocational College	Rizhao	Junior College
22	Shandong Engineering Vocational and Technical University	Jinan	Undergraduate
23	Shandong Foreign Languages Vocational and Technical University	Rizhao	Undergraduate
24	Shandong Foreign Affairs Translation Vocational University	Weihai	Undergraduate

3.2.2 Sample Selection Strategy

Based on the stratification criteria outlined above, the 24 private vocational colleges in Shandong Province were classified as follows:

Table 3.2 Population Classification

No.	School	City	Type of UEC		Educational Level	City	UEC Intensity	School Size and Resource Allocation
			Level	Model		Economic Development Level		
1	Qufu Far East Vocational and Technical College	Jining	Junior College	Internships and Practices	Vocational	Less Developed	Moderate	Small
2	Dezhou Science and Technology Vocational College	Dezhou	Junior College	Internships and Practices	Vocational	Less Developed	Moderate	Small
3	Shandong Liming Science and Technology Vocational College	Taian	Junior College	Collaborative R&D	Vocational	Less Developed	Low	Small
4	Shandong Shenghan Finance and Trade Vocational College	Jinan	Junior College	Targeted Training	Vocational	Developed	High	Medium
5	Qingdao Flying Vocational and Technical College	Qingdao	Junior College	Internships and Practices	Vocational	Developed	High	Medium
6	Dongying Science and Technology Vocational College	Dongying	Junior College	Collaborative R&D	Vocational	Less Developed	Low	Small
7	Qingdao Qianshi Vocational and Technical College	Qingdao	Junior College	Internships and Practices	Vocational	Developed	High	Medium
8	Weifang Business Vocational College	Weifang	Junior College	Targeted Training	Vocational	Less Developed	Moderate	Medium
9	Shandong Xilin Science and Technology Vocational College	Jinan	Junior College	Internships and Practices	Vocational	Developed	Moderate	Medium
10	Shandong Cultural Industry Vocational College	Qingdao	Junior College	Internships and Practices	Vocational	Developed	Moderate	Medium

No.	School	City	Level	Type of UEC Model	Educational Level	City	UEC Intensity	School Size and Resource Allocation
						Economic Development Level		
11	Shandong Maritime Vocational College	Wei fang	Junior College	Collaborative R&D	Vocational	Less Developed	Moderate	Small
12	Shandong Art and Design Vocational College	Jinan	Junior College	Targeted Training	Vocational	Developed	High	Medium
13	Yantai Gold Vocational College	Yantai	Junior College	Internships and Practices	Vocational	Developed	Moderate	Medium
14	Rizhao Marine Engineering Vocational College	Rizhao	Junior College	Targeted Training	Vocational	Less Developed	Moderate	Small
15	Qingdao Aviation Technology Vocational College	Qingdao	Junior College	Collaborative R&D	Vocational	Developed	High	Medium
16	Weifang Environmental Engineering Vocational College	Wei fang	Junior College	Internships and Practices	Vocational	Less Developed	Moderate	Medium
17	Binzhou Science and Technology Vocational College	Bin zhou	Junior College	Collaborative R&D	Vocational	Less Developed	Low	Small
18	Weifang Food Science and Technology Vocational College	Wei fang	Junior College	Internships and Practices	Vocational	Less Developed	Moderate	Medium
19	Yantai Urban Science and Technology Vocational College	Yan tai	Junior College	Targeted Training	Vocational	Developed	Moderate	Small
20	Dezhou Engineering Vocational College	Dezhou	Junior College	Collaborative R&D	Vocational	Less Developed	Low	Small
21	Rizhao Health and Wellness Vocational College	Rizhao	Junior College	Internships and Practices	Vocational	Less Developed	Moderate	Medium

No.	School	City	Level	Type of UEC Model	Educational Level	City Economic Development Level	UEC Intensity	School Size and Resource Allocation
22	Shandong Engineering Vocational and Technical University	Jinan	Undergraduate	Targeted Training	Undergraduate	Developed	High	Medium
23	Shandong Foreign Languages Vocational and Technical University	Rizhao	Undergraduate	Targeted Training	Undergraduate	Less Developed	Moderate	Medium
24	Shandong Foreign Affairs Translation Vocational University	Wei hai	Undergraduate	Internships and Practices	Undergraduate	Developed	Moderate	Medium

The stratification of the sample was conducted based on multiple dimensions related to the implementation context of University - Enterprise Cooperation (UEC) and institutional characteristics. These criteria were operationalized as follows:

Type of UEC Model: Institutions were classified according to their dominant modes of University - Enterprise Cooperation, including targeted talent training programs, enterprise-based internships and practical training, and cooperative research and development or joint training projects. This classification captured differences in cooperation structure and learning exposure.

Educational Level and Disciplinary Orientation: Institutions were categorized based on their educational orientation and the primary focus of their academic programs, distinguishing among different disciplinary emphases within higher vocational education. This criterion helped reflect variations in curriculum structure and skill development pathways.

City Economic Development Level: Institutions were classified according to the economic development level of the cities in which they were located. Based on regional economic indicators, cities were categorized as economically developed or economically underdeveloped, allowing for the examination of regional disparities in enterprise resources and employment environments.

UEC Intensity: The intensity of University - Enterprise Cooperation was determined by the frequency of cooperation, depth of enterprise participation, and duration of cooperative activities. Based on these indicators, institutions were grouped into high, medium, and low UEC intensity categories.

School Size and Resource Allocation: Institutions were classified according to their overall enrollment scale and the availability of educational and cooperative resources. Based on these characteristics, schools were categorized as large, medium, or small in scale.

Based on the above stratification criteria, a proportional classification framework was established for the 24 private higher vocational colleges in Shandong Province, which served as the basis for subsequent sample selection and randomization procedures.

Table 3.3 Proportional Classification

Category	Subcategory	Percentage
University-Enterprise Cooperation (UEC) Model Type	Collaborative R&D	24%
	Internship & Practice	44%
	Targeted Training	32%
University Level	Vocational College	88%

Category	Subcategory	Percentage
City Economic Development Level	Undergraduate College	12%
	Developed Regions	44%
	Less Developed Regions	56%
UEC Intensity	High Intensity	24%
	Medium Intensity	60%
	Low Intensity	16%
School Size & Resource Allocation	Medium-Sized Schools	64%
	Small-Sized Schools	36%

The above classification statistics illustrate the distribution of private higher vocational colleges across different UEC models, educational and disciplinary orientations, city economic development levels, UEC intensity, and school size and resource allocation. This multidimensional classification provides a comprehensive overview of how different types of institutions in Shandong Province engage in University - Enterprise Cooperation. It also establishes an empirical basis for comparing UEC implementation patterns and for generating targeted insights and improvement strategies aimed at enhancing students' perception of employability.

Based on the previously determined stratification criteria—namely type of UEC model, institutional characteristics and disciplinary background, city economic development level, UEC intensity, and school size and resources—a sample selection was conducted from the population of 24 private higher vocational colleges in Shandong Province. Following proportional representation principles and practical research considerations, five institutions were selected to ensure diversity and representativeness. The rationale for selecting each institution is outlined below:

1. Shandong Engineering Vocational and Technical University (Jinan)

Reason for selection: This institution was selected due to its strong engineering orientation and well-established University - Enterprise Cooperation practices, particularly in cooperative research and development. Its mature cooperation mechanisms and deep enterprise involvement made it a representative case of high-intensity UEC. In addition, accessibility for field research facilitated efficient data collection.

2. Rizhao Maritime Engineering Vocational College (Rizhao)

Reason for selection: Located in a city with a moderate level of economic development, this college has a clear disciplinary focus on maritime engineering and

has implemented UEC primarily through targeted talent training programs. It was therefore selected as a representative of the targeted training cooperation model.

3. Weifang Environmental Engineering Vocational and Technical College (Weifang)

Reason for selection: Weifang is an important industrial city in Shandong Province, and this institution has demonstrated stable cooperation with enterprises in the field of environmental engineering. Its UEC activities, mainly characterized by research and development cooperation, reflect a medium institutional scale and medium cooperation intensity, making it suitable for comparative analysis.

4. Shandong Cultural Industry Vocational College (Qingdao)

Reason for selection: This college specializes in cultural and creative industries and allocates substantial resources to liberal arts - oriented programs. Located in Qingdao, a city with a high level of economic development, the institution has established strong partnerships with cultural enterprises, making it representative of UEC practices in the cultural industry sector.

5. Dezhou Science and Technology Vocational College (Dezhou)

Reason for selection: Although Dezhou has a relatively lower level of economic development, this college plays an important role in supporting the local economy. Its University-Enterprise Cooperation is characterized by flexible and diverse cooperation forms, making it representative of small-scale institutions with adaptive UEC strategies.

The selected institutions collectively reflect variation across geographic regions, disciplinary orientations, institutional scales, and cooperation models. Detailed classification information and proportional distribution results are presented in Table 3.4.

Table 3.4 Sample Selection

No.	School	City	(UEC) Model Type	University Level & Major Background	City Economic Development Level	UEC Intensity	School Size & Resource Allocation	Selection Rationale
1	Shandong Engineering Vocational and Technical University	Jinan	Collaborative R&D	Engineering	High	High	Large	The author's institution, strong in engineering, deep UEC, convenient for data collection.
2	Rizhao Marine Engineering Vocational College	Rizhao	Targeted Training	Engineering	Medium	Medium	Medium	Strong in marine engineering, prominent in targeted training, representative of the targeted training model.
3	Weifang Environmental Engineering Vocational College	Weifang	Collaborative R&D	Engineering	Medium	Medium	Medium	Significant in environmental engineering with deep R&D cooperation, representative of medium-sized institutions with moderate UEC intensity.
4	Shandong Cultural Industry Vocational College	Qingdao	Internship & Practice	Liberal Arts	High	High	Medium	Focused on cultural industries, strong in the liberal arts, representative of cultural industry direction.
5	Dezhou Science and Technology Vocational College	Dezhou	Internship & Practice	Comprehensive	Low	Medium	Small	Plays an important role in the local economy, flexible and diverse UEC, representative of small-sized institutions.

The selected institutions collectively covered a wide range of University–Enterprise Cooperation (UEC) models, including targeted talent training, enterprise-based internships and practical training, and cooperative research and development. They also represented different levels of city economic development (high, medium, and low), diverse institutional orientations and disciplinary backgrounds (engineering-focused, liberal arts-oriented, and comprehensive programs), as well as varying school sizes and levels of resource allocation (large, medium, and small).

Through this sampling strategy, the study ensured an appropriate balance between diversity and representativeness within the selected sample. This comprehensive coverage enhanced the robustness of the empirical analysis and provided a solid and scientific foundation for examining the effectiveness of different UEC models in private higher vocational colleges across Shandong Province, thereby supporting the generalizability of the research findings.

3.3 Samples and Sampling

After the five research institutions were determined, publicly available information released by the selected colleges was used to identify the basic scale of University–Enterprise Cooperation (UEC) implementation at each institution. Specifically, data regarding the number of students participating in UEC programs, the number of teachers involved, the number of cooperating enterprises, and the number of administrative and management personnel responsible for UEC were collected.

These indicators provided an institutional-level overview of the scope and intensity of UEC activities across the five selected colleges and served as an important reference for understanding differences in cooperation capacity and implementation contexts. The detailed distribution of these indicators is presented in Table 3.5.

Table 3.5 Numbers of UEC Students

School	Number of Students
Shandong Engineering Vocational and Technical University (Jinan)	3,200
Rizhao Maritime Engineering Vocational College (Rizhao)	2,800
Weifang Environmental Engineering Vocational College (Weifang)	2,500
Shandong Cultural Industry Vocational College (Qingdao)	2,100
Dezhou Science and Technology Vocational College (Dezhou)	2,000

This study employed a stratified random sampling method to ensure adequate representativeness across the five selected private higher vocational colleges: Shandong Engineering Vocational and Technical University, Rizhao Maritime Engineering

Vocational College, Weifang Environmental Engineering Vocational and Technical College, Shandong Cultural Industry Vocational College, and Dezhou Science and Technology Vocational College. Stratification was applied to account for institutional differences in University - Enterprise Cooperation (UEC) models, regional economic contexts, disciplinary orientations, and institutional scale.

Stratified random sampling is a probability-based sampling technique that improves sample representativeness by dividing the population into non-overlapping subgroups (strata) and then randomly selecting participants from each stratum. In the present study, this approach was adopted to ensure that students from different institutional contexts were proportionally represented. By reducing variability within strata and increasing variability between strata, stratified random sampling effectively reduces sampling error and enhances the precision and reliability of the results.

Sample Size Determination: To determine an appropriate sample size, the study calculated the minimum required number of respondents based on standard statistical principles. The calculation assumed a 95% confidence level, a 5% margin of error, no prior information about population proportions, an expected response rate of 70%, and a design effect of 1, which corresponds to a simple random sampling assumption within strata.

Key Parameters:

Confidence Level (Z): 95% $Z = 1.96$

Margin of Error (E): 0.05

Estimated Proportion (p): 0.50 (used to maximize sample size in the absence of prior information)

Expected Response Rate (R): 0.70

Design Effect (DE): 1

Preliminary Sample Size Calculation

The preliminary sample size was calculated using the standard formula:

$$n_0 = \frac{z^2 \times p \times (1 - p)}{E^2}$$

Substituting the values:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{0.05^2} = \frac{3.8416 \times 0.25}{0.0025} = \frac{0.9604}{0.0025} = 384.16$$

Adjustment for Response Rate and Design Effect

To account for the expected response rate and design effect, the adjusted sample size was calculated as:

$$n = \frac{n_0}{RR} \times DE$$

$$n = \frac{384.16}{0.70} \times 1 = 548.8$$

Rounding up to the nearest whole number, the final required sample size was 549, which was further rounded to 550 respondents to ensure adequacy.

Student Sample Allocation

Based on the determined total sample size, student respondents were proportionally allocated across the five selected institutions according to their relative UEC student populations. The detailed distribution of the student sample is presented in Table 3.6.

Table 3.6 Numbers of Sampled Students

School	Student Population	Proportional Sample Size
Shandong Engineering Vocational and Technical University	3,200	140
Rizhao Maritime Engineering Vocational College	2,800	122
Weifang Environmental Engineering Vocational College	2,500	109
Shandong Cultural Industry Vocational College	2,100	92
Dezhou Science and Technology Vocational College	2,000	87
Total	12,600	550

In total, 561 valid questionnaires were collected, which exceeded the minimum required sample size of 550 respondents. Therefore, the final sample size met and satisfied the statistical requirements for subsequent quantitative analyses, ensuring sufficient statistical power and reliability for hypothesis testing and model estimation.

3.4 Research Tools

The primary research tool used in this study was a structured questionnaire, which was designed to collect data on students' perceptions regarding the role of University–Enterprise Cooperation (UEC) in enhancing their perception of employability in private higher vocational colleges in Shandong Province. The questionnaire served as the main

instrument for quantitative data collection and was used to support hypothesis testing and model validation.

To ensure the scientific rigor, reliability, and validity of the research instrument, the questionnaire was developed based on established theoretical frameworks and a comprehensive review of relevant literature. The design emphasized key constructs associated with employability development and UEC outcomes, including Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability. This approach ensured consistency between the questionnaire items and the underlying measurement structure of the study.

All measurement items were assessed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). This scale was selected because it is widely used in social science research and allows for the generation of continuous data, which is suitable for subsequent statistical analyses, including structural equation modeling.

The questionnaire was designed in alignment with the research hypotheses and included an operationalization table that specified the variables, constructs, and corresponding measurement items used in the survey. The collected data were subsequently used to evaluate the reliability and validity of the measurement scales.

The questionnaire consisted of two main sections. The first section collected demographic information, including gender, age, type of institution, and member of student union. The second section comprised Likert-scale items measuring the seven core constructs: Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability. The specific measurement items for each construct are presented in Table 3.7.

Table 3 .7 Questionnaire Items and Sources

Dimension	Item	Source
1. Disciplinary and Industry Knowledge	I believe that the courses offered by the school have helped me acquire sufficient professional knowledge.	González & Wagenaar (2008)
	I have a clear understanding of the industry trends in my major.	
	Participating in school-enterprise cooperation has helped me better understand industry standards and practical requirements.	
	I believe I possess the industry knowledge required by the current job market.	
	Through school-enterprise cooperation, I have gained a better understanding of the latest technologies and trends in my field of study.	
2. Practical and Problem-solving Skills	I am able to apply the theories I have learned to solve practical problems.	Heppner & Petersen (1982)
	The project internship in school-enterprise cooperation has helped me improve my practical skills.	
	I am able to effectively solve complex problems in practice or internship tasks.	
	I believe that I have the ability to independently solve problems in my work.	
	The experience of school-enterprise cooperation has made me more confident when facing practical problems.	
3. Professionalism and Work Attitude	School enterprise cooperation has made me realize the importance of professional ethics.	Stern & Papadakis (2006)
	I believe I have good teamwork skills.	
	Through school-enterprise cooperation, I have developed a serious and responsible work attitude.	
	I am able to adapt to the pressure and challenges in my work.	
	School enterprise cooperation has enhanced my confidence and motivation for career development.	

Dimension	Item	Source
4. Teacher Guidance and Feedback	I believe that teachers have provided ample support and guidance in school-enterprise cooperation.	Ryan & Shim (2008)
	I have benefited from teachers' feedback and improved my professional skills and workplace readiness.	
	The guidance provided by the teacher during the internship project helped me better understand the workflow.	
	The advice given by teachers in school-enterprise cooperation is of great significance to my future career development.	
	During the process of school-enterprise cooperation, the guidance of teachers helped me better cope with workplace challenges.	
5. Enterprise Practice Experience	I believe that practical experience in the enterprise is very important for improving my employability.	Coll & Eames (2004)
	The enterprise practice in school-enterprise cooperation has given me a better understanding of the actual work environment.	
	I have accumulated valuable work experience through enterprise practice.	
	The enterprise practice in school-enterprise cooperation has familiarized me with the workflow within the industry.	
	Enterprise practice has helped me establish connections with professionals in the industry.	
6. Learning Engagement	I actively participate in various learning and internship activities during the process of school-enterprise cooperation.	Schaufeli et al. (2002)
	The school-enterprise cooperation project has given me more motivation to devote myself to professional learning.	
	I am willing to invest extra time to improve my performance in school-enterprise cooperation.	

Dimension	Item	Source
7. Students' Perception of Employability	Collaboration between schools and enterprises has sparked my interest in exploring new knowledge in my studies.	Rothwell et al. (2008)
	I believe that through school-enterprise cooperation, my employment competitiveness has been significantly improved.	
	School enterprise cooperation has given me more confidence in my abilities in the future job market.	
	Participating in school-enterprise cooperation has given me a clearer understanding of the requirements of enterprises for talent.	
	School enterprise cooperation helps me better prepare for my future career development. Through school-enterprise cooperation, I have gained a clearer career plan and goals.	

3.5 Data Collection

This study aimed to investigate the impact of University–Enterprise Cooperation (UEC) on enhancing students' perception of employability in private higher vocational colleges in Shandong Province. To ensure the accuracy, reliability, and representativeness of the data, the data collection procedure was conducted in a structured and standardized manner, as described below.

3.5.1 Preparation of Data Collection Instrument

Prior to data collection, the research instruments were designed and finalized. A structured questionnaire was developed as the primary data collection tool. The questionnaire covered key constructs related to UEC and employability, including Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability. All items were formulated based on relevant theoretical frameworks and empirical studies to ensure content validity and alignment with the research objectives.

Before formal distribution, the questionnaire was reviewed to ensure clarity of wording, logical structure, and suitability for the target student population. This preparation process helped reduce ambiguity and improved the overall quality of the collected data.

3.5.2 Data Collection Process

The data collection was carried out through an online survey platform (Wenjuanxing). Survey invitations were distributed to students in the selected private higher vocational colleges through institutional coordination. The purpose, significance, and confidentiality of the study were clearly explained to all potential respondents to ensure informed and voluntary participation.

To ensure the randomness of participant selection within each stratum, the list of eligible students involved in University–Enterprise Cooperation was first obtained through institutional coordination at each selected college. Within each stratum, students were randomly selected using a random number procedure and were individually invited to participate in the survey.

The Wenjuanxing platform was used solely as a data collection tool, and the questionnaire link was distributed only to the randomly selected students, rather than being publicly accessible. This procedure ensured that each participant had an equal probability of being selected within their respective stratum, thereby satisfying the requirements of stratified random sampling.

Respondents were invited to complete the questionnaire online within a specified time frame. To improve the response rate, reminders were issued before the submission deadline. After the data collection period ended, all returned questionnaires

were screened for completeness and validity. Responses with missing data or obvious response patterns were excluded, resulting in a final dataset suitable for subsequent statistical analysis.

Table 3.8 Data Collection Process

Stage	Activity	Time Frame	Responsible Personnel
Preparation	Development of Questionnaire	2 weeks	Researcher
Pre-test	Conduct Pilot Study to refine the survey	1 week	Researcher
Data Collection	Distribute the finalized survey to participants	4 weeks	Research Assistant
Data Entry	Input collected data into statistical software	2 weeks	Data Entry Staff
Cleaning	Check for missing or inconsistent data	1 week	Data Analyst
Data Analysis	Conduct statistical analysis as per the analysis plan	2 weeks	Statistician
Reporting	Compile results into a research report	3 weeks	Researcher

3.5.3 Data Processing

The questionnaire data were processed and analyzed using SPSS 26.0 and AMOS 23.0. The data analysis procedures included descriptive statistical analysis, reliability and validity testing, confirmatory factor analysis, structural equation modeling (SEM), as well as mediation and moderation effect analyses. Through a systematic data processing and analysis procedure, this study ensured the quality, consistency, and representativeness of the data, thereby providing a solid empirical foundation for hypothesis testing and model validation.

3.6 Data Analysis

3.6.1 Data Cleansing

Prior to formal data analysis, the dataset was screened for potential outliers to ensure data accuracy and stability. Outliers may distort statistical results if they are caused by data entry errors or extreme response patterns. In this study, SPSS 26.0 was used to conduct outlier detection through scatter plot analysis. The results indicated that no significant outliers were identified, and therefore all valid responses were retained for subsequent analysis.

3.6.2 Normality Test

A normality assessment was conducted to determine whether the data met the assumptions required for parametric statistical analyses. Normality was evaluated using skewness and kurtosis values for each observed variable. Following commonly accepted criteria, skewness and kurtosis values within the range of ± 3 were considered

indicative of an approximately normal distribution. The analysis results showed that all variables met this criterion, indicating that the data were suitable for further statistical analysis.

3.6.3 Descriptive Statistical Analysis

Descriptive statistical analysis was performed to summarize the basic characteristics of the sample and to examine the overall response patterns of the measurement items. This analysis included frequency statistics for demographic variables (gender, age, type of institution, and member of student union) and mean and standard deviation calculations for all scale items.

The frequency analysis provided an overview of the sample composition and helped confirm the diversity and representativeness of the respondents. Mean analysis was used to examine the central tendency of each construct, reflecting students' overall perceptions and attitudes toward University–Enterprise Cooperation–related factors and employability. These descriptive results offered essential background information and served as a basis for subsequent reliability testing, validity assessment, and structural model analysis.

3.6.4 Reliability Test

3.6.4.1 Item Objective Congruence (IOC)

The Item Objective Congruence (IOC) method was employed to assess the content validity of the questionnaire items. IOC is an expert-based evaluation approach that examines the degree to which each item is consistent with the research objectives and construct definitions (Rovinelli & Hambleton, 1977).

In this study, five experts with doctoral qualifications or extensive experience in higher education and employability-related research were invited to review the measurement items. Each expert independently evaluated whether each item was relevant to the intended construct, assigning scores of 1 (relevant), 0 (uncertain), or –1 (irrelevant). The IOC value for each item was calculated by summing the expert scores and dividing by the total number of experts.

Following established evaluation criteria, items with an IOC value of 0.50 or above were considered to demonstrate acceptable content validity and were retained. Items with lower IOC values were revised or removed. The IOC assessment results indicated that all retained items met the recommended validity threshold, confirming that the questionnaire exhibited satisfactory content validity.

3.6.4.2 Pilot Test

A pilot test was conducted to further examine the clarity, feasibility, and reliability of the questionnaire prior to formal data collection. Pilot testing is commonly used to identify potential issues in item wording, questionnaire structure, and response patterns before large-scale implementation.

Consistent with methodological recommendations, 50 respondents who were representative of the target population were selected for the pilot study. The pilot data were analyzed to assess response variability and preliminary reliability performance. Based on the pilot results, the questionnaire items demonstrated clear wording and acceptable internal consistency, and no items were identified as requiring deletion.

Minor adjustments related to wording clarity were made where necessary. Overall, the pilot test confirmed that the questionnaire was appropriate and ready for formal data collection.

3.6.4.3 Internal Consistency Reliability

Internal consistency reliability was assessed using Cronbach's Alpha coefficient to evaluate the degree to which items within each construct consistently measured the same underlying concept.

Cronbach's Alpha values were calculated for all constructs using the pilot data. According to commonly accepted criteria, values above 0.70 indicate good reliability, while values above 0.60 are considered acceptable in social science research. The results showed that all constructs achieved acceptable to good Cronbach's Alpha values, indicating satisfactory internal consistency.

Based on the IOC assessment, pilot testing, and reliability analysis, the Questionnaire used in this study was confirmed to be valid, reliable, and suitable for subsequent confirmatory factor analysis and structural equation modeling using the full sample.

In this study, Cronbach's Alpha coefficients were calculated for each construct using SPSS 26.0. The results indicated that all constructs achieved acceptable or good internal consistency, demonstrating that the measurement scales were reliable and suitable for subsequent confirmatory factor analysis and structural equation modeling.

$$\alpha = x = \frac{k}{K - 1} \left(1 - \frac{\sum_{i=1}^k (\sigma_i^2)}{\sigma^2} \right)$$

Table 3. 9 Rules of Thumb about Cronbach's Alpha Coefficient Size

Alpha Coefficient Range	Strength of Association
$\alpha < 0.5$	Unacceptable
$\alpha < 0.6$	Poor

Alpha Coefficient Range	Strength of Association
$0.6 < \alpha < 0.7$	Moderate
$0.7 < \alpha < 0.8$	Good
$0.8 < \alpha < 0.9$	Very good
$\alpha \geq 0.9$	Excellent

3.6.5 Exploratory Factor Analysis and Confirmatory Factor Analysis

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are commonly used techniques for examining the factor structure and construct validity of measurement instruments. In this study, all measurement items were adapted from established and validated scales in prior research, and the theoretical structure of each construct was clearly defined in advance. Therefore, Confirmatory Factor Analysis (CFA) was adopted as the primary method to assess the validity of the measurement model.

EFA is generally used in preliminary research when the underlying factor structure is unknown (Fabrigar & Wegener, 2011). It aims to explore latent dimensions by reducing data dimensionality and identifying potential factor patterns. Statistical indicators such as the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity are commonly used to assess data suitability for EFA. A KMO value greater than 0.60 indicates that factor analysis is appropriate (Kaiser, 1970). A significant Bartlett's test also supports the suitability of the data for factor analysis (Bartlett, 1950). However, given the confirmatory nature of the present study and the use of mature measurement instruments, EFA was not emphasized in the main analysis.

Confirmatory Factor Analysis (CFA) was conducted using AMOS 23.0 to verify whether the predefined factor structure was consistent with the observed data. CFA requires researchers to specify a measurement model based on theoretical assumptions and empirical evidence prior to analysis (Byrne, 2010). In this study, each observed variable was specified to load only on its corresponding latent construct, and the relationships among constructs were defined according to the proposed theoretical framework.

The goodness of fit of the measurement model was evaluated using multiple fit indices, including the Chi-square statistic (χ^2), Comparative Fit Index (CFI), Adjusted Goodness-of-Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA) (Schermelleh-Engel et al., 2003). The CFA results indicated that the measurement model demonstrated an acceptable fit, confirming that the observed variables adequately represented their intended latent constructs.

Consequently, the validated measurement model provided a sound basis for subsequent structural equation modeling and hypothesis testing.

3.6.6 AVE Value and CR Value

To further assess the measurement quality of the latent constructs, Average Variance Extracted (AVE) and Composite Reliability (CR) were calculated based on the results of the confirmatory factor analysis. AVE and CR are widely used indicators for evaluating convergent validity and construct reliability in structural equation modeling (Fornell & Larcker, 1981).

AVE reflects the average proportion of variance in observed variables that is explained by their corresponding latent construct. An AVE value of 0.50 or higher indicates that the latent variable explains more than half of the variance of its indicators, demonstrating adequate convergent validity (Hair et al., 2010). In this study, AVE values were computed for all constructs, and the results showed that they met the recommended threshold, indicating satisfactory convergent validity of the measurement model.

Composite Reliability (CR) was used to evaluate the internal consistency reliability of the latent constructs. Unlike Cronbach's Alpha, CR takes into account the standardized factor loadings of individual indicators and their measurement errors, providing a more accurate assessment of construct reliability in SEM contexts (Raykov, 1997). A CR value of 0.70 or above is generally regarded as acceptable (Nunnally & Bernstein, 1994). The CR results obtained in this study exceeded the recommended criterion, indicating that all constructs demonstrated good internal consistency and reliability.

Overall, the AVE and CR results confirmed that the measurement model exhibited adequate convergent validity and construct reliability, providing a sound basis for subsequent structural equation modeling and hypothesis testing.

3.6.7 Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) was employed in this study to test the hypothesized relationships among the latent variables in the proposed research model. SEM was considered appropriate because it allows for the simultaneous examination of multiple relationships among independent variables, mediating variables, moderating variables, and dependent variables while accounting for measurement error.

Based on the validated measurement model, a structural model was specified to examine the effects of DK, PS, PA, and TK on EP, the effect of EP on SPE, the mediating role of EP, and the moderating role of LE in the relationship between EP and SPE. The hypothesized relationships among constructs were represented using a path diagram, and model parameters were estimated using AMOS 23.0.

The overall fit of the structural model was evaluated using commonly accepted goodness-of-fit indices, including the Chi-square statistic (χ^2), Comparative

Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). These indices were used to assess the degree to which the hypothesized model was consistent with the observed data, thereby providing a basis for subsequent hypothesis testing.

3.6.8 Mediation

Mediation analysis was conducted to examine whether Enterprise Practice Experience (EP) mediated the relationships between university-related factors and Students' Perception of Employability (SPE). Specifically, the analysis tested whether DK, PS, PA, and TK influenced SPE indirectly through EP within the proposed structural model.

In this study, mediation effects were tested using the bootstrap method, which is widely recommended for mediation analysis due to its robustness and minimal reliance on distributional assumptions (Preacher & Hayes, 2004). The bootstrap procedure involved repeated resampling to estimate the indirect effects and their corresponding confidence intervals.

A mediation effect was considered statistically significant if the 95% confidence interval did not include zero. This approach allowed for a reliable assessment of both partial and full mediation effects within the structural equation model and provided empirical support for the hypothesized indirect relationships.

3.6.9 Moderation

Moderation analysis was conducted to examine whether Learning Engagement (LE) changed the strength of the relationship between Enterprise Practice Experience (EP) and Students' Perception of Employability (SPE). This analysis aimed to identify whether students with different levels of engagement benefited differently from enterprise practice experience.

In this study, the moderating effect was tested by incorporating the interaction term between EP and LE into the analysis model. A statistically significant interaction term indicated the presence of a moderation effect, suggesting that the relationship between EP and SPE differed across different levels of LE.

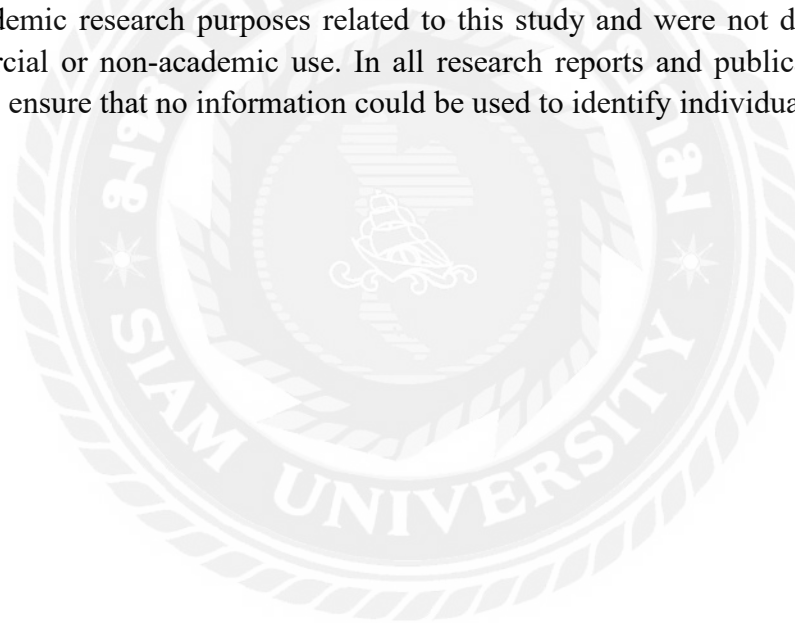
The results of the moderation analysis provided insights into whether the relationship between enterprise practice experience and students' perception of employability was strengthened or weakened across different levels of learning engagement, thereby contributing to a more nuanced understanding of the proposed research model.

3.7 Ethical Considerations

This study was conducted in strict accordance with established ethical standards and guidelines to ensure both the scientific validity and ethical integrity of the research. The primary ethical considerations included informed consent, confidentiality and privacy protection, and responsible data use throughout the research process.

Informed Consent: Prior to data collection, all participants were provided with detailed information regarding the purpose, procedures, and scope of the study. The informed consent form clearly explained participants' rights, potential risks and benefits, data usage, and confidentiality measures. Participants were informed that their participation was entirely voluntary and that they had the right to withdraw from the study at any time without penalty or adverse consequences. They were also informed that they could choose not to respond to any questions they felt uncomfortable answering. Data collection proceeded only after informed consent was obtained from all participants.

Confidentiality and Privacy: To protect participants' privacy, all personal identifying information was anonymized during data collection, storage, and analysis. A coding system was used in place of names and other identifiable information. All collected data were securely stored on password-protected and encrypted devices, with access limited to members of the research team only. The data were used exclusively for academic research purposes related to this study and were not disclosed for any commercial or non-academic use. In all research reports and publications, care was taken to ensure that no information could be used to identify individual participants.



CHAPTER 4

RESEARCH RESULTS

This chapter presents the empirical findings based on the formal survey sample and to report the results of hypothesis testing proposed in Chapter 3. Instrument development, expert-based content validation, and pilot testing procedures were completed in Chapter 3; therefore, the analyses reported in this chapter focus on (1) describing the full-sample data characteristics, (2) evaluating the measurement model using confirmatory factor analysis, and (3) testing the hypothesized structural relationships using SEM, including mediation and moderation effects.

4.1 Sample Data Acquisition and Processing

4.1.1 Descriptive Internal Consistency Statistics

This section reports descriptive internal consistency statistics based on the formal survey dataset. The purpose is to provide background information on the overall response stability and inter-item coherence before proceeding to the measurement and structural model analyses. Detailed procedures and results of instrument validation, including expert review and pilot testing, have been reported in Chapter 3; therefore, the statistics presented in this section are not intended as pilot validation, but as a descriptive summary of the measurement performance within the full dataset.

In the formal questionnaire survey, reliability testing was conducted to examine the internal consistency of the measurement items. Cronbach's Alpha was used to evaluate whether items within the same construct consistently measured the intended latent variable (Cronbach, 1951). The reliability results in this chapter are based on the 561 valid responses from the formal survey rather than the pilot test reported in Chapter 3. The specific results are shown in Table 4.1.

From the results in Table 4.1, the Cronbach's Alpha values for Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability were 0.863, 0.890, 0.900, 0.857, 0.826, 0.859, and 0.814, respectively. All values exceeded 0.70, indicating satisfactory internal consistency in the formal sample.

Table 4.1 Internal Consistency Statistics (Full Sample)

Indication	Items	Cronbach's Alpha
Disciplinary and Industry Knowledge	5	0.863
Practical and Problem-Solving Skills	5	0.890
Professionalism and Work Attitude	5	0.900
Teacher Guidance and Feedback	5	0.857
Enterprise Practice Experience	5	0.826
Learning Engagement	4	0.859
Students' Perception of Employability	5	0.814

4.1.2 Implementation of Questionnaire Survey

The data for this questionnaire survey were collected online through Wenjuanxing for approximately four weeks, from February 10 to March 9, 2025. A total of 600 questionnaires were distributed, and 561 valid responses were retained, resulting in a valid response rate of 93.5%.

4.1.3 Outlier

Outlier screening was conducted to ensure that the dataset met the assumptions required for subsequent statistical analyses. Using SPSS 26.0, scatter plots were examined for all key variables to identify any extreme or abnormal values within the dataset. The results indicated that no outliers were detected in the formal sample. Therefore, all valid cases were retained for subsequent confirmatory factor analysis and structural equation modeling.

4.1.4 Normality test

Normality was assessed using skewness and Kurtosis statistics for all constructs. The results showed that the skewness and Kurtosis values were within acceptable ranges, indicating that the distributional assumptions for subsequent parametric analyses were adequately satisfied. Therefore, the dataset was considered suitable for CFA and SEM estimation.

4.2 Descriptive Statistics of Samples

Table 4.2 presents the basic situation of demographic descriptive analysis. From the perspective of gender, the number of females and males is 203 and 358 respectively, accounting for 36.19% and 63.81% respectively. From the perspective of age distribution, the majority are aged 18-20 and 21-23, with 233 and 276 respondents respectively, accounting for 41.53% and 49.2% respectively; from the type of institution, most are Vocational College, with a total of 441 respondents, accounting for 78.61%; Looking at the Member of Student Union situation, most of them are not, totaling 514, accounting for 91.62%.

It should be noted that a small proportion of respondents were aged 24 and above. This is consistent with the enrollment characteristics of higher vocational institutions in China, where student cohorts may include individuals with delayed entry, vocational-to-higher-education progression, prior work experience, or continuing education pathways. Therefore, these cases were considered valid members of the sampling frame rather than outliers, and they were retained for analysis.

Table 4.2 Demographic Analysis

Item	Category	N	Percent (%)
Gender	Female	203	36.19
	Male	358	63.81
Age	18-20	233	41.53
	21-23	276	49.2
	24 and above	52	9.27
	Vocational College	441	78.61
Type of Institution	University	120	21.39
Member of Student Union	NO	514	91.62
	YES	47	8.38
Total		561	100

4.3 Descriptive Statistical Analysis of Variables

Table 4.3 presents the mean and standard deviation of Disciplinary and Industry Knowledge. The mean value is between 3.335 and 3.467, and the standard deviation is between 0.989 and 1.021. DK5 has the lowest mean value of 3.335, while DK3 and DK4 have the highest mean value of 3.467.

Table 4.3 Mean and Standard Deviation of Disciplinary and Industry Knowledge

Item	N	Mean	Std.	Skewness	Kurtosis
DK1	561	3.44	1.011	-0.144	-0.679
DK2	561	3.428	1.021	-0.112	-0.606
DK3	561	3.467	0.989	-0.019	-0.627
DK4	561	3.467	1.009	-0.093	-0.512
DK5	561	3.335	1.026	0.021	-0.623

Table 4.4 presents the mean and standard deviation of Practical and Problem-Solving Skills. The mean ranges from 3.412 to 3.526, and the standard deviation ranges from 0.898 to 0.964. PS3 has the highest mean value of 3.526, while PS2 has the lowest mean value of 3.412.

Table 4.4 Mean and Standard Deviation of Practical and Problem-Solving Skills

Item	N	Mean	Std.	Skewness	Kurtosis
PK1	561	3.428	0.929	-0.291	-0.207
PK2	561	3.412	0.964	-0.458	0.054
PK3	561	3.526	0.898	-0.612	0.374
PK4	561	3.419	0.959	-0.348	-0.005
PK5	561	3.421	0.927	-0.307	0.084

Table 4.5 presents the mean and standard deviation of Professionalism and Work Attitude. The mean value is between 3.619 and 3.761, and the standard deviation is between 1.045 and 1.075. PA1 has the highest mean value of 3.761, and PA2 has the lowest mean value of 3.619.

Table 4.5 Mean and Standard Deviation of Professionalism and Work Attitude

Item	N	Mean	Std.	Skewness	Kurtosis
PA1	561	3.761	1.052	-0.757	0.205
PA2	561	3.619	1.058	-0.491	-0.415
PA3	561	3.72	1.045	-0.76	0.135
PA4	561	3.736	1.055	-0.731	-0.003
PA5	561	3.742	1.075	-0.76	0.075

Table 4.6 presents the mean and standard deviation of Teacher Guidance and Feedback. The mean value is between 3.169 and 3.212, and the standard deviation is between 0.944 and 1.081. TK1 has the highest mean value of 3.212, while TK4 has the lowest mean value of 3.169.

Table 4.6 Mean and Standard Deviation of Teacher Guidance and Feedback

Item	N	Mean	Std.	Skewness	Kurtosis
TK1	561	3.212	0.947	-0.067	-0.055
TK2	561	3.196	0.975	0.156	-0.366
TK3	561	3.21	0.944	0.055	0.057
TK4	561	3.169	1.055	0.217	-0.648
TK5	561	3.178	1.081	0.058	-0.602

Table 4.7 presents the mean and standard deviation of Enterprise Practice Experience. The mean value is between 3.551 and 3.656, and the standard deviation is between 0.949 and 0.973. EP3 has the highest mean value of 3.656, while EP4 has the lowest mean value of 3.551.

Table 4.7 Mean and Standard Deviation of Enterprise Practice Experience

Item	N	Mean	Std.	Skewness	Kurtosis
EP1	561	3.633	0.957	-0.364	-0.277
EP2	561	3.638	0.961	-0.3	-0.337
EP3	561	3.656	0.959	-0.352	-0.285
EP4	561	3.551	0.949	-0.366	-0.151
EP5	561	3.608	0.973	-0.259	-0.52

Table 4.8 presents the mean and standard deviation of Learning Engagement. The mean value ranges from 3.508 to 3.560, and the standard deviation ranges from 0.966 to 1.009. LE1 has the lowest mean value of 3.508, while LE3 has the highest mean value of 3.560.

Table 4.8 Mean and Standard Deviation of Learning Engagement

Item	N	Mean	Std.	Skewness	Kurtosis
LE1	561	3.508	0.995	-0.06	-0.689
LE2	561	3.529	1.009	-0.191	-0.561
LE3	561	3.56	0.966	-0.289	-0.305
LE4	561	3.515	0.986	-0.166	-0.596

Table 4.9 presents the mean and standard deviation of Students' Perception of Employability. The mean value is between 3.604 and 3.729, and the standard deviation is between 0.872 and 0.923. SPE5 has the highest mean value of 3.729, and SPE4 has the lowest mean value of 3.604.

Table 4.9 Mean and Standard Deviation of Students' Perception of Employability

Item	N	Mean	Std.	Skewness	Kurtosis
SPE1	561	3.701	0.884	-0.264	-0.268
SPE2	561	3.667	0.877	-0.238	-0.173
SPE3	561	3.645	0.889	-0.299	-0.055
SPE4	561	3.604	0.872	-0.112	-0.365
SPE5	561	3.729	0.923	-0.286	-0.623

4.4 Reliability Analysis

Table 4.10 presents the reliability analysis of Disciplinary and Industry Knowledge. The Corrected Item-Total Correlation (CITC) values range from 0.635 to 0.745, all above 0.30. The Cronbach's Alpha if Item Deleted values range from 0.819 to 0.846, all below the overall Cronbach's Alpha of 0.863. Therefore, no item needed to be deleted.

Table 4.10 Reliability Analysis of Disciplinary and Industry Knowledge
(Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach α
DK1	0.661	0.84	0.863
DK2	0.635	0.846	
DK3	0.745	0.819	
DK4	0.691	0.832	
DK5	0.681	0.835	

Table 4.11 presents the reliability analysis of Practical and Problem-Solving Skills. First, from the perspective of the coefficient value of Corrected Item-Total Correlation (CITC), the range is between 0.727-0.738, and the coefficient values are all higher than 0.3, and the correlation is relatively high. From the perspective of Cronbach's Alpha if Item Deleted, the coefficient values range from 0.864 to 0.867, which are all less than the overall coefficient value of 0.89. Therefore, the item does not need to be deleted.

Table 4.11 Reliability Analysis of Practical and Problem-Solving Skills
(Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach Alpha
PK1	0.734	0.865	0.89
PK2	0.727	0.867	
PK3	0.73	0.866	
PK4	0.738	0.864	
PK5	0.728	0.867	

Table 4.12 presents the reliability analysis of Professionalism and Work Attitude. First, from the perspective of the coefficient value of Corrected Item-Total Correlation (CITC), the range is between 0.707-0.793, and the coefficient values are all higher than 0.3, and the correlation is relatively high. From the perspective of Cronbach's Alpha if Item Deleted, the coefficient values range from 0.87 to 0.889, which are all less than the overall coefficient value of 0.9. Therefore, the item does not need to be deleted.

Table 4.12 Reliability Analysis of Professionalism and Work Attitude
(Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach Alpha
PA1	0.793	0.87	
PA2	0.707	0.889	
PA3	0.756	0.878	0.9
PA4	0.739	0.881	
PA5	0.768	0.875	

Table 4.13 presents the reliability analysis of Teacher Guidance and Feedback. The Corrected Item-Total Correlation (CITC) values range from 0.639 to 0.730, all above 0.30. The Cronbach's Alpha if Item Deleted values range from 0.811 to 0.836, all below the overall Cronbach's Alpha of 0.857. Therefore, no item needed to be deleted.

Table 4.13 Reliability Analysis of Teacher Guidance and Feedback
(Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach α
TK1	0.639	0.836	
TK2	0.667	0.829	
TK3	0.653	0.832	0.857
TK4	0.73	0.811	
TK5	0.675	0.827	

Table 4.14 presents the reliability analysis of Enterprise Practice Experience. The Corrected Item-Total Correlation (CITC) values range from 0.553 to 0.690, all above 0.30. The Cronbach's Alpha if Item Deleted values range from 0.771 to 0.811, all below the overall Cronbach's Alpha of 0.826. Therefore, no item needed to be deleted.

Table 4.14 Reliability Analysis of Enterprise Practice Experience
(Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach Alpha
EP1	0.69	0.771	
EP2	0.594	0.799	
EP3	0.637	0.786	0.826
EP4	0.632	0.788	
EP5	0.553	0.811	

Table 4.15 presents the reliability analysis of Learning Engagement. The Corrected Item-Total Correlation (CITC) values range from 0.676 to 0.724, all above 0.30. The Cronbach's Alpha if Item Deleted values range from 0.812 to 0.832, all below the overall Cronbach's Alpha of 0.859. Therefore, no item needed to be deleted.

Table 4.15 Reliability Analysis of Learning Engagement (Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach α
LE1	0.724	0.812	0.859
LE2	0.676	0.832	
LE3	0.706	0.819	
LE4	0.71	0.818	

Table 4.16 presents the reliability analysis of Students' Perception of Employability. First, from the coefficient value of Corrected Item-Total Correlation (CITC), the range is between 0.587-0.639, and the coefficient values are all higher than 0.3, and the correlation is relatively high. From the perspective of Cronbach's Alpha if Item Deleted, the coefficient values range from 0.767 to 0.788, which are all less than the overall coefficient value of 0.814. Therefore, the item does not need to be deleted.

Table 4.16 Reliability Analysis of Students' Perception of Employability (Cronbach's Alpha)

Item	Corrected Item-Total Correlation (CITC)	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
SPE1	0.611	0.776	0.814
SPE2	0.615	0.774	
SPE3	0.581	0.785	
SPE4	0.57	0.788	
SPE5	0.639	0.767	

4.5 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) is a statistical analysis method used to test and verify whether the proposed theoretical factor structure is consistent with the observed data. This analysis method is often used to measure and verify the suitability of the conceptual factor model. Before conducting CFA, the factor model to be tested in the study needs to be clearly defined. This includes specifying the latent factors and their relationship with the observed variables, usually a path model. CFA usually requires large sample data to ensure the accuracy and stability of the model. The specific model is as follows:

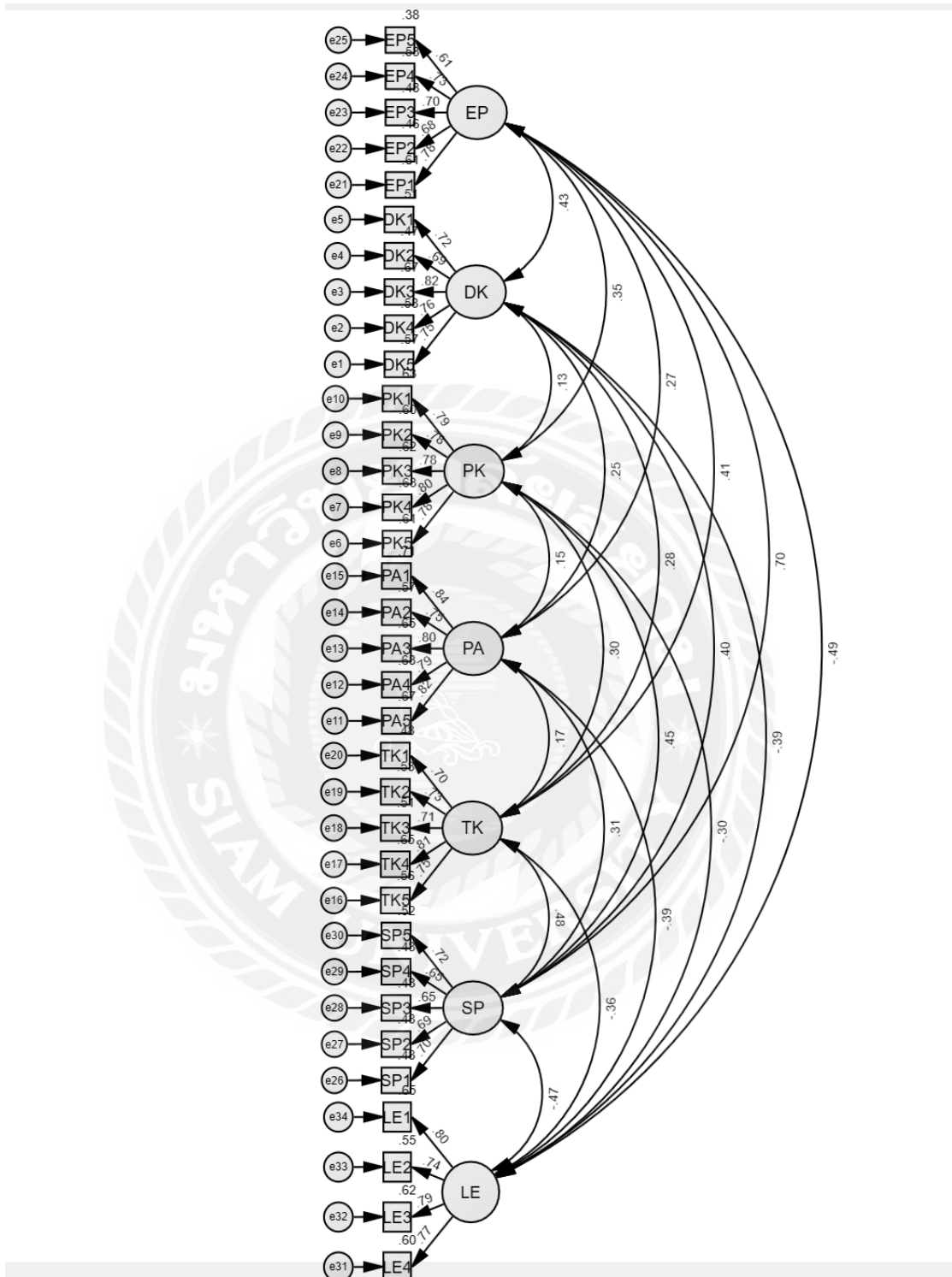


Figure 4.1 CFA analysis

Table 4.17 presents the confirmatory factor analysis (CFA) fitting index of the structural equation model, which evaluates the goodness of fit of the model from multiple perspectives. Firstly, the chi square value (χ^2) is 713.817 and the degrees of freedom are 390. Based on this, the calculated χ^2/Df is 1.830, which is significantly lower than the standard critical value of 5, indicating that the overall fitting effect of the model is good. Further observation of other key fitting indicators shows that the RMSEA value is 0.035, far below the acceptable upper limit of 0.10, indicating a small residual in the model and suggesting that the latent variable structure can better reflect the covariance structure between observed variables; The GFI value is 0.925, exceeding the benchmark value of 0.80, indicating that the model has achieved a good level of overall fitting; The NFI value is 0.916, and both IFI and CFI values are 0.960, which are higher than the critical value of 0.90. This further indicates that the model has superior relative and incremental fitting properties. Based on all the above indicators, the model reaches the statistical significance standard in terms of overall adaptability, indicating that the scale has strong structural validity, the relationships between latent variables are reasonably set, and the observed indicators can effectively reflect their corresponding latent constructs. The fitting results of the model support the application of the scale in subsequent path analysis or structural relationship modeling.

Table 4.17 CFA Fitting Values

Fit Index	Critical value	Current Value	Result
χ^2		713.817	
Df		390	
χ^2 / Df	<5	1.830	Comply with standards
RMSEA	<0.08	0.035	Comply with standards
GFI	>0.8	0.925	Comply with standards
NFI	>0.9	0.916	Comply with standards
IFI	>0.9	0.960	Comply with standards
CFI	>0.9	0.960	Comply with standards

Table 4.18 presents the measurement model test results. Through the measurement model test, it can be seen that the standard load coefficient values in the measurement model are all above 0.6, and the standard relative errors are small, the critical ratios are above 3.29, and the parameter estimates are all significant at the 0.001 level. Therefore, each factor the explanatory power of the measurement model is higher, and the fit of the model is higher.

Table 4.18 Measurement Model Test Results

			Estimate	SE	CR	P	Estimate
DK5	<---	DK	1				0.753
DK4	<---	DK	0.99	0.057	17.405	***	0.758
DK3	<---	DK	1.051	0.056	18.793	***	0.821
DK2	<---	DK	0.91	0.058	15.736	***	0.688
DK1	<---	DK	0.936	0.057	16.377	***	0.715
PK5	<---	PS	1				0.781
PK4	<---	PS	1.054	0.054	19.608	***	0.796
PK3	<---	PS	0.973	0.05	19.286	***	0.785
PK2	<---	PS	1.033	0.054	19.047	***	0.776
PK1	<---	PS	1.017	0.052	19.505	***	0.792
PA5	<---	PA	1				0.821
PA4	<---	PA	0.947	0.045	21.099	***	0.793
PA3	<---	PA	0.951	0.044	21.484	***	0.804
PA2	<---	PA	0.901	0.046	19.665	***	0.752
PA1	<---	PA	1.006	0.044	22.963	***	0.844
TK5	<---	TK	1				0.747
TK4	<---	TK	1.056	0.058	18.148	***	0.808
TK3	<---	TK	0.834	0.052	16.094	***	0.714
TK2	<---	TK	0.88	0.054	16.446	***	0.729
TK1	<---	TK	0.815	0.052	15.665	***	0.695
EP1	<---	EP	1				0.781
EP2	<---	EP	0.869	0.056	15.536	***	0.675
EP3	<---	EP	0.892	0.056	16.027	***	0.695
EP4	<---	EP	0.928	0.055	16.883	***	0.731
EP5	<---	EP	0.799	0.057	14.012	***	0.614
SPE1	<---	SPE	1				0.696
SPE2	<---	SPE	0.985	0.069	14.321	***	0.691
SPE3	<---	SPE	0.944	0.069	13.624	***	0.653
SPE4	<---	SPE	0.927	0.068	13.64	***	0.654
SPE5	<---	SPE	1.085	0.073	14.894	***	0.724
LE4	<---	LE	1				0.774
LE3	<---	LE	0.998	0.054	18.525	***	0.788
LE2	<---	LE	0.981	0.056	17.396	***	0.742
LE1	<---	LE	1.048	0.055	18.88	***	0.804

4.6 AVE and CR Values

AVE (Average Variance Extracted) is an indicator used to evaluate the validity of the measurement model. It measures the average proportion of variance between measurement items (indicators) under the construct, and the proportion of variance related to observation errors. The value range of AVE is usually between 0 and 1. Higher AVE values indicate that the measurement items explain more variance of the construct, that is, they better reflect the construct. Generally, AVE values greater than 0.5 are considered good, indicating that the measurement items have high validity. CR (Composite Reliability) is an indicator used to evaluate the reliability of the measurement model. It measures the total proportion of variance of measurement items (indicators) under the construct, and the proportion of variance related to observation errors. The value range of CR is usually between 0 and 1. Higher CR values indicate higher internal consistency between measurement items. Generally, CR values greater than 0.7 are considered acceptable, indicating good consistency between measurement items. It can be seen from the AVE and CR values that AVE is greater than 0.5 and CR values are above 0.7. Therefore, the convergent validity of the scale is also good.

Table 4.19 presents the AVE and CR values. The AVE values of Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, Learning Engagement, and Students' Perception of Employability are 0.561, 0.618, 0.646, 0.547, 0.592, 0.605, and 0.568, respectively, which are greater than 0.5, and the CR values are 0.864, 0.89, 0.901, 0.858, 0.828, 0.859, and 0.815, respectively, which are greater than 0.7, so they meet the standards.

Table 4.19 Model AVE and CR Index Results

Factor	Average Variance Extracted (AVE)	Composite Reliability (CR)
DK	0.561	0.864
PS	0.618	0.89
PA	0.646	0.901
TK	0.547	0.858
EP	0.592	0.828
LE	0.605	0.859
SPE	0.568	0.815

4.7 Discriminant Validity

Table 4.20 presents the assessment of discriminant validity of the latent variables. Discriminant validity examines whether each latent construct is statistically distinct from other constructs. Following the Fornell-Larcker criterion, discriminant validity is supported when the square root of AVE for each construct is greater than its correlations with other constructs (Fornell & Larcker, 1981).

The results show that the square root of AVE for each construct is greater than its correlations with other constructs. For example, the square root of AVE for DK is 0.749, which is higher than its correlations with PS, PA, TK, EP, LE, and SPE. Therefore, the measurement model demonstrates acceptable discriminant validity.

Table 4.20 Discriminant Validity

	DK	PS	PA	TK	EP	LE	SPE
DK	0.749						
PS	0.107	0.786					
PA	0.22	0.129	0.804				
TK	0.231	0.268	0.15	0.74			
EP	0.359	0.299	0.238	0.353	0.769		
LE	0.337	0.259	0.342	0.317	0.429	0.778	
SPE	0.337	0.381	0.259	0.405	0.577	0.393	0.754

Note: The diagonal character numbers are the square root values of AVE

4.8 Structural Equation Modeling

Structural equation modeling is a comprehensive multivariate statistical analysis technique that combines the advantages of path analysis, factor analysis, and regression analysis, and can handle both measurement models and structural models. The core idea of SEM is to estimate the relationship between latent variables through observed variables, thereby testing the validity of the theoretical model. The specific model is as follows:

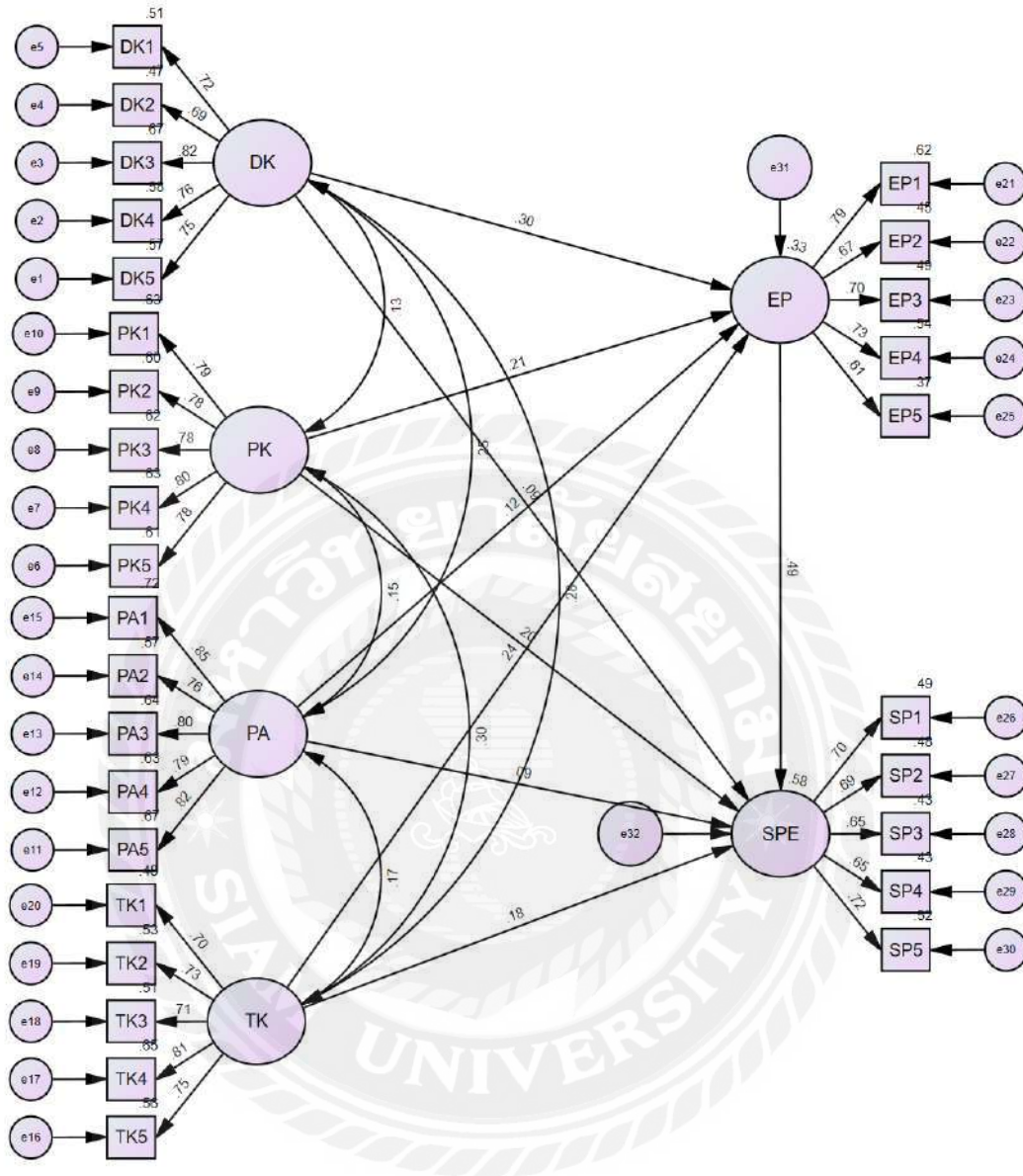


Figure 4.2 SEM Analysis

Table 4.21 shows the results of the structural equation model. Specifically:

In Enterprise Practice Experience<---Disciplinary and Industry Knowledge, the standardized regression coefficient value is 0.3, $P=0.000<0.001$. Therefore, the impact of Disciplinary and Industry Knowledge on Enterprise Practice Experience is positive and significant;

Enterprise Practice Experience <---Practical and Problem-Solving Skills, the standardized regression coefficient value is 0.215, $P=0.000<0.001$. Therefore, the

impact of Practical and Problem-Solving Skills on Enterprise Practice Experience is positive and significant;

In Enterprise Practice Experience<---Professionalism and Work Attitude, the standardized regression coefficient value is 0.121, $P=0.007<0.01$. Therefore, the impact of Professionalism and Work Attitude on Enterprise Practice Experience is positive and significant;

In Enterprise Practice Experience<---Teacher Guidance and Feedback, the standardized regression coefficient value is 0.243, $P=0.000<0.001$. Therefore, the impact of Teacher Guidance and Feedback on Enterprise Practice Experience is positive and significant;

In Students' Perception of Employability<---Enterprise Practice Experience, the standardized regression coefficient value is 0.49, $P=0.000<0.001$. Therefore, the impact of Enterprise Practice Experience on Students' Perception of Employability is positive and significant;

Students' Perception of Employability <---Disciplinary and Industry Knowledge, the standardized regression coefficient value is 0.094, $P=0.035<0.05$, therefore, the impact of Disciplinary and Industry Knowledge on Students' Perception of Employability is positive and significant;

Students' Perception of Employability<---Practical and Problem-Solving Skills, the standardized regression coefficient value is 0.195, $P=0.000<0.001$, therefore, the impact of Practical and Problem-Solving Skills on Students' Perception of Employability is significant;

In Students' Perception of Employability<---Professionalism and Work Attitude, the standardized regression coefficient value is 0.091, $P=0.022<0.05$. Therefore, the impact of Professionalism and Work Attitude on Students' Perception of Employability is positive and significant;

In Students' Perception of Employability<---Teacher Guidance and Feedback, the standardized regression coefficient value is 0.18, $P=0.000<0.001$. Therefore, the impact of Teacher Guidance and Feedback on Students' Perception of Employability is positive and significant.

Table 4.21 Structural Equation Model Results

			Estimate	S.E.	C.R.	P	Estimate
EP	<---	DK	0.292	0.047	6.176	***	0.3
EP	<---	PS	0.223	0.048	4.637	***	0.215
EP	<---	PA	0.103	0.038	2.714	0.007	0.121
EP	<---	TK	0.226	0.046	4.934	***	0.243
SPE	<---	EP	0.402	0.047	8.556	***	0.49

			Estimate	S.E.	C.R.	P	Estimate
SPE	<---	DK	0.075	0.036	2.109	0.035	0.094
SPE	<---	PS	0.166	0.037	4.535	***	0.195
SPE	<---	PA	0.064	0.028	2.283	0.022	0.091
SPE	<---	TK	0.137	0.035	3.953	***	0.18
DK5	<---	DK	1				0.754
DK4	<---	DK	0.989	0.057	17.404	***	0.758
DK3	<---	DK	1.049	0.056	18.781	***	0.821
DK2	<---	DK	0.908	0.058	15.718	***	0.688
DK1	<---	DK	0.936	0.057	16.395	***	0.716
PK5	<---	PS	1				0.782
PK4	<---	PS	1.053	0.054	19.615	***	0.796
PK3	<---	PS	0.973	0.05	19.29	***	0.785
PK2	<---	PS	1.033	0.054	19.072	***	0.777
PK1	<---	PS	1.015	0.052	19.481	***	0.791
PA5	<---	PA	1				0.82
PA4	<---	PA	0.948	0.045	21.013	***	0.792
PA3	<---	PA	0.95	0.045	21.337	***	0.801
PA2	<---	PA	0.907	0.046	19.724	***	0.756
PA1	<---	PA	1.01	0.044	22.923	***	0.846
TK5	<---	TK	1				0.748
TK4	<---	TK	1.056	0.058	18.157	***	0.809
TK3	<---	TK	0.835	0.052	16.106	***	0.714
TK2	<---	TK	0.878	0.054	16.404	***	0.727
TK1	<---	TK	0.814	0.052	15.663	***	0.695
EP1	<---	EP	1				0.786
EP2	<---	EP	0.856	0.055	15.445	***	0.67
EP3	<---	EP	0.888	0.055	16.107	***	0.697
EP4	<---	EP	0.925	0.054	16.991	***	0.733
EP5	<---	EP	0.787	0.057	13.923	***	0.609
SPE1	<---	SPE	1				0.697
SPE2	<---	SPE	0.984	0.069	14.324	***	0.692
SPE3	<---	SPE	0.941	0.069	13.604	***	0.652
SPE4	<---	SPE	0.927	0.068	13.646	***	0.655
SPE5	<---	SPE	1.084	0.073	14.894	***	0.724

4.9 Mediating Effect Test

Through the mediation test, it is found that:

Table 4.22 presents the results of the mediation effect tests conducted using the percentile bootstrap method. The mediation model examines whether Enterprise Practice Experience (EP) mediates the relationships between four independent variables—Disciplinary and Industry Knowledge (DK), Practical and Problem-Solving Skills (PS), Professionalism and Work Attitude (PA), and Teacher Guidance and Feedback (TK)—and the dependent variable, Students' Perception of Employability (SPE). The table reports the total effect, mediation effect, 95% bootstrap confidence interval, direct effect, and mediation conclusion for each path.

The first path examines the effect of Disciplinary and Industry Knowledge on Students' Perception of Employability, mediated by Enterprise Practice Experience. The total effect is 0.180 and is statistically significant at the $p < 0.001$ level, indicating that students' foundational academic and industry knowledge contributes positively to their perceptions of being employable. The mediation effect ($a*b$) is 0.085, with a 95% bootstrap confidence interval ranging from 0.071 to 0.136, which does not include zero—indicating a statistically significant indirect effect. The direct effect (c') after controlling for the mediator is 0.094, which is also statistically significant ($p < 0.01$). This leads to the conclusion of partial mediation, meaning that while enterprise practice experiences partially explain the relationship between disciplinary knowledge and employability perception, disciplinary knowledge also has an independent direct influence. This underscores the dual importance of theoretical learning and practical application—students must not only master knowledge but also apply it in enterprise settings to internalize a sense of employability.

The second path evaluates the mediating effect of Enterprise Practice Experience in the relationship between Practical and Problem-Solving Skills and Students' Perception of Employability. The total effect is 0.233 ($p < 0.001$), suggesting that students who possess practical competencies and problem-solving abilities are more confident in their employability. The mediation effect is 0.067, with a 95% BootCI of [0.048, 0.108], again excluding zero and confirming the significance of the indirect pathway. The direct effect remains statistically significant at 0.166 ($p < 0.001$), meaning the model also fits a partial mediation framework. These findings indicate that practical skills do not just function through experiential learning—students with hands-on skills and adaptability are more likely to actively engage in and benefit from enterprise practice experiences, and at the same time, they hold an inherent belief in their ability to succeed in the job market. For educational institutions, this result suggests that curricula should place stronger emphasis on experiential learning, internships, and project-based problem-solving modules to cultivate both applied skills and employability confidence.

The third mediation path explores how Professionalism and Work Attitude affects Students' Perception of Employability, again through Enterprise Practice Experience as a mediator. The total effect here is 0.103 ($p < 0.001$), the mediation effect is 0.037, and the 95% bootstrap confidence interval is [0.020, 0.077], indicating a significant indirect effect. The direct effect is 0.067 ($p < 0.01$), which also supports the conclusion of partial mediation. This pathway highlights the importance of soft skills—particularly responsibility, motivation, and work ethic—in shaping students' practice experiences and self-evaluated employability. Students with a strong work attitude are more likely to engage deeply and effectively in practical tasks, leading to richer learning outcomes and more positive perceptions of their job readiness. At the same time, their professional mindset contributes directly to their sense of competence and preparedness. Educational programs should therefore not neglect the cultivation of work values and attitudes, integrating them through classroom expectations, behavioral assessment, and co-curricular activities such as volunteering and mentorship.

The final path examines the mediating role of Enterprise Practice Experience in the effect of Teacher Guidance and Feedback on Students' Perception of Employability. The total effect is 0.221 ($p < 0.001$), and the mediation effect is 0.074, with a 95% BootCI ranging from 0.055 to 0.127. This significant indirect effect is complemented by a direct effect of 0.147 ($p < 0.001$), confirming yet another case of partial mediation. This result emphasizes the critical role teachers play—not only in imparting knowledge but in shaping students' practice experiences. Feedback and mentorship from teachers help students better understand their strengths and weaknesses, improve their professional behavior in enterprise settings, and link classroom learning with real-world tasks. Moreover, teacher support directly strengthens students' self-confidence and perceptions of employability, independent of practice experiences. To leverage this effect, universities should foster a strong teaching culture with active feedback mechanisms, reflective coaching, and teacher-industry collaboration to support student development from both pedagogical and practical perspectives.

Table 4.22 Results of Mediating Effect Tests

Item	Total effect	Mediation effect value	95% BootCI	Direct effect	Test conclusion
Disciplinary and Industry Knowledge=>Enterprise Practice Experience=>Students' Perception of Employability	0.180***	0.085	0.071 ~ 0.136	0.094**	partial mediation

Item	Total effect	Mediation effect value	95% BootCI	Direct effect	Test conclusion
Practical and Problem-Solving Skills=>Enterprise Practice	0.233***	0.067	0.048 ~	0.166***	partial mediation
Experience=>Student' Perception of Employability			0.108		
Professionalism and Work Attitude=>Enterprise Practice	0.103***	0.037	0.020 ~	0.067**	partial mediation
Experience=>Student' Perception of Employability			0.077		
Teacher Guidance and Feedback=>Enterprise Practice	0.221***	0.074	0.055 ~	0.147***	partial mediation
Experience=>Students' Perception of Employability			0.127		

Notes: * p<0.05 ** p<0.01 *** p<0.001

Bootstrap type = percentile bootstrap method

4.10 Moderating Effect Test

Table 4.23 presents the results of the moderation effect test. The interaction term between Enterprise Practice Experience and Learning Engagement was significant ($B = 0.077$, $p = 0.015 < 0.05$), indicating a positive moderating effect. However, the increase in explained variance was small ($\Delta R^2 = 0.007$), so the moderation effect should be interpreted as statistically significant but limited in magnitude.

Table 4.23 Results of Moderation Effect Tests

	Model				
	B	Standard error	t	p	β^2
constant	3.689	0.024	152.754	0.000***	-
Enterprise Practice Experience	0.43	0.036	11.909	0.000***	0.47
Learning Engagement	-0.13	0.031	-4.203	0.000***	-0.16
Enterprise Practice Experience*Learning Engagement	0.077	0.031	2.44	0.015*	0.092
R ²	0.366				

	Model				
	B	Standard error	t	p	β
Adjusted R ²	0.363				
F-value	F (3,557) = 107.188, p = 0.000				
△ R ²	0.007				
△ F value	F (1,557) = 5.956, p = 0.015				

Dependent variable = Student 's Perception of Employability

*p<0.05 **p<0.01 ***p<0.001

4.11 Validation of Research Outcomes

A structured expert evaluation questionnaire was conducted to validate the conceptual model proposed in this study. This procedure was not an interview; instead, experts independently completed a structured rating form to evaluate the propriety, feasibility, and utility of the model. To ensure scientific rigor and practical value, a panel of nine experts from educational administration, private higher education, and industry participated in the independent review. The validation process was conducted from August 1 to August 15, 2025 through an online-offline structured rating format.

The evaluation framework was structured around three primary dimensions:

Propriety – Assessing the theoretical soundness and content relevance of each item;

Feasibility – Evaluating the practical applicability within real-world enterprise internship environments;

Utility – Measuring the item's potential to inform policy, guide vocational university' work and support engagement strategies.

Scoring Guidelines:

Rate each indicator on a 5-point scale (1 = Strongly Disagree, 5 = Strongly Agree).

Items marked with "*" are core indicators

Table 4.24 Expert Review Committee Information

NO.	Name	Title	Institution	Position	Years of Experience	Participation
1	Zhao Lei	Professor of Education	Higher education institution	Dean	20	Online
2	Zhang Yang	Professor of Education	Higher education institution	Dean	21	Online
3	Wang Hui	Chair Professor	Higher education institution	Dean	18	Online
4	Liu Qiang	Chair Professor	Higher education institution	Dean	16	Offline
5	Sun Wei	Professor of Education	Higher education institution	Dean	17	Online
6	Wang Chongguang	Senior Engineer	Industry organization	General Manager	18	Offline
7	Li Xiaoming	Professor of Education	Higher education institution	Dean	13	Online
8	ShiZhong	Professor of Education	Higher education institution	President	18	Offline
9	Chen Jing	Secretary General	Industry organization	Chief Researcher	13	Online

Table 4.25 Results of Expert Evaluation

Dimension	NO.	Expert1	Expert2	Expert3	Expert4	Expert5	Expert6	Expert7	Expert8	Expert9	M
Propriety	P1*	5	4	5	4	4	4	5	5	5	4.56
	P2*	5	5	5	4	4	4	5	5	5	4.67
	P3*	4	5	5	5	5	5	5	5	5	4.89
	P4	5	5	5	4	4	4	5	4	4	4.44
	P5	5	4	5	5	4	4	5	4	5	4.56
Feasibility	F1*	4	4	4	5	5	5	5	5	5	4.67
	F2	5	4	5	4	5	5	4	5	5	4.67
	F3	4	5	5	5	5	5	4	4	5	4.67
	F4	5	4	5	4	4	4	5	5	5	4.56
	F5	5	5	5	4	4	4	5	5	5	4.67
Utility	U1*	5	5	4	5	4	5	5	5	5	4.78
	U2	4	5	5	5	4	4	5	4	4	4.44
	U3	5	4	5	5	5	5	5	5	4	4.78
	U4	4	5	5	5	4	4	4	5	4	4.44
	U5	4	5	4	5	5	5	4	5	4	4.56

Table 4.26 Validation Results

Dimension	Total Range	Avg. Score	Std. Deviation	Conclusion
Propriety	21-25	4.69	0.3	Highly Appropriate
Feasibility	22-25	4.63	0.4	Fully Feasible
Utility	22-25	4.65	0.3	Significant Utility



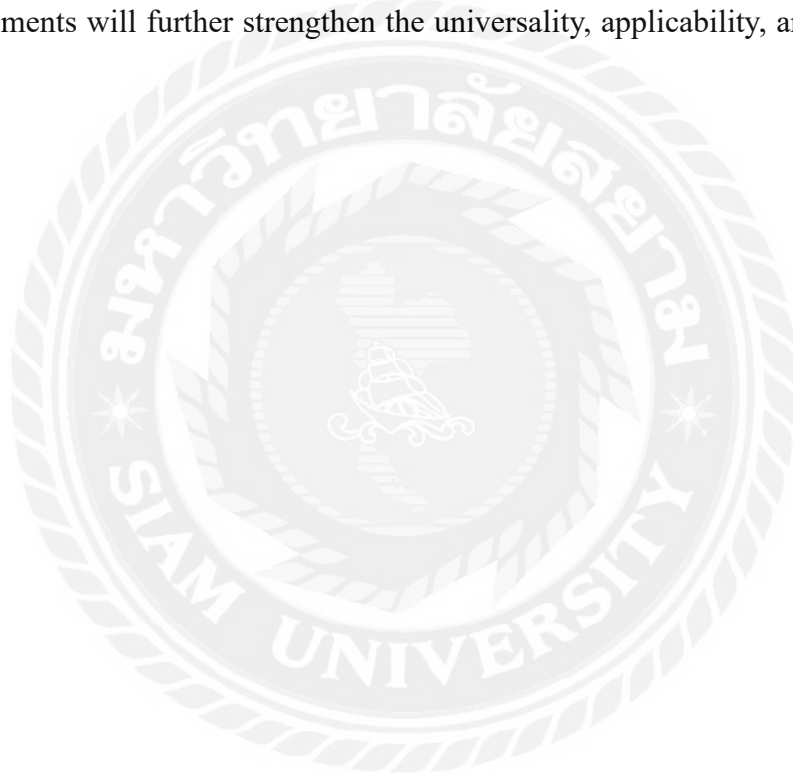
Table 4.27 Expert Reviews on Propriety, Feasibility, and Utility

Expert Name	Focus Dimension	Main Conclusion	Suggestions for Improvement
Zhao Lei	Propriety	Well aligned with the national strategy of industry-education integration; research subjects are appropriate and conclusions reliable; adheres to academic norms.	Expand the sample to include universities from different regions and of different types.
Zhang Yang	Propriety	Covers not only knowledge and skills but also values and professional attitudes; demonstrates theoretical and educational significance. Research methodology is reasonable; design comprehensive and feasible; provides empirical support for university-enterprise cooperation.	Add open-ended questionnaire items in future studies to further explain quantitative findings.
Wang Hui	Feasibility	Strong potential for practical application; questionnaire effectively captures students' experiences.	Broaden sample scope; consider resource disparities among institutions.
Liu Qiang	Feasibility	Provides direct support for curriculum reform and enterprise internship/job design; shows high practical value.	Refine wording of items, e.g., frequency and methods of teacher feedback.
Sun Wei	Utility	Research framework is systematic and aligns with policy orientation; practical significance is clear for guiding industry-university collaboration.	Integrate student feedback with enterprise needs to strengthen application.
Wang Chong Guang	Propriety		Enhance longitudinal tracking of outcomes to verify long-term effectiveness.

Expert Name	Focus Dimension	Main Conclusion	Suggestions for Improvement
Li Xiaoming	Utility	Applicable beyond engineering, including agriculture and healthcare; broad value.	Address disciplinary and industry-specific differences when promoting findings.
Shi Zhong	Utility	Demonstrates solid theoretical foundation and methodological rigor; contributes to innovation in educational evaluation.	Strengthen cross-disciplinary validation to ensure wider applicability.
Chen Jing	Comprehensive Evaluation	Performs well in appropriateness, feasibility, and usefulness; valuable for schools, enterprises, and policymakers.	Consider disparities in teacher guidance resources when scaling up.

Validation Conclusion

Overall, the experts recognized that the model demonstrates high levels of propriety, feasibility, and utility. It aligns with national strategies of industry-education integration and reflects both theoretical and practical significance. The research provides valuable insights for improving students' knowledge, competencies, and employability, while also offering decision-making references for universities, enterprises, and policymakers. Future improvements should focus on expanding the sample to cover diverse regions and types of institutions, refining the questionnaire design for greater precision, incorporating longitudinal questionnaire data to deepen interpretation, and addressing resource disparities across schools and industries. These enhancements will further strengthen the universality, applicability, and impact of the study.



CHAPTER 5

RESEARCH DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Summary of Key Findings

Based on the quantitative analysis conducted using structural equation modeling (SEM), this study provides empirical evidence on the mechanism through which University–Enterprise Cooperation (UEC) enhances students' perception of employability among private vocational college students in Shandong Province. Rather than focusing on individual statistical indicators, this section summarizes the overall patterns and substantive findings of the study to provide a foundation for the subsequent discussion.

First, the findings indicate that students' perception of employability is shaped by a combination of university-related educational inputs and experiential learning processes. Disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, as well as teacher guidance and feedback, were all found to play significant roles in the UEC context. These results suggest that employability perception is not formed in isolation, but emerges from sustained academic preparation and institutional support.

Second, enterprise practice experience was identified as a central mechanism in the employability development process. Students who reported higher-quality enterprise practice experiences tended to exhibit stronger confidence in their employment readiness and career prospects. Importantly, the results show that the influence of university-related factors on employability perception operates not only through direct pathways but also, to a large extent, through enterprise practice experience. This finding highlights the pivotal role of experiential learning in translating educational resources into employability-related outcomes.

Third, the mediating analysis demonstrates that enterprise practice experience serves as an effective transmission channel linking academic preparation with students' perception of employability. While university-related factors retain some direct influence, their effects are substantially strengthened when students are provided with meaningful opportunities to engage in enterprise-based practice. This result underscores the importance of integrating classroom learning with authentic workplace experiences in vocational education.

Fourth, learning engagement was found to significantly moderate the relationship between enterprise practice experience and students' perception of employability. The positive impact of enterprise practice experience on employability perception was stronger for students who demonstrated higher levels of engagement in learning activities. This suggests that students' active involvement, motivation, and reflective participation function as amplifiers that enhance the effectiveness of experiential learning.

Overall, the key findings reveal a layered and interactive employability development mechanism within the UEC framework. University-related factors provide the foundational inputs, enterprise practice experience functions as the core transformation mechanism, and learning engagement operates as a conditional enhancer. Together, these elements form an integrated system that shapes students' perception of employability. The following sections build on these summarized findings to offer an in-depth discussion, theoretical interpretation, and practical implications.

5.2 Discussion

5.2.1 Current Status of Employability Perception

In the context of intensified global labor market competition and rapid technological transformation, students' perception of employability has become a critical indicator for evaluating the alignment between vocational education outcomes and labor market adaptability. Recent employability research emphasizes that employability perception reflects not only objective skill possession but also students' subjective confidence in their ability to obtain, maintain, and develop employment in dynamic career environments (Tomlinson, 2017). Within this framework, the present study examined the employability perception of students enrolled in higher vocational colleges in Shandong Province under the University–Enterprise Cooperation (UEC) system.

Based on questionnaire data collected from 561 students across five vocational colleges, the descriptive results indicate that students' overall employability perception remains at a moderate level. Most employability-related variables were around the moderate level, while teacher guidance and feedback showed comparatively lower mean scores. This distribution reflects a pattern of being above average but not highly confident, suggesting that students recognize certain employability strengths while simultaneously expressing hesitation and uncertainty regarding their future employment prospects (Jackson & Bridgstock, 2021).

Further analysis suggests that students' employability perception is shaped more strongly by self-judgment and internal appraisal than by external employment outcomes. Although many students believe they possess essential technical skills and foundational knowledge, they remain uncertain about whether these competencies can be successfully translated into stable employment. Contemporary employability research attributes this phenomenon to two primary factors: first, the perceived

misalignment between curricular content and evolving workplace requirements; and second, insufficient opportunities for structured career reflection and identity formation (Clarke, 2018). In this study, such uncertainty manifests as relatively low scores in dimensions related to employment certainty and career confidence.

At the dimensional level, students reported comparatively higher scores in self-evaluation of practical and operational skills, reflecting the tangible outcomes of UEC initiatives implemented in recent years. Internships, project-based learning, and enterprise mentor participation appear to have strengthened students' confidence in their hands-on abilities. This finding is consistent with recent empirical evidence indicating that work-integrated learning and enterprise exposure positively influence students' perceived technical competence (Tran, 2016). However, lower scores were observed in more complex cognitive and developmental dimensions, such as industry knowledge integration, professional identity formation, and advanced problem-solving capability. This structural imbalance suggests that while vocational students may be "capable of performing tasks," they often lack a comprehensive understanding of occupational roles, industry dynamics, and long-term career pathways.

This pattern echoes recent critiques of vocational education that highlight an overemphasis on immediate skill training at the expense of holistic employability development. Contemporary studies argue that employability increasingly depends on adaptive capabilities, reflective learning, and career self-management rather than isolated technical proficiency (Tomlinson, 2017). The findings of this study reinforce the concern that vocational students may demonstrate strong task execution skills while lacking clarity regarding the purpose, value, and future application of their work—resulting in a form of "instrumental competence without professional confidence."

From a regional and contextual perspective, Shandong Province is undergoing accelerated industrial restructuring, transitioning from traditional manufacturing toward intelligent manufacturing, high-end services, and marine-related industries. This transformation has expanded employment opportunities for vocational graduates whose skills align with industry demand, while simultaneously raising employer expectations regarding complex competencies such as adaptability, cross-functional communication, and continuous learning (Shandong Provincial Bureau of Statistics, 2021). In this environment, employability perception is no longer determined solely by technical training but increasingly shaped by students' confidence in their ability to navigate complex and evolving work contexts.

According to recent applications of Social Cognitive Career Theory, career-related perception is jointly influenced by self-efficacy, outcome expectations, and perceived environmental support (Lent et al., 1994). However, the current vocational education system in Shandong appears to place greater emphasis on skill delivery than on feedback mechanisms, career guidance, and reflective evaluation. As a result, some students who participate in enterprise internships or cooperative projects still fail to

develop a strong sense of professional belonging or career direction. This explains why engagement in UEC does not automatically translate into high employability confidence for all students.

Cultural and social factors further complicate students' employability perception. Recent studies on Chinese vocational students highlight the persistent influence of family expectations, social comparison, and preferences for perceived employment stability on career confidence (Tomlinson, 2017). In contexts where parental expectations strongly shape career decisions, students may evaluate their employability based on external validation rather than experiential feedback, leading to cognitive dissonance between actual competence and perceived employability.

Within the present sample, students demonstrated relatively strong confidence in practical skills and enterprise practice experience, while reporting comparatively lower perceptions of teacher guidance and career-related support. This pattern suggests that UEC implementation should not only strengthen practice opportunities but also improve guidance, feedback, and career-oriented learning support.

5.2.2 Impact of University-Related Factors on Employability Perception

To examine the influence of university-related factors on students' perception of employability, this study incorporated four core dimensions—Disciplinary and Industry Knowledge (DK), Practical and Problem-Solving Skills (PS), Professionalism and Work Attitude (PA), and Teacher Guidance and Feedback (TK)—into the structural equation modeling analysis. The results indicate that all four variables exert statistically significant positive effects on students' perceived employability, although the magnitude of their effects varies across dimensions. This finding highlights the multifaceted nature of employability development within the University–Enterprise Cooperation (UEC) framework.

Disciplinary and industry knowledge demonstrated a stable and significant positive influence on employability perception, suggesting that a solid academic foundation and industry awareness provide essential cognitive support for students' employment confidence. Recent employability studies emphasize that disciplinary knowledge remains a crucial component of employability when it is embedded within an understanding of industry context and occupational standards (Tomlinson, 2017). Students who possess clearer conceptual frameworks and industry-related knowledge are better positioned to interpret job requirements and assess their own readiness for employment.

However, contemporary research cautions against equating knowledge acquisition with employability outcomes. While students may demonstrate adequate subject knowledge, they often struggle to translate abstract concepts into actionable strategies in real workplace situations. This reflects a persistent "knowledge–application gap" observed in vocational education contexts, where learning outcomes are insufficiently connected to authentic work scenarios (Jackson & Bridgstock, 2021).

The findings of this study suggest that disciplinary knowledge enhances employability perception primarily when it supports students' understanding of how academic learning aligns with industry practices, rather than functioning as isolated theoretical content.

Among the four university-related factors, practical and problem-solving skills emerged as the strongest predictor of perceived employability. This result reinforces the central role of applied competence in vocational education, where students' confidence in their employability is closely tied to their ability to address real-world tasks and challenges. Recent studies consistently demonstrate that employers increasingly value graduates' capacity to solve problems, adapt to uncertainty, and apply skills flexibly across contexts (Clarke, 2018). In this study, students who reported higher levels of practical and problem-solving competence also expressed stronger confidence in their employment readiness.

Nevertheless, the findings also point to structural limitations in current practical teaching approaches. Many vocational programs emphasize task completion and process simulation, while offering limited opportunities to engage with unstructured or interdisciplinary problems. As a result, students may develop proficiency in specific procedures but experience difficulty when confronted with novel or complex workplace situations. Contemporary employability research argues that practical competence should extend beyond technical execution to include adaptive transfer, situational judgment, and reflective problem-solving (Jackson & Bridgstock, 2021). The dominance of PS in predicting employability perception in this study underscores both its importance and the need to broaden its pedagogical scope.

Professionalism and work attitude also exerted a significant, though comparatively weaker, influence on employability perception. As a set of non-technical attributes—including responsibility, ethical awareness, collaboration, and initiative—professionalism contributes to students' perceived organizational fit and long-term career adaptability. Recent literature highlights that such soft skills are increasingly critical determinants of employability, particularly in service-oriented and knowledge-intensive industries (Fugate et al., 2004). The statistical significance of PA in this study confirms that students' employability confidence is shaped not only by what they can do, but also by how they behave and interact in professional environments.

Despite its recognized importance, the cultivation and assessment of professionalism remain challenging within vocational education. Soft skills are often less visible and more difficult to evaluate than technical competencies, particularly in classroom-based settings. Without sustained exposure to authentic workplace relationships, students may lack opportunities to test and refine professional attitudes, which can negatively affect their employability perception during early employment stages (Fugate et al., 2004). The findings suggest that professionalism should be more systematically embedded within experiential learning and enterprise-based activities.

Teacher guidance and feedback were also found to play a meaningful role in shaping students' employability perception, although their effect was less direct than that of practical skills. Teachers serve not only as instructors but also as facilitators of career awareness and reflective learning. Recent studies emphasize that high-quality feedback can enhance students' self-efficacy, clarify career goals, and support the integration of learning experiences (Hattie & Timperley, 2007). In this study, effective teacher guidance contributed to students' confidence by helping them interpret enterprise practice experiences and identify areas for improvement.

However, the findings also reveal constraints in the current vocational teaching context. Many teachers face competing demands related to heavy teaching workloads and expectations for industry engagement, which may limit their capacity to provide individualized career guidance. Students in this study reported relatively lower satisfaction with feedback related to career pathways and industry development trends, suggesting a gap between academic instruction and labor market insight. This highlights the need for institutional support mechanisms that enhance teachers' industry exposure and career guidance capabilities.

Overall, the results demonstrate that university-related factors influence students' perception of employability through differentiated pathways. Practical and problem-solving skills constitute the most immediate source of employment confidence, while disciplinary knowledge, professionalism, and teacher guidance provide essential cognitive, behavioral, and reflective support. These findings underscore the importance of a balanced educational approach that integrates technical competence with professional development and career-oriented guidance within the UEC framework.

5.2.3 Mediating Effect of Enterprise Practice Experience

Enterprise Practice Experience (EP) was identified as one of the most influential factors affecting students' perception of employability, with its path coefficient occupying a dominant position among all variables in the structural model. Within the higher vocational education system, practice-oriented learning—particularly internships, work-integrated learning, and enterprise-based training embedded in authentic workplace contexts—plays a decisive role in shaping students' professional confidence and employability-related self-awareness. Recent employability research consistently confirms that experiential learning constitutes a central mechanism through which students translate educational preparation into perceived employment readiness (Jackson & Bridgstock, 2021).

From a theoretical perspective, enterprise practice experience provides students with exposure to real, complex, and dynamic task environments, enabling them to move from abstract knowledge acquisition toward applied competence through "learning by doing." Contemporary career development theories emphasize that employability perception is constructed through repeated interactions between personal capability beliefs and contextual learning experiences (Lent et al., 1994). High-quality

enterprise practice offers a realistic foundation for enhancing students' self-efficacy and outcome expectations by allowing them to test their abilities, receive feedback, and experience professional roles in situ. The findings of this study indicate that students who reported more frequent and higher-quality enterprise practice experiences also demonstrated significantly stronger employability perception, underscoring the importance of embedding learning within authentic career contexts.

From a practical standpoint, while higher vocational colleges commonly offer practical training courses, short-term internships, or project-based collaborations with enterprises, the depth and quality of these experiences vary substantially. Some practice activities remain limited to observational learning or peripheral task execution, providing students with minimal opportunities to assume responsibility or participate in core business processes. Recent studies caution that such "surface-level" practice may fail to generate meaningful learning outcomes or enhance employability confidence (Tran, 2016). In contrast, enterprise practice experiences that involve independent task responsibility, teamwork participation, and structured feedback significantly strengthen students' professional autonomy and perceived job adaptability. This distinction helps explain why EP exerts a particularly strong effect on employability perception in this study.

Enterprise practice experience also functions as a critical bridging mechanism that alleviates the persistent gap between vocational education and employer expectations. Although vocational curricula increasingly incorporate industry standards and competency frameworks, rapid technological change and evolving workplace practices make it difficult for educational institutions to fully anticipate labor market demands. Direct engagement in enterprise environments enables students to acquire up-to-date industry knowledge, operational norms, and organizational culture more efficiently, facilitating a cognitive transition from a "student role" to a "professional role" (Tomlinson, 2017). This transformation not only enhances students' understanding of job requirements but also strengthens their confidence during job search and early career stages.

However, the positive impact of enterprise practice experience does not occur automatically. Recent research emphasizes that the effectiveness of work-integrated learning depends on structured task design, clear learning objectives, and collaborative supervision between educational institutions and enterprises (Billett, 2011). Practice programs lacking systematic guidance risk reducing students' participation to routine labor or fragmented experiences, which may weaken rather than enhance employability perception. Therefore, sustainable partnerships between schools and enterprises are essential to ensure that practice experiences evolve from "experience-oriented exposure" to "outcome-oriented learning."

Moreover, students' subjective engagement plays a crucial role in determining the effectiveness of enterprise practice. Students who enter practice experiences without clear career goals or who participate passively may fail to construct positive professional meaning from their activities, potentially reinforcing uncertainty about their employability. Recent studies highlight that pre-practice preparation—such as career orientation, task clarification, and psychological readiness training—significantly enhances students' capacity to benefit from enterprise practice (Jackson, 2016). These preparatory mechanisms help students approach practice with reflective intent and proactive learning attitudes.

Finally, enterprise practice experience may indirectly influence students' perception of employability by reshaping their understanding of the relationship between disciplinary knowledge and practical competence. Through engagement in enterprise tasks, students often recognize gaps in their knowledge systems, which can stimulate autonomous learning motivation and goal-directed behavior. This iterative process of "practice–reflection–relearning" fosters deeper recognition of the relevance and value of academic learning, thereby enhancing employability perception at both cognitive and emotional levels (Tomlinson, 2017). Consequently, enterprise practice experience not only strengthens immediate employment confidence but also contributes to students' long-term career adaptability.

5.2.4 Moderating Role of Learning Engagement

This study further examined the moderating role of Learning Engagement (LE) in the relationship between Enterprise Practice Experience (EP) and Students' Perception of Employability (SPE) using interaction effect analysis. The results demonstrate that learning engagement exerts a statistically significant positive moderating effect on this relationship. Specifically, the positive impact of enterprise practice experience on employability perception becomes stronger as students' level of learning engagement increases. However, because the additional explanatory power of the interaction effect was relatively small, the moderation result should be interpreted cautiously.

From a theoretical perspective, the moderating role of learning engagement can be explained through contemporary constructivist learning theory and modern applications of self-determination theory. Recent constructivist research emphasizes that learning outcomes are shaped by learners' active cognitive processing, reflection, and meaning construction rather than passive exposure to learning environments (Kolb, 1984). In enterprise practice contexts, students who actively engage in tasks, reflect on experiences, and connect practice with prior knowledge are more likely to transform external experiences into internalized competencies and professional understanding.

Similarly, recent self-determination theory–based studies suggest that learning engagement is driven by the fulfillment of autonomy, competence, and relatedness needs within learning environments (Ryan & Deci, 2000). When enterprise

practice provides students with meaningful tasks, opportunities to demonstrate competence, and supportive interactions with mentors, students are more likely to experience intrinsic motivation and sustained engagement. This heightened engagement, in turn, amplifies the positive influence of enterprise practice on employability perception.

Empirically, this study reveals substantial variation in learning engagement among students participating in enterprise practice programs. Although most students were exposed to similar practice opportunities, their depth of participation and learning behaviors differed markedly. Highly engaged students actively sought challenging tasks, communicated frequently with enterprise mentors, and engaged in systematic reflection on their learning experiences. These students reported significantly higher levels of employability perception. In contrast, students with lower engagement tended to complete assigned tasks passively, lacked clear learning goals, and failed to internalize their practical experiences, resulting in limited gains in employability perception. This contrast underscores that enterprise practice experience alone does not automatically translate into employability confidence; rather, learning engagement functions as a critical catalyst in this transformation process.

The moderating effect of learning engagement can be understood through three interrelated pathways. First, the cognitive processing pathway suggests that highly engaged students engage in deeper information processing, including reflection, abstraction, and transfer of learning across contexts. Such cognitive activities enhance students' understanding of how their competencies align with job requirements, thereby strengthening employability perception. Second, the emotional and identity-related pathway indicates that engaged students are more likely to develop a sense of professional belonging and occupational identity within enterprise environments. Positive emotional experiences and identity affirmation contribute to stronger confidence in future career development. Third, the behavioral performance pathway highlights that engaged students are more likely to receive positive feedback, greater responsibility, and increased trust from enterprise mentors. These reinforcing interactions further enhance students' perceived competence and professional self-efficacy.

Recent empirical studies support the differentiated role of learning engagement across student groups. Students with stronger self-regulated learning ability and clearer career goals are more likely to demonstrate high engagement during enterprise practice and, consequently, derive greater employability benefits (Fredricks et al., 2004). Conversely, students in earlier stages of study or those with limited exposure to workplace environments may struggle to sustain engagement without structured guidance, feedback, and scaffolding. This suggests that learning engagement does not emerge spontaneously, but requires deliberate instructional design and supportive learning environments.

Accordingly, the findings imply that enterprise practice programs should be designed with differentiated task structures and support strategies. For example, introductory students may benefit from observation-based tasks and guided reflection activities to build initial industry awareness, while senior students approaching graduation may require more complex, responsibility-driven assignments to enhance their sense of achievement and employability readiness. By aligning task difficulty and support mechanisms with students' developmental stages, institutions can more effectively foster learning engagement and maximize the educational value of enterprise practice.

Overall, this study confirms the positive moderating role of learning engagement in the relationship between enterprise practice experience and students' perception of employability. Learning engagement should be understood not merely as a transient psychological state, but as an integrated manifestation of motivation, behavior, and professional awareness. Within the university–enterprise cooperation framework, learning engagement functions as a driving force, a transformational bridge, and an amplifier that connects experiential learning resources with employability outcomes. Therefore, future educational reform and practice design should prioritize the development of systematic guidance and evaluation mechanisms that support students' learning engagement, ensuring that enterprise practice serves as an effective pathway for holistic employability development.

5.3 Conclusion

5.3.1 Overall Pattern of Students' Perception of Employability

The discussion of students' perception of employability should be situated within the broader context of contemporary vocational education and labor market uncertainty. The results of this study indicate that students' overall employability perception remains at a moderate level, reflecting neither a strong sense of insecurity nor a high level of confidence. This pattern suggests that vocational students tend to adopt a cautious and relatively pragmatic evaluation of their own employability.

Recent employability research emphasizes that employability perception is inherently subjective and shaped by students' interpretations of their skills, experiences, and future career opportunities rather than by objective employment outcomes alone (Tomlinson, 2017). In this study, students demonstrated reasonable confidence in their technical and operational abilities, yet expressed uncertainty regarding long-term career development, job stability, and adaptability to changing labor market demands. Such ambivalence reflects a common phenomenon among vocational students who possess practical competencies but lack clarity regarding career trajectories and professional identity.

This moderated employability perception can also be understood as a response to increasing labor market complexity. Rapid technological change, industrial upgrading, and heightened employer expectations have made employment outcomes

less predictable, particularly for vocational graduates. Recent studies indicate that under such conditions, students are more likely to engage in conservative self-assessment, balancing perceived competence with awareness of external risks (Clarke, 2018). The findings of this study align with this trend, suggesting that students' employability perception is shaped by both internal capability assessment and external environmental uncertainty.

Furthermore, the results highlight a structural imbalance within students' employability perception. While confidence in task execution and technical skills is relatively high, perceptions related to career planning, professional growth, and industry-wide adaptability are comparatively weaker. Contemporary research argues that employability increasingly depends on meta-competencies such as career self-management, adaptability, and lifelong learning orientation rather than on isolated technical skills (Tomlinson, 2017). The observed imbalance suggests that vocational education may still prioritize immediate job-related skills over long-term career development capacities, thereby limiting students' overall employability confidence.

From a contextual perspective, this pattern is particularly relevant in regions undergoing industrial transformation, such as Shandong Province. As industries shift toward intelligent manufacturing, high-end services, and technologically intensive sectors, vocational graduates are expected to demonstrate not only operational competence but also cognitive flexibility and continuous learning capability. Recent regional labor market analyses indicate that students' employability perception is increasingly influenced by their perceived ability to adapt to such transitions (Tomlinson, 2017). In this context, moderate employability perception reflects both opportunity awareness and perceived pressure.

Overall, the findings suggest that students' employability perception is best understood as a dynamic and multi-dimensional construct shaped by educational experience, labor market context, and individual interpretation. This provides an important foundation for understanding the roles of university-related factors, enterprise practice experience, and learning engagement discussed in the subsequent sections.

5.3.2 Role of University-Related Factors in Employability Development

The findings of this study indicate that university-related factors play a foundational role in shaping students' perception of employability within the University–Enterprise Cooperation (UEC) framework. Rather than exerting isolated effects, disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback collectively constitute an integrated educational environment that prepares students for effective engagement in enterprise practice and future employment.

Recent employability research emphasizes that higher education institutions influence employability not only through skill transmission, but also by shaping

students' cognitive frameworks, behavioral norms, and career-related self-efficacy (Tomlinson, 2017). In this study, the combined influence of university-related factors reflects the importance of aligning academic learning with industry expectations and professional development goals. When students perceive coherence between what they learn at university and what is required in the workplace, they are more likely to evaluate their employability positively.

Disciplinary and industry knowledge contributes to employability development by enabling students to contextualize their learning within occupational and industrial settings. Contemporary studies argue that employability-oriented knowledge is not limited to subject mastery, but includes understanding industry standards, workflows, and emerging trends (Jackson & Bridgstock, 2021). The findings suggest that students' employability perception benefits when disciplinary learning is explicitly connected to real-world applications, thereby reducing uncertainty about the relevance of academic content.

Practical and problem-solving skills represent the most visible manifestation of university influence on employability perception. However, the discussion of these skills extends beyond technical proficiency. Recent research highlights that employability increasingly depends on students' ability to adapt skills across contexts, manage ambiguity, and engage in reflective problem-solving (Tomlinson, 2017). The results of this study suggest that university environments that emphasize experiential learning, applied projects, and reflective practice are better positioned to foster employability confidence among students.

Professionalism and work attitude further shape employability development by influencing how students perceive their suitability for organizational environments. Contemporary literature underscores that employers value behavioral attributes such as responsibility, collaboration, initiative, and ethical awareness alongside technical competence (Fugate et al., 2004). The findings indicate that when universities incorporate professionalism development into teaching and assessment practices, students are more likely to view themselves as capable of meeting workplace expectations and sustaining long-term career development.

Teacher guidance and feedback function as a critical enabling mechanism that integrates academic learning with career-related reflection. Recent studies emphasize that effective feedback enhances students' self-regulated learning, career clarity, and confidence in navigating transitions from education to employment (Hattie & Timperley, 2007). In this study, teacher guidance appears to support employability development by helping students interpret learning experiences, identify strengths and gaps, and align educational efforts with career aspirations. However, the discussion also suggests that the effectiveness of teacher guidance depends on its alignment with industry realities and students' practical experiences.

Importantly, the influence of university-related factors should be understood as preparatory rather than sufficient for employability development. While these factors establish essential knowledge, skills, and attitudes, their full impact on employability perception is realized only when students have opportunities to apply and test them in authentic enterprise contexts. This observation provides a conceptual link to the mediating role of enterprise practice experience discussed in the following section.

Overall, the findings reinforce the view that universities play a strategic role in employability development by constructing an educational ecosystem that integrates academic learning, professional socialization, and career-oriented guidance. Within the UEC framework, university-related factors serve as the groundwork upon which experiential learning and individual engagement build, highlighting the need for coherent and employment-oriented educational design.

5.3.3 Enterprise Practice Experience as a Core Mediating Mechanism

The findings of this study confirm that enterprise practice experience plays a central mediating role in the relationship between university-related factors and students' perception of employability. Rather than exerting purely direct effects, disciplinary knowledge, practical skills, professionalism, and teacher guidance influence employability perception largely through students' engagement in enterprise-based practice. This result highlights enterprise practice experience as a key transformation mechanism within the University–Enterprise Cooperation (UEC) framework.

Recent employability research increasingly emphasizes that educational inputs must be translated into experiential learning outcomes in order to meaningfully influence students' employability-related beliefs (Tomlinson, 2017). From this perspective, enterprise practice experience provides the context in which students can apply, test, and refine the competencies developed in academic settings. The mediating effect observed in this study suggests that employability perception is constructed not simply through possessing knowledge or skills, but through experiencing their relevance and effectiveness in authentic work environments.

Enterprise practice experience enables students to bridge the gap between theoretical learning and workplace application by exposing them to real organizational tasks, professional norms, and performance expectations. Through such exposure, students gain concrete feedback regarding their abilities, which contributes to stronger self-efficacy and clearer outcome expectations. Recent studies grounded in career development theory indicate that these experiential feedback processes are critical for shaping employability perception and career confidence (Lent et al., 1994). The findings of this study support this view by demonstrating that students with richer enterprise practice experiences exhibit higher levels of employability perception, even when controlling for academic preparation.

Importantly, the mediating role of enterprise practice experience underscores the conditional effectiveness of university-related factors. While universities may provide strong disciplinary instruction, skill training, and professional guidance, these elements alone are insufficient to fully shape students' employability beliefs. Without opportunities to apply learning in enterprise contexts, students may struggle to assess the practical value of their competencies, resulting in weaker employability confidence. This observation aligns with recent critiques of employability initiatives that rely heavily on curriculum reform without sufficient integration of workplace learning (Clarke, 2018).

The partial mediation identified in this study further suggests that enterprise practice experience complements rather than replaces the influence of university-related factors. Academic preparation continues to exert a direct influence on employability perception by shaping students' cognitive understanding and professional orientation. However, enterprise practice amplifies and consolidates these effects by providing experiential validation. This layered influence highlights the importance of designing UEC programs that ensure coherence between academic learning objectives and enterprise practice tasks.

Moreover, the mediating role of enterprise practice experience has important implications for the quality and structure of UEC initiatives. Recent studies emphasize that not all practice experiences are equally effective in enhancing employability outcomes (Tran, 2016). Practice experiences characterized by clear learning goals, meaningful task responsibility, and structured feedback are more likely to support the development of employability perception than superficial or observational placements. The findings of this study suggest that the mediating effect of enterprise practice experience depends on its capacity to provide students with authentic learning opportunities that reinforce the relevance of academic preparation.

Overall, the discussion of enterprise practice experience as a mediating mechanism reinforces its strategic position within the employability development process. By translating university-based learning into experiential evidence of competence, enterprise practice experience enables students to construct more confident and realistic assessments of their employability. This insight provides a foundation for understanding the conditional role of learning engagement discussed in the following section.

5.3.4 Moderating Role of Learning Engagement

The results of this study further demonstrate that learning engagement plays a significant moderating role in the relationship between enterprise practice experience and students' perception of employability. This finding suggests that the effectiveness of enterprise practice is not uniform across students, but depends substantially on the extent to which students actively engage in learning activities during the practice process. Learning engagement therefore functions as a key conditional factor that shapes how experiential learning is translated into employability-related confidence.

Recent employability and learning research emphasizes that experiential learning outcomes are highly contingent on students' cognitive, emotional, and behavioral investment (Fredricks et al., 2004). In the context of University–Enterprise Cooperation, enterprise practice provides learning opportunities, but learning engagement determines how students interpret, internalize, and utilize these opportunities. Highly engaged students are more likely to reflect on practice experiences, seek feedback, and connect workplace tasks with academic knowledge, thereby strengthening their employability perception.

From a theoretical standpoint, modern constructivist learning theory argues that learners actively construct meaning through interaction with learning environments, rather than passively absorbing information (Kolb, 1984). Applied to enterprise practice, this perspective implies that students' learning outcomes depend on their depth of engagement with tasks, colleagues, and organizational contexts. The moderating effect observed in this study supports this view by indicating that enterprise practice experience contributes more strongly to employability perception when students demonstrate higher levels of engagement.

Similarly, contemporary self-determination theory research highlights learning engagement as an outcome of intrinsic motivation supported by autonomy, competence, and relatedness within learning environments (Ryan & Deci, 2000). When enterprise practice offers meaningful tasks, opportunities for competence development, and supportive mentorship, students are more likely to experience autonomous motivation and sustained engagement. This motivational process amplifies the positive influence of enterprise practice on employability perception, as reflected in the significant interaction effect identified in this study.

The discussion also suggests that learning engagement explains why some students derive greater employability benefits from similar practice experiences than others. Even when exposed to comparable enterprise practice settings, students differ in their willingness to take initiative, reflect on experiences, and pursue learning goals. Recent studies indicate that students with stronger self-regulated learning skills and clearer career orientation tend to exhibit higher engagement and, consequently, stronger employability outcomes (Fredricks et al., 2004). This differentiation highlights learning engagement as a mechanism that converts experiential exposure into perceived employability advantage.

Importantly, the moderating role of learning engagement underscores that providing enterprise practice opportunities alone is insufficient for maximizing employability development. Without adequate engagement, students may participate in practice in a superficial or instrumental manner, limiting the potential impact on employability perception. This finding reinforces calls in recent literature for integrating reflective activities, mentoring, and structured feedback into work-integrated learning programs to support sustained engagement (Billett, 2011).

Overall, the discussion of learning engagement as a moderating factor highlights its strategic importance within the employability development process. Learning engagement enhances the effectiveness of enterprise practice by strengthening cognitive processing, emotional involvement, and behavioral initiative. This insight contributes to a more nuanced understanding of how experiential learning operates within UEC frameworks and provides a foundation for the integrated model interpretation presented in the following section.

5.3.5 Integrated Interpretation of the UEC-Based Employability Model

Taken together, the findings of this study reveal a coherent and layered mechanism through which University–Enterprise Cooperation contributes to students' perception of employability. Rather than resulting from isolated educational inputs, employability perception emerges from the interaction among university-related factors, enterprise practice experience, and students' learning engagement. This integrated interpretation highlights the systemic nature of employability development within vocational education contexts.

At the foundational level, university-related factors—including disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback—provide essential cognitive, behavioral, and motivational preparation for students. These factors shape students' readiness to participate in enterprise practice and establish initial confidence in their professional capabilities. Consistent with recent employability literature, this preparation phase reflects the role of higher education institutions in constructing the conditions under which employability-related learning can occur (Tomlinson, 2017).

At the intermediate level, enterprise practice experience functions as the core transformation mechanism that converts educational preparation into employability perception. Through authentic workplace engagement, students are able to test their competencies, receive feedback, and gain insight into organizational expectations. This experiential validation enables students to construct more realistic and confident assessments of their employability. The mediating effects identified in this study confirm that enterprise practice experience is not merely an additional component, but a pivotal process through which university inputs exert their strongest influence.

At the conditional level, learning engagement operates as a critical amplifier that determines the extent to which enterprise practice experience translates into employability perception. Students' cognitive investment, emotional involvement, and behavioral initiative shape how practice experiences are interpreted and internalized. The moderating effect observed in this study explains why similar enterprise practice opportunities may yield different employability outcomes across students. This finding aligns with recent research emphasizing the role of individual agency and engagement in employability development (Fredricks et al., 2004).

This layered structure suggests that employability perception should be understood as a dynamic outcome of interaction between institutional design and individual participation. University-related factors create the necessary learning conditions, enterprise practice experience provides the experiential context, and learning engagement determines the depth and effectiveness of learning. Weakness at any level may limit the overall effectiveness of University–Enterprise Cooperation initiatives. For example, strong enterprise practice without sufficient engagement may lead to superficial learning, while high engagement without meaningful practice opportunities may result in unrealized employability potential.

Overall, the integrated interpretation offered in this section advances a holistic understanding of employability development within vocational education. It underscores the importance of aligning curriculum design, enterprise collaboration, and student engagement strategies to achieve sustainable employability outcomes. This synthesized perspective provides a conceptual foundation for the UEC-based employability model developed in the next section and informs the practical implications discussed later in this chapter.

5.4 Development of the UEC-Based Employability Model

Based on the integrated findings discussed in the previous sections, this study further developed a conceptual model to illustrate how University–Enterprise Cooperation (UEC) contributes to students' perception of employability. Rather than reiterating empirical results, this section abstracts the core conclusions into an onion-shaped employability model, which visually and conceptually represents the layered and interactive nature of employability development in vocational education.

The onion model was adopted as an analytical metaphor to emphasize that students' perception of employability is not formed through a single factor or intervention, but emerges from multiple interrelated layers that operate simultaneously. Each layer represents a distinct yet interconnected component of the UEC system, collectively shaping students' employability perception.

At the core layer of the model lies students' perception of employability, which reflects their self-assessed confidence in obtaining, sustaining, and developing employment in the labor market. This perception represents the ultimate educational outcome examined in this study. It is inherently subjective, dynamic, and influenced by both internal experiences and external learning environments.

Surrounding the core is the enterprise practice experience layer, which functions as the primary transformation mechanism within the model. Enterprise practice provides students with authentic workplace exposure, enabling them to apply knowledge, test skills, and internalize professional norms. Through these experiences, abstract learning outcomes are converted into concrete career-related confidence. The positioning of enterprise practice as the central layer highlights its pivotal role in translating educational preparation into employability perception.

The foundational layer consists of university-related factors, including disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback. These elements collectively establish the academic, behavioral, and cognitive conditions necessary for effective participation in enterprise practice. Rather than directly determining employability perception in isolation, these factors prepare students to engage meaningfully with enterprise-based learning opportunities and to interpret their experiences productively.

Operating across layers is learning engagement, which functions as a dynamic amplifier within the model. Learning engagement influences how students interact with both university-based learning and enterprise practice experiences. Highly engaged students are more likely to reflect deeply, seek feedback, and construct professional meaning from their experiences, thereby strengthening the impact of enterprise practice on employability perception. In contrast, limited engagement may weaken the effectiveness of even well-designed practice opportunities. By positioning learning engagement as a cross-cutting element, the model emphasizes the role of student agency in employability development.

The outermost layer of the onion model represents the broader institutional and socio-economic context, including regional industrial structure, labor market conditions, and policy support for university–enterprise cooperation. Although not the primary focus of this study, this contextual layer frames the operation of UEC initiatives and shapes the opportunities available to students. Its inclusion acknowledges that employability perception is embedded within wider structural conditions beyond the control of individual institutions or learners.

Overall, the UEC-based employability onion model illustrates employability development as a systemic and layered process, in which educational inputs, experiential learning, and individual engagement interact to shape students' employability perception. This conceptualization advances existing employability frameworks by explicitly integrating mediation and moderation mechanisms within a unified structure. The model provides a theoretical foundation for the practical implications discussed in the following section and offers a reference framework for future research on employability development in vocational education contexts.

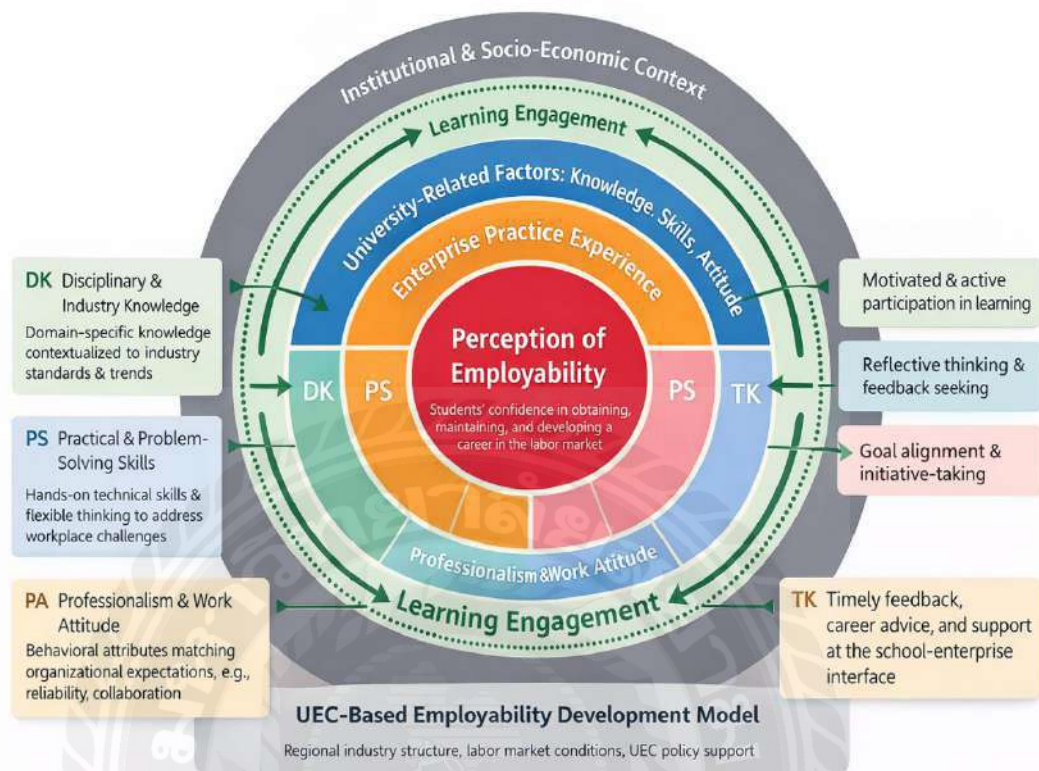


Figure 5.1 Onion Model of University–Enterprise Cooperation and Employability Perception

5.5 Practical Implications and Recommendations

Drawing on the key findings in Sections 5.1–5.2 and the onion-model synthesis in Section 5.3, this section provides practical implications and recommendations for key stakeholders. The central logic is that improving students' perception of employability requires layered and coordinated interventions: policy and institutional safeguards (outer layer), employability-oriented educational design (university layer), high-quality enterprise practice as the core transformation mechanism (enterprise layer), and students' active engagement as the amplifier (cross-layer driver). Recent employability research similarly emphasizes that employability development is not the product of a single initiative but the outcome of aligned efforts across systems, organizations, and individuals (Tomlinson, 2017).

5.5.1 Implications for Government and Policymakers

Facing the structural challenges confronting higher vocational education in China and the profound transformation of labor-market demand, local governments bear an irreplaceable responsibility in promoting University–Enterprise Cooperation (UEC) and strengthening students' employability perception. Based on the conclusions of this study, governments are encouraged to improve the system from three interrelated

dimensions: (1) strategic funding and ecosystem coordination, (2) employability-oriented assessment and certification, and (3) standardization and institutional safeguards for UEC implementation.

First, governments should establish a regional employability-support mechanism that provides policy guarantees and financial resources for deepening UEC. Under economic transformation and talent-structure upgrading, employers increasingly expect vocational graduates to demonstrate not only technical competence but also adaptive problem-solving, professional behaviors, and career self-management capacity. However, many vocational colleges still face constraints in curriculum upgrading, practice resource development, and industry-mentor introduction. It is therefore recommended that provincial or municipal authorities set up dedicated funding schemes—such as "UEC collaborative education funds" and "practice-education incubation grants"—prioritizing consortia with demonstrated outcomes in co-education, cross-disciplinary training platforms, and professional literacy development. Meanwhile, fiscal allocation can be linked to the quality of UEC implementation (e.g., practice task authenticity, mentoring input, learning outcomes), thereby encouraging colleges to embed employability enhancement as a core objective of talent development programs and forming an employability-oriented education supply mechanism (Tomlinson, 2017).

Second, establishing a systematic and operational employability assessment and certification system is essential for improving educational accountability and labor-market recognition. In many current contexts, student capability assessment is still dominated by academic scores and credentials, while soft competencies—professionalism, job adaptability, industry understanding—are insufficiently measured, which contributes to the employer complaint of "credentials without workplace readiness." It is recommended that education authorities lead the development of a unified regional employability indicator framework, organizing indicators into three domains—professional literacy, professional/technical competence, and job adaptation and career self-management—and refining measurable indicators such as problem-solving, collaboration, communication, learning agility, occupational understanding, and adaptability. Certification can adopt multiple evidence sources (enterprise mentor appraisal, task-based practice assessment, scenario simulations, portfolio-based employability profiling), generating an "employability level certificate" and a "capability growth portfolio." Such outcomes can support students' self-cognition and job search, inform employer selection, and serve as institutional evidence for teaching-quality improvement. On this basis, policymakers may consider gradually promoting a dual-track credential system where competency certification complements academic qualifications, supporting a shift from "academic outcome orientation" to "professional competence orientation." In addition, involving third-party evaluation agencies and industry associations can enhance the scientific rigor, authority, and industry alignment of the system (Clarke, 2018).

Third, governments should strengthen the standardization and institutionalization of UEC implementation. Although national policy frameworks have encouraged industry–education integration in recent years, local practice often faces fragmentation, unclear responsibilities, and excessive flexibility that may lead to formalistic cooperation with limited student benefit. It is recommended that authorities develop unified implementation guidelines—such as "Management Measures for Higher Vocational UEC Practice" or "Standards for Vocational Practice Teaching"—to clarify minimum requirements regarding time allocation, task design, mentoring qualifications, feedback and evaluation, and student rights protection. For example, practice should ensure adequate workload and learning substance, practice tasks should align with authentic enterprise projects and include outputs and process management, enterprise mentors should meet experience requirements and participate in formative evaluation, and post-practice reflection and joint evaluation should be mandatory. A qualification mechanism for internship-hosting enterprises is also recommended, incorporating practice resources, mentoring capacity, safety assurance, and management systems into audits, establishing a "white list of practice enterprises" and a "demonstration practice base" mechanism, with appropriate incentives (recognition, subsidies, or policy-based benefits). In parallel, protecting student rights in practice requires clear rules for agreements, insurance, safety training, reasonable working hours, labor protection, and complaint channels to enhance students' security and perceived gains during enterprise practice (Tran, 2016).

In sum, government should play multiple roles in strategic guidance, policy support, and institutional safeguards. Dedicated funding provides the material basis for co-education; a scientific certification system provides a basis for capability recognition and quality evaluation; and standardized implementation rules ensure the normalization and quality of UEC. Coordinated governance across these three dimensions can strengthen vocational education's employability orientation and support regional economic and human-capital development.

5.5.2 Implications for Vocational Colleges

Under the continuing reform of vocational education and industrial upgrading, higher vocational colleges should proactively implement employability-oriented education reform and build a multi-dimensional improvement mechanism around students' perception of employability. This study indicates that employability perception depends not only on knowledge and skills training, but also on practical opportunities, professionalism development, teacher guidance, industry understanding, and—critically—students' learning engagement. Therefore, three reform pathways are recommended: reconstructing employability-oriented talent training, strengthening learning engagement mechanisms, and upgrading teacher career-guidance models.

First, vocational colleges should reconstruct their talent training system around employability competence, moving beyond a "knowledge-transfer" paradigm toward

integrated capability development. In many colleges, program structures still rely heavily on textbook-driven teaching with limited practice density, insufficient industry-case integration, and few cross-domain projects, which weakens students' ability to transfer learning into workplace performance. Colleges should incorporate job-competency logic in top-level design, aligning curriculum modules with occupational standards and embedding practical competence, problem-solving, and professionalism into graduation requirements. Core courses can adopt project-based learning, co-developed enterprise curricula, and task-driven units to strengthen application and adaptability. A flexible credit and capability-portfolio system can also be introduced to encourage cross-major learning, enterprise training participation, and staged practice accumulation, forming a three-dimensional pathway of "major + capability + industry."

Second, colleges should establish systematic mechanisms to stimulate and guide learning engagement, enhancing students' initiative and deep involvement in both academic and practice-based learning. This study highlights that engagement functions as a critical amplifier in translating enterprise practice into employability perception. However, many vocational students lack clear career goals and self-regulated learning capacity, resulting in passive participation and "task completion orientation." Colleges may adopt multiple strategies to strengthen intrinsic motivation and external participation willingness. For example, structured tools such as reflective practice logs, career growth records, and employability portfolios can guide students to reflect after training, internships, and industry seminars, thereby raising metacognitive awareness and employability-related self-assessment. Additionally, colleges should strengthen career education from the first year, establishing career development courses or planning workshops that help students define personal pathways, identify competence gaps, and set action plans. Creating a positive engagement ecosystem through recognition systems, learning communities, and skill competitions can also reinforce sustained engagement and professional identity formation (Tomlinson, 2017).

Third, vocational colleges need to optimize teacher guidance systems and enhance teachers' bridging role in shaping professional confidence. High-quality teacher feedback supports career cognition, competence beliefs, and emotional stability during career choice. Yet many teachers are overloaded by teaching and assessment duties and cannot provide sustained, individualized career guidance. Colleges are recommended to implement a multi-level career guidance system, including a dual-mentor arrangement ("academic mentor + industry mentor"). Academic mentors can support capability growth and learning strategies, while enterprise mentors provide industry cognition, workplace adaptation feedback, and career insight. Teachers should also receive targeted training in vocational career guidance and industry trend interpretation, integrating employability literacy into teaching. Colleges can expand part-time enterprise mentor systems by inviting technical experts, HR managers, and project leaders for career salons, skill reviews, and project evaluation sessions, enabling stronger integration of knowledge transfer with industry experience.

In teacher evaluation, colleges may incorporate student employability development outcomes as part of performance appraisal, encouraging teachers to internalize employability cultivation as a teaching objective. Establishing a "teaching achievement–student development" linkage mechanism can promote continuous improvement through industry-case integration, enterprise resource connection, and feedback-driven teaching refinement. Institutional support such as internal employability-improvement grants can further encourage educational innovation and provide evidence for effective in-school employability enhancement pathways.

Overall, vocational colleges should advance reforms across system design, teacher–student interaction, and student motivation. By reconstructing employability-oriented training, strengthening engagement mechanisms, and upgrading career guidance aligned with industry integration, colleges can enhance students' self-efficacy, adaptability, and employability confidence, supporting a transition from "knowledge-based teaching institutions" to "capability-based education platforms."

5.5.3 Implications for Enterprises

As vocational education becomes increasingly employability-oriented, enterprises should no longer be viewed merely as internship providers but as key co-educators in students' professional capability formation. Students' employability perception is closely associated with authentic practice experiences and workplace cognition, which are largely constructed within enterprise-participating practice links. Therefore, enterprises should move from passive acceptance of interns to proactive, systematic participation across education stages, achieving dual goals of student development and talent supply.

First, enterprises should clarify their co-education responsibility, shifting from a "utilization-oriented" cooperation mindset to an "empowerment-oriented" collaboration logic. In practice, some enterprises treat interns as temporary labor and assign repetitive marginal tasks, resulting in limited learning gains and weakened professional identity. Enterprises are recommended to formulate structured internship/training plans, jointly designed by HR and operational/project departments, specifying staged learning objectives, competence modules, and evaluation standards. Assigning job mentors, offering focused training, implementing staged reporting, and providing performance feedback can help students build a visible competence growth curve, accumulate authentic work experience through project participation, and strengthen job adaptation and skill transfer.

Second, enterprises should design practice content that is systematic, appropriately challenging, and feedback-rich. Where internship design lacks structure, challenge, and feedback, students may fail to develop competence and control. Enterprises can build a task chain including "position observation–task execution–problem analysis–output presentation," strengthening communication, coordination, problem-solving, and execution through team collaboration and project summarization.

Regular reviews and career mentoring by enterprise mentors help students identify strengths and growth space and build positive professional self-cognition (Billett, 2011).

Third, enterprises should participate in curriculum co-development, standards setting, and talent evaluation to deepen industry–education integration. Students' employability perception is shaped not only by classroom learning but also by contact with industry standards and job competence structures. Enterprises can contribute updated cases, process standards, and tool application content, aligning teaching with workplace reality. They may also support professional setting optimization and curriculum restructuring using job-portrait-based backward design and topic-to-task conversion. In evaluation, enterprises can co-develop competence matrices based on workplace performance and collaborate with teachers to build multidimensional assessment frameworks combining industry knowledge, workplace behavior, and adaptation capability, enhancing alignment between graduation standards and industry entry standards.

Fourth, a cooperation-performance feedback mechanism should be established to enable dynamic evaluation and continuous improvement. Many partnerships lack systematic feedback channels and risk becoming formalistic. Enterprises can form UEC evaluation teams to assess practice link quality using indicators such as student satisfaction, mentoring frequency, job fit, and capability improvement evidence, and then feed results back into curriculum reform and training-program optimization, forming a closed-loop quality assurance mechanism of "input–implementation–feedback–adjustment."

Finally, internal incentive mechanisms should be designed to mobilize enterprise participation. Enterprises can incorporate "talent cultivation contribution" into performance appraisal, offering promotion or bonus incentives to mentors and staff involved in teaching design and internship organization. Large enterprise groups may establish dedicated UEC departments or talent bases to professionalize cooperation governance. In addition, industry associations and leading enterprises may take the lead in building regional UEC communities, moving beyond one-to-one partnerships and enabling scale advantages in resource sharing, standard setting, and model replication. Establishing demonstration bases in industry parks can support multi-party collaboration and strengthen regional vocational education service capacity.

In summary, enterprises should shift from "temporary internship providers" to "deeply engaged co-educators," enhancing students' employability perception through structured task design, mentoring input, curriculum co-construction, evaluation mechanisms, and institutional support. Only when enterprises internalize student capability development into their talent strategy and build trust-based cooperation with colleges can UEC evolve from external collaboration to integrated co-education.

5.5.4 Implications for Students

Students are active agents in employability development, and their engagement and initiative critically shape outcomes. To strengthen employability perception and long-term career adaptability, students should adopt a learning strategy centered on goal setting, reflective practice, proactive participation, professionalism development, and lifelong learning.

First, students should cultivate habits of reflection and goal management by maintaining employability portfolios documenting skills, reflections, outputs, and achievements, while setting clear short- and long-term goals to guide academic learning and enterprise practice. Second, during enterprise placements, students should actively seek challenges, emphasize problem-solving and adaptability, engage in daily reflection, and communicate regularly with mentors to internalize workplace learning and build realistic confidence. Third, beyond technical skills, professionalism and soft competencies are essential. Students should enhance collaboration, communication, responsibility, and ethical awareness through project teamwork, extracurricular career clubs, competitions, and networking activities. Finally, students must embrace lifelong learning, recognizing employability as a dynamic capability requiring continuous upgrading. Participation in online courses, professional certifications, and industry seminars helps students keep pace with labor-market transformation and sustain employability beyond initial employment (Tomlinson, 2017).

In line with the onion-model logic, government-level structural support provides the institutional environment; vocational college reform cultivates foundational competence and guidance; enterprise participation transforms theory into workplace capability; and students' engagement determines whether experience becomes employability confidence. Together, these layers constitute a collaborative employability enhancement system in which each stakeholder's contribution strengthens students' employability perception.

5.6 Research Contributions

5.6.1 Theoretical Contributions

This study contributes to the interdisciplinary literature on higher vocational education, University–Enterprise Cooperation, and employability in three ways.

First, the study developed an integrated explanatory framework that places Students' Perception of Employability (SPE) at the core and conceptualizes employability perception as a layered outcome shaped by university factors, enterprise practice experience, and learning engagement. Compared with earlier employability research that often emphasizes objective outcomes (e.g., employment rates, salary, job match), this study emphasizes the subjective, developmental, and mechanism-based nature of employability perception, aligning with contemporary employability scholarship that stresses identity, adaptability, and career self-management as central to

employability development (Tomlinson, 2017).

Second, this study incorporated Learning Engagement as a key conditional mechanism that influences how enterprise practice experience translates into employability perception. By emphasizing student agency, it extends UEC research that traditionally focuses on structural arrangements (resource sharing, enterprise participation, institutional coordination) and clarifies a learner-centered mechanism: practice environments do not automatically generate employability gains; rather, employability benefits are amplified when students demonstrate high engagement and reflective learning behaviors (Fredricks et al., 2004).

Third, the study integrated multiple educational dimensions—disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, and teacher guidance and feedback—together with enterprise practice experience in a unified model, addressing fragmentation in prior research that often examined isolated predictors. The resulting framework provides a coherent conceptual tool for future empirical research and supports a more systematic understanding of how educational supply translates into students' employability-related psychological construction.

5.6.2 Practical Contributions

Beyond theoretical value, this study offers practical contributions for education administrators, policymakers, and enterprises in at least four aspects.

First, the study provides a pathway reference for optimizing UEC mechanisms in vocational colleges. It clarifies that high-quality enterprise practice is a central transformation process through which students develop job understanding, career cognition, and confidence, implying that practice should be treated as a core teaching link rather than a supplementary arrangement. Second, it offers evidence supporting student-centered educational reform: practice platforms alone are insufficient; colleges should embed reflective tasks, output presentations, and process evaluation so that students become active constructors of meaning rather than passive participants. Third, it provides policy implications for regional governance in industrial transformation contexts: governments can enhance employability development by establishing UEC funds, internship-base standardization projects, and employability assessment and certification systems that encourage deep enterprise participation and quality monitoring. Fourth, it provides management inspiration for enterprise talent development: enterprises can improve talent pipeline quality and stability by investing in co-education (curriculum co-construction, long-term training, scholarships) and by using the model's competency structure to review internship-job fit and optimize internal talent cultivation mechanisms (Billett, 2011).

5.7 Research Limitations

Despite its contributions, this study has several limitations that should be acknowledged.

First, in terms of sample representativeness, the data were collected from students in five higher vocational colleges in Shandong Province. While the sample reflects certain regional characteristics and institutional contexts, it may not fully represent employability perception among all Chinese vocational students. Shandong's industrial structure and UEC resource conditions may differ from less-developed regions, so generalization should be made cautiously. In addition, the participants were mainly undergraduates within the vocational stage (freshmen to juniors), not fully covering imminent graduates or early-career employees, which may limit deeper linkage between employability perception and actual employment behaviors. Future research can expand samples across regions, institution types, and graduation stages to improve external validity.

Second, regarding method and variable scope, although this study covered key educational predictors (knowledge, skills, professionalism, teacher feedback, and enterprise practice), employability is a complex psycho-social construct influenced by broader factors such as family background, social capital, gender norms, psychological security, and labor-market pressure. These factors were not included and may confound employability perception. Future research may incorporate additional variables to enrich explanatory power and theoretical depth.

Third, this study adopted a cross-sectional questionnaire survey design. While the analytical approach can reveal structural relationships, it cannot fully capture the dynamic development of employability perception over time. Longitudinal questionnaire surveys can track students from on-campus learning through enterprise practice into early career stages, enabling stronger inference on developmental mechanisms and intervention timing. Moreover, future research may use follow-up questionnaires, repeated-measures survey designs, and open-ended questionnaire items to enrich the interpretation of students' perceptions while maintaining consistency with questionnaire-based research.

Finally, future studies may explore cross-level mechanisms by distinguishing individual-level and organizational-level factors, examining how institutional support, organizational culture, and management systems influence employability perception through mentoring, feedback, and engagement pathways. Comparative studies across majors (e.g., engineering vs. liberal arts) may also reveal differentiated employability logic and enable more targeted vocational education strategies. From a practical perspective, building regional data platforms (school–government–enterprise) and tracking graduate outcomes 3–5 years after graduation can further test the predictive validity of employability perception and its long-term impact trajectory.

5.8 Future Research Recommendations

Building on the findings and model proposed in this study, future research can further strengthen the explanatory power, generalizability, and practical applicability of the UEC-based employability framework. Since students' perception of employability is a complex and dynamic construct shaped by multi-level factors, subsequent studies are recommended to advance in the following directions.

5.8.1 Expanding Research Scope and Enhancing Generalizability

First, future studies should broaden the sample scope beyond the current focus on five private higher vocational colleges in Shandong Province. Although Shandong provides a valuable context due to its industrial transformation and strong vocational education policy support, regional differences in economic structure, labor market maturity, and education resources may lead to variations in UEC implementation and employability perception. Therefore, comparative studies across multiple provinces—especially between economically developed coastal regions and less-developed inland regions—would help clarify whether the onion-model structure holds across different contexts. In addition, future research can include a wider range of institution types, such as public vocational colleges, applied undergraduate institutions, and comprehensive universities with industry-integrated programs, to test whether institutional heterogeneity influences the model pathways and employability perception outcomes.

5.8.2 Adopting Longitudinal and Multi-Wave Questionnaire Designs

Second, future studies are encouraged to adopt longitudinal and multi-wave questionnaire designs to capture the dynamic evolution of employability perception over time. Employability perception is not static; it changes as students progress through coursework, participate in enterprise practice, and transition into employment. Longitudinal tracking through repeated questionnaire surveys—from entry into vocational education through internships and into the first years of employment—would provide stronger evidence regarding causal sequencing and developmental trajectories. Open-ended questionnaire items may also be added to capture students' reflections on practice experiences, professional identity development, and employability confidence without introducing non-questionnaire data.

5.8.3 Introducing Additional Mediating and Moderating Variables

Third, while this study incorporated enterprise practice experience as a mediating mechanism and learning engagement as a moderating factor, future research can further enrich the model by introducing additional psychological and contextual variables. For example, career self-efficacy, employment anxiety, perceived labor market competitiveness, and professional identity may function as important mediators linking learning experiences to employability perception. Similarly, moderating factors such as family socioeconomic background, social capital, gender role expectations, or institutional support climate may help explain why the same UEC experience produces

different outcomes among students. Incorporating these variables would allow researchers to construct a more comprehensive psychosocial model and improve explanatory precision.

5.8.4 Exploring Multi-Level and Cross-Level Mechanisms

Fourth, future research should consider adopting multi-level modeling strategies to explore cross-level influence mechanisms. Employability perception is shaped not only by individual learning experiences but also by institutional environments, enterprise governance practices, and regional policy ecosystems. Hierarchical SEM or multilevel regression models can be used to distinguish individual-level factors (student engagement, self-efficacy, career planning) from organizational-level factors (college resources, mentoring systems, enterprise participation intensity, and practice-base quality). Such cross-level designs would clarify how organizational contexts indirectly shape students' employability perception through interaction processes such as teacher feedback, mentoring frequency, and the authenticity of enterprise practice tasks.

5.8.5 Conducting Comparative Studies Across Disciplines and Industry Sectors

Fifth, future studies should conduct comparative analyses across disciplines and industry sectors. Employability perception is likely to differ across majors due to distinct occupational structures, skill requirements, and labor market demand. For example, engineering-oriented majors may benefit more from structured technical internships, whereas service-oriented majors may depend more heavily on communication skills and professional identity development. Similarly, cooperation models in traditional manufacturing industries may differ substantially from those in emerging digital technology sectors. Comparative studies can identify discipline-specific pathways and generate more targeted recommendations for diversified vocational education reforms.

5.8.6 Strengthening Evidence Linkage Between Employability Perception and Actual Employment Outcomes

Finally, future studies should strengthen the linkage between employability perception and objective employment outcomes. While employability perception is a meaningful psychological outcome and can influence job-search behavior and career decision-making, it is important to verify its predictive validity for actual employment quality. Subsequent research can incorporate graduate tracking systems and follow-up surveys 1–3 years after graduation to examine whether employability perception predicts employment matching, salary growth, job stability, promotion opportunities, and career satisfaction. Such evidence would enhance the practical value of employability perception as an evaluation indicator and support more evidence-based policymaking and institutional reform.

Overall, these future recommendations aim to advance employability research from a single-context, cross-sectional perspective toward a broader, longitudinal, multi-wave, and multi-level survey-based understanding. By expanding samples, enriching model variables, adopting repeated questionnaire designs, and linking perception to real outcomes, future research can further refine the UEC-based employability onion model and provide stronger theoretical and practical guidance for vocational education development.



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APPENDIX

APPENDIX A: Survey Questionnaire

Survey Questionnaire Investigation of the College-Enterprise Cooperation Model in Private Institutions of Higher Education

Dear Respondent:

Greetings! To better understand your views on the development of private college-enterprise cooperation in Shandong Province, we have specifically designed this questionnaire. Your feedback is very important to our research. The content of the questionnaire will be strictly confidential and used only for academic research. Thank you for your participation! Please fill in the response column with the corresponding number of your choice.

Mr. Liu Jie, Ph.D. Student
Siam University

Part 1 Basic Information

What is your gender?

- a) Male
- b) Female

What is your age?

- a) Under 18
- b) 18-22
- c) 23-26
- d) 27 and above

What type of school do you attend?

- a) Private college
- b) Public university
- c) Vocational/technical school

What is your major?

(Please specify): _____

What is your year of study?

- a) Freshman (1st year)
- b) Sophomore (2nd year)
- c) Junior (3rd year)
- d) Senior (4th year)

Part 2, Scale Items

				1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree Answer (Likert Scale)				
	Dimension		Question items	1	2	3	4	5
1	1. Disciplinary and Industry Knowledge(DK)	DK1	I believe that the courses offered by the school have helped me acquire sufficient professional knowledge.					
2		DK2	I have a clear understanding of the industry trends in my major.					
3		DK3	Participating in school enterprise cooperation has helped me better understand industry standards and practical requirements.					
4		DK4	I believe I possess the industry knowledge required by the current job market.					
5		DK5	Through school enterprise cooperation, I have gained a better understanding of the latest technologies and trends in my field of study.					
6	2. Practical and Problem-solving Skills (PK)	PK1	I am able to apply the theories I have learned to solve practical problems.					
7		PK2	The project internship in school enterprise cooperation has helped me improve my practical skills.					
8		PK3	I am able to effectively solve complex problems in my work.					
9		PK4	I believe that I have the ability to independently					

				1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree Answer (Likert Scale)				
	Dimension		Question items	1	2	3	4	5
			solve problems in my work.					
10		PK5	The experience of school enterprise cooperation has made me more confident when facing practical problems.					
11	3. Professional and Work Attitude (PA)	PA1	School enterprise cooperation has made me realize the importance of professional ethics.					
12		PA2	I believe I have good teamwork skills.					
13		PA3	Through school enterprise cooperation, I have developed a serious and responsible work attitude.					
14		PA4	I am able to adapt to the pressure and challenges in my work.					
15		PA5	School enterprise cooperation has enhanced my confidence and motivation for career development.					
16	4. Teacher Guidance and Feedback (TK)	TK1	I believe that teachers have provided ample support and guidance in school enterprise cooperation.					
17		TK2	I have benefited from the feedback from teachers and improved my professional ethics.					
18		TK3	The guidance provided by the teacher during the internship project helped me better understand the workflow.					
19		TK4	The advice given by teachers in school					

				1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree Answer (Likert Scale)				
	Dimension		Question items	1	2	3	4	5
			enterprise cooperation is of great significance to my future career development.					
20		TK5	During the process of school enterprise cooperation, the guidance of teachers helped me better cope with workplace challenges.					
21	5. Enterprise Practice Experience (EP)	EP1	I believe that practical experience in the enterprise is very important for improving my employability.					
22		EP2	The enterprise practice in school enterprise cooperation has given me a better understanding of the actual work environment.					
23		EP3	I have accumulated valuable work experience through corporate practice.					
24		EP4	The enterprise practice in school enterprise cooperation has familiarized me with the workflow within the industry.					
25		EP5	Corporate practice has helped me establish connections with professionals in the industry.					
26	6. Learning Engagement (LE)	LE1	I actively participate in various learning and internship activities during the process of school enterprise cooperation.					

				1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree Answer (Likert Scale)				
	Dimension		Question items	1	2	3	4	5
27		LE2	The school enterprise cooperation project has given me more motivation to devote myself to professional learning.					
28		LE3	I am willing to invest extra time to improve my performance in school enterprise cooperation.					
29		LE4	Collaboration between schools and enterprises has sparked my interest in exploring new knowledge in my studies.					
30	7. Student's Perception of Employability (SPE)	SPE1	I believe that through school enterprise cooperation, my employment competitiveness has been significantly improved.					
31		SPE2	School enterprise cooperation has given me more confidence in my abilities in the future job market.					
32		SPE3	Participating in school enterprise cooperation has given me a clearer understanding of the requirements of enterprises for talent.					
33		SPE4	School enterprise cooperation helps me better prepare for my future career development.					
34		SPE5	Through school enterprise cooperation, I have gained a clearer career plan and goals.					

私立高等教育机构校企合作模式调查问卷

尊敬的被调查者:

您好! 为了更好地了解您对山东省私立高校校企合作发展的看法,我们特别设计了这份调查问卷。您的反馈对我们的研究非常重要。问卷内容将严格保密,仅用于学术研究。感谢您的参与! 请在回答栏中填入您所选择的相应数字。

刘杰先生,博士研究生
暹罗大学

第一部分 基本信息

您的性别是?

- a) 男性
- b) 女性

您的年龄是?

- a) 18 岁以下
- b) 18-22 岁
- c) 23-26 岁
- d) 27 岁及以上

您就读的学校类型是?

- a) 私立学院
- b) 公立大学
- c) 职业/技术学校

您的专业是?

(请具体说明): _____

您的年级是?

- a) 大一 (第一年)
- b) 大二 (第二年)
- c) 大三 (第三年)
- d) 大四 (第四年)

第二部分 量表

	维度	问题条目	1. 强烈不同意 2. 不同意 3. 中立 4. 同意 5. 强烈同意 答案 (李克特量表)					
			1	2	3	4	5	
1	1. 学科 与行业知识 (DK)	DK1	我认为学校提供的课程帮助我获得了足够的专业知识。					
2		DK2	我对我所学专业的行业发展趋势有清晰的了解。					
3		DK3	参与校企合作帮助我更好地理解行业标准和实际要求。					
4		DK4	我认为我具备当前就业市场所要求的行业知识。					
5		DK5	通过校企合作,我对我所学领域的最新技术和发展趋势有了更好的了解。					
6	2. 实践 与问题解决能力 (PK)	PK1	我能够将所学的理论应用于解决实际问题。					
7		PK2	校企合作中的项目实习帮助我提高了实践技能。					
8		PK3	我能够有效地解决工作中的复杂问题。					
9		PK4	我认为我具备独立解决工作问题的能力。					
10		PK5	校企合作的经历使我在面对实际问题时更加自信。					
11	3. 职业 与工作态度 (PA)	PA1	校企合作让我认识到了职业道德的重要性。					
12		PA2	我认为我具备良好的团队合作能力。					
13		PA3	通过校企合作,我养成了认真负责的工作态度。					
14		PA4	我能够适应工作中的压力和挑战。					
15		PA5	校企合作增强了我对职业发展的信心和动力。					
16	4. 教师 指导与反馈 (TK)	TK1	我认为在校企合作中,老师提供了充足的支持和指导。					
17		TK2	我从老师的反馈中受益匪浅,并提高了我的职业道德。					
18		TK3	老师在实习项目期间提供的指导帮助我更好地理解工作流程。					
19		TK4	老师在校企合作中提供的建议对我的未来职业发展具有重要意义。					

	维度	问题条目	1. 强烈不同意 2. 不同意 3. 中立 4. 同意 5. 强烈同意 答案（李克特量表）				
			1	2	3	4	5
20		TK5 在校企合作过程中,老师的指导帮助我更好地应对职场挑战。					
21	5. 企业 实践经验 (EP)	EP1 我认为在企业中的实践经验对于提高我的就业能力非常重要。					
22		EP2 校企合作中的企业实践让我对实际工作环境有了更好的了解。					
23		EP3 我通过企业实践积累了宝贵的工作经验。					
24		EP4 校企合作中的企业实践让我熟悉了行业内部的工作流程。					
25		EP5 企业实践帮助我与行业内的专业人士建立了联系。					
26	6. 学习 投入度 (LE)	LE1 在校企合作过程中,我积极参与各种学习和实习活动。					
27		LE2 校企合作项目让我有更多的动力投入到专业学习中。					
28		LE3 我愿意投入额外的时间来提高我在校企合作中的表现。					
29		LE4 校企合作激发了我探索专业新知识的兴趣。					
30		SPE1 我认为通过校企合作,我的就业竞争力得到了显著提升。					
31	7. 学生就 业观 (SPE)	SPE2 校企合作让我对未来就业市场中的自身能力更有信心。					
32		SPE3 参与校企合作让我对企业的人才要求有了更清晰的认识。					
33		SPE4 校企合作帮助我更好地为未来的职业发展做准备。					
34		SPE5 通过校企合作,我获得了更清晰的职业规划和目标。					

English to Chinese Translator: ZhangGui Hua

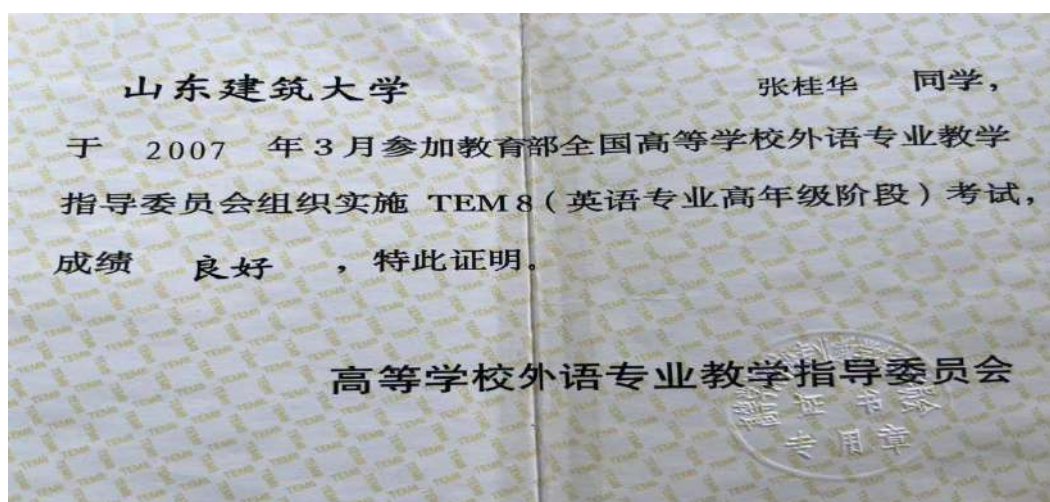
Chinese to English Translator: Sun Peng

Translator Expert 1: Zhang Guihua, female, born July 22, 1982, holds a Master's degree in Subject Teaching (English) from Shandong Normal University and is certified as an English Proficiency Test Band 8 holder. She was a visiting scholar at the University of Ottawa, Canada (2017.10-2018.03).

Translator Expert 2: Sun Peng, female, born December 12, 1990, holds a Master's degree in Foreign Linguistics and Applied Linguistics from Harbin Institute of Technology. She is certified as an English Proficiency Test Band 8 holder, possesses Professional English Level 2 Translation certification, and has advanced Business English qualifications.

翻译专家 1：张桂华,女,1982.07.22,山东师范大学学科教学（英语）硕士,专业英语八级,访问学者（2017.10-2018.03 加拿大渥太华大学）

翻译专家 2：孙朋,女,1990.12.12,哈尔滨工业大学 外国语言学及应用语言学硕士,专业英语八级、二级笔译、商务英语高级。



APPENDIX B: Letter of Cooperation



ใบรับรองจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

หมายเลขใบรับรอง: PIM-REC 002/2568

ข้อเสนอการวิจัยนี้ และเอกสารประกอบของข้อเสนอการวิจัยตามรายการแสดงด้านล่าง ได้รับการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ สถาบันการจัดการปัญญาภิวัฒน์แล้ว คณะกรรมการฯ มีความเห็นว่าข้อเสนอการวิจัยที่จะดำเนินการมีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการตามข้อเสนอการวิจัยนี้ได้

ชื่อข้อเสนอโครงการ: A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province

รหัสข้อเสนอการวิจัย (ถ้ามี): (ไม่มี)

หน่วยงาน: Siam University

ผู้วิจัยหลัก: LIU JIE

ลงนาม.....

(อาจารย์ ดร.พิเชษฐ์ มุสิกะโปดก)

ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

วันที่รับรอง: 10 กุมภาพันธ์ 2568

วันหมดอายุ: 10 กุมภาพันธ์ 2569

เอกสารที่คณะกรรมการรับรอง

1. โครงร่างการวิจัย
2. ข้อมูลสำหรับชี้แจงกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และ ใบแสดงความยินยอมจากกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3. เครื่องมือที่ใช้ในการวิจัย/เก็บรวบรวมข้อมูล เช่น แบบสอบถาม แบบสัมภาษณ์ ประเด็นในการสนทนากลุ่ม เป็นต้น

เงื่อนไขการรับรอง

1. นักวิจัยดำเนินการวิจัยตามที่ระบุไว้ในโครงร่างการวิจัยอย่างเคร่งครัด
2. นักวิจัยรายงานเหตุการณ์ไม่พึงประสงค์ร้ายแรงที่เกิดขึ้นหรือเปลี่ยนแปลงกิจกรรมวิจัยใดๆ ต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ภายในกำหนด
3. นักวิจัยส่งรายงานความก้าวหน้าต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ตามเวลาที่กำหนดหรือเมื่อได้รับการร้องขอจากคณะกรรมการฯ
4. หากการวิจัยไม่สามารถดำเนินการเสร็จสิ้นภายในกำหนด ผู้วิจัยต้องยื่นขออนุมัติใหม่ก่อนอย่างน้อย 1 เดือน
5. หากการวิจัยเสร็จสมบูรณ์ ผู้วิจัยต้องแจ้งปิดโครงการตามแบบฟอร์มที่กำหนด

SU. 0210.04/ 01



Graduate School of Education
38 Siam University
Petchkasem Bangwa,
Phasicharoon Bangkok 10160

January 2025

Dear: Professor Ji Biao, PhD.

Executive vice President of Shandong Vocational and Technical Education Research
Institute of Shandong Normal University.

Subject: Invitation to be an expert to examine research tools.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education works on dissertation: "A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province." with Assoc.Prof. Dr. Boonmee Nenyod (an advisor) and Assistant Professor Dr. Leehsing Lu (a co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research tools.

Questionnaire regarding current circumstances is a significant tool of the research which is needed to be considered and examined including suggestion for research tools. Mr. Liu Jie will contact and coordinate all details by himself.

We really appreciate your help.

Best regards

A handwritten signature in black ink, appearing to be 'Chanita Rukspollmuang'.

Professor Emeritus Dr.Chanita Rukspollmuang
Dean of Graduate School of Education

SU. 0210.04/ 02



Graduate School of Education
38 Siam University
Petchkasem Bangwa,
Phasicharoon Bangkok 10160

January 2025

Dear: Assoc. Prof. Zhu Jin Long, PhD.

Executive President of Vocational and Technical College of Guangzhou Kang University,
Member of the Teaching Steering Committee for Technical Education and Vocational Training of
the Ministry of Human Resources and Social Security.

Subject: Invitation to be an expert to examine research tools.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education works on dissertation: "A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province." with Assoc. Prof. Dr. Boonmee Nenyod (an advisor) and Assistant Professor Dr. Leehsing Lu (a co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research tools.

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We really appreciate your help.

Best regards

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education

SU. 0210.04/ 04



Graduate School of Education
38 Siam University
Petchkasem Bangwa,
Phasicharoon Bangkok 10160

January 2025

Dear: Professor Liu Bing Yuan, Ph.D.

Chairman of young Talent Special Committee of Shandong Higher Education Talent
Research Association

Subject: Invitation to be an expert to examine research tools

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education works on dissertation: "A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province." with Assoc. Prof. Dr. Boonmee Nenyod (an advisor) and Assistant Professor Dr. Lechsing Lu (a co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research tools.

Questionnaire regarding current circumstances is a significant tool of the research which is needed to be considered and examined including suggestion for research tools. Mr. Liu Jie will contact and coordinate all details by himself.

We really appreciate your help.

Best regards

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education

SU. 0210.04/ 05



Graduate School of Education
38 Siam University
Petchkasem Bangwa,
Phasicharoon Bangkok 10160

January 2025

Dear: Assoc. Professor Ma Yue, Ph.D.

Researcher of Higher Vocational Education Research Center of Shandong Engineering
Vocational And Technical University

Subject: Invitation to be an expert to examine research tools

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education works on dissertation: "A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province." with Assoc. Prof. Dr. Boonmee Nenyod (an advisor) and Assistant Professor Dr. Leehsing Lu (a co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research tools.

Questionnaire regarding current circumstances is a significant tool of the research which is needed to be considered and examined including suggestion for research tools.

Mr. Liu Jie will contact and coordinate all details by himself.

We really appreciate your help.

Best regards

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education

SU. 0210.04/ 03



Graduate School of Education
38 Siam University
Petchkasem Bangwa
Phasicharoon Bangkok 10160

January 2025

Dear: Assoc. Professor Chia-Chan Chang, Ph.D.

Deputy director of the student employability Development Center OF Shandong
University of Engineering and Vocational Technology

Subject: Invitation to be an expert to examine research tools

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education works on dissertation: "A Model To Enhance Students' Perception Of Employability Of University-Enterprise Cooperation in Shandong Province." with Assoc. Prof. Dr. Boonmee Nenyod (an advisor) and Assistant Professor Dr. Leehsing Lu (a co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research tools.

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We really appreciate your help.

Best regards

A handwritten signature in black ink, appearing to be 'Chanita Rukspollmuang'.

Professor Emeritus Dr.Chanita Rukspollmuang
Dean of Graduate School of Education

Table Experts Information

No	Full Name	Position	Years of Experience
1	Liu Bingyuan	Professor, Doctoral Supervisor	15
2	Ji Biao	Professor of Education at Shandong Normal University, Executive Vice President of Shandong Vocational and Technical Education Research Institute	20
3	Zhu Jinglong	Executive President of Guangzhou Kangda Vocational and Technical College	14
4	Zhang Jiazhen (Zhang Jiachen)	Associate Professor at the Business School of Shandong Vocational and Technical University	10
5	Ma Yue	Associate Professor at Shandong Vocational and Technical University	23

APPENDIX C: Item Objective Congruence (IOC) Testing

Index of Item-Objective Congruence (IOC) Form for Individual Research

Individual Research Title:

Instruction:

This IOC form seeks the expert's feedback on the degree of congruence between the research instrument questions, the study's research objectives, and the definitions of terms. The criteria used for IOC are as follows.

+1= Congruent

0= Questionable

-1= Incongruent

NOTE: For each item of the questionnaire, the study will adopt a Five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = slightly Disagree, 4 = agree, 5 = strongly Agree).

Research Questions:

This study aims to examine the current state and influencing factors of employability perceptions among vocational college students in Shandong Province under the framework of UEC. The guiding research questions are as follows:

1. What is the current status of employability perceptions among vocational college students in Shandong Province under the UEC framework?
2. How do university-related factors (disciplinary and industry knowledge, problem-solving skills, professionalism, and teacher guidance) affect students' employability perceptions?
3. How do enterprise-related factors (enterprise practice experience) affect students' employability perceptions?
4. Does learning engagement moderate the relationship between enterprise practice experience and students' employability perceptions?
5. What are the overall implications of the findings for improving UEC-based strategies to enhance vocational college students' employability perceptions?

Research Objectives:

The main purpose of this study is to establish a university-enterprise cooperation (UEC) model in Shandong Province to improve students' employability perception. The specific research objectives are as follows:

1.To investigate the current status of employability perceptions among vocational college students under UEC;

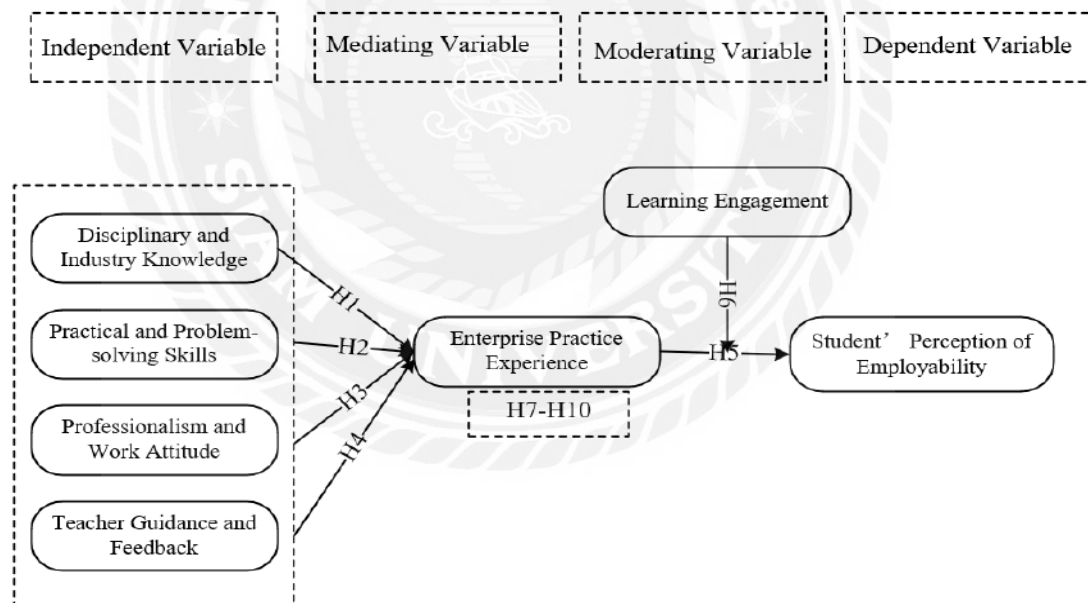
2.To examine the impact of university-related factors (disciplinary and industry knowledge, problem-solving skills, professionalism, and teacher guidance) on employability perceptions;

3.To examine the impact of enterprise-related factors (enterprise practice experience) on employability perceptions;

4.To test the moderating role of learning engagement in the relationship between enterprise practice experience and employability perceptions.

5.To derive implications from the research findings for the design and implementation of UEC strategies aimed at strengthening vocational college students' employability perceptions.

Conceptual Framework:



Questionnaire for Quantitative Research Instrument:

	Variables and Definition	Questions	IOC Score			Expert's Comments
			-1	0	1	
	Dimension	Question items				
1	1. Disciplinary and Industry Knowledge (DK)	DK1 I believe that the courses offered by the school have helped me acquire sufficient professional knowledge.				
2		DK2 I have a clear understanding of the industry trends in my major.				
3		DK3 Participating in school enterprise cooperation has helped me better understand industry standards and practical requirements.				
4		DK4 I believe I possess the industry knowledge required by the current job market.				
5		DK5 Through school enterprise cooperation, I have gained a better understanding of the latest technologies and trends in my field of study.				
6	2. Practical and Problem-solving Skills (PK)	PK1 I am able to apply the theories I have learned to solve practical problems.				
7		PK2 The project internship in school enterprise cooperation has helped me improve my practical skills.				
8		PK3 I am able to effectively solve complex problems in my work.				
9		PK4 I believe that I have the ability to independently solve problems in my work.				
10		PK5 The experience of school enterprise cooperation has made me more confident when facing practical problems.				
11	3. Professional and Work Attitude (PA)	PA1 School enterprise cooperation has made me realize the importance of professional ethics.				
12		PA2 I believe I have good teamwork skills.				
13		PA3 Through school enterprise cooperation, I have developed a				

	Variables and Definition	Questions	IOC Score			Expert's Comments
			-1	0	1	
	Dimension	Question items				
		serious and responsible work attitude.				
14		PA4 I am able to adapt to the pressure and challenges in my work.				
15		PA5 School enterprise cooperation has enhanced my confidence and motivation for career development.				
16	4. Teacher Guidance and Feedback (TK)	TK1 I believe that teachers have provided ample support and guidance in school enterprise cooperation.				
17		TK2 I have benefited from the feedback from teachers and improved my professional ethics.				
18		TK3 The guidance provided by the teacher during the internship project helped me better understand the workflow.				
19		TK4 The advice given by teachers in school enterprise cooperation is of great significance to my future career development.				
20		TK5 During the process of school enterprise cooperation, the guidance of teachers helped me better cope with workplace challenges.				
21		5. Enterprise Practice Experience (EP)	EP1 I believe that practical experience in the enterprise is very important for improving my employability.			
22	EP2 The enterprise practice in school enterprise cooperation has given me a better understanding of the actual work environment.					
23	EP3 I have accumulated valuable work experience through corporate practice.					
24	EP4 The enterprise practice in school enterprise cooperation has familiarized me with the workflow within the industry.					
25	EP5 Corporate practice has helped me establish connections with professionals in the industry.					

	Variables and Definition	Questions	IOC Score			Expert's Comments
			-1	0	1	
	Dimension	Question items				
26	6. Learning Engagement (LE)	LE1 I actively participate in various learning and internship activities during the process of school enterprise cooperation.				
27		LE2 The school enterprise cooperation project has given me more motivation to devote myself to professional learning.				
28		LE3 I am willing to invest extra time to improve my performance in school enterprise cooperation.				
29		LE4 Collaboration between schools and enterprises has sparked my interest in exploring new knowledge in my studies.				
30	7. Student's Perception of Employability(SPE)	SPE 1 I believe that through school enterprise cooperation, my employment competitiveness has been significantly improved.				
31		SPE 2 School enterprise cooperation has given me more confidence in my abilities in the future job market.				
32		SPE 3 Participating in school enterprise cooperation has given me a clearer understanding of the requirements of enterprises for talent.				
33		SPE 4 School enterprise cooperation helps me better prepare for my future career development.				
34		SPE 5 Through school enterprise cooperation, I have gained a clearer career plan and goals.				

APPENDIX D: Result of Item Objective Congruence (IOC) Testing

	Variables and Definition	Questions	IOC Score					
			E1	E2	E3	E4	E5	
	Dimension	Question items						
1	1. Disciplinary and Industry Knowledge (DK)	DK1	I believe that the courses offered by the school have helped me acquire sufficient professional knowledge.	1	1	1	1	1
2		DK2	I have a clear understanding of the industry trends in my major.	1	1	1	1	1
3		DK3	Participating in school enterprise cooperation has helped me better understand industry standards and practical requirements.	1	0	0	0	1
4		DK4	I believe I possess the industry knowledge required by the current job market.	1	1	1	1	1
5		DK5	Through school enterprise cooperation, I have gained a better understanding of the latest technologies and trends in my field of study.	1	1	1	1	1
6	2. Practical and Problem-solving Skills (PK)	PK1	I am able to apply the theories I have learned to solve practical problems.	1	1	0	1	1
7		PK2	The project internship in school enterprise cooperation has helped me improve my practical skills.	1	1	1	1	0
8		PK3	I am able to effectively solve complex problems in my work.	1	1	1	1	1
9		PK4	I believe that I have the ability to independently	1	1	1	1	1

	Variables and Definition	Questions	IOC Score				
			E1	E2	E3	E4	E5
	Dimension	Question items					
		solve problems in my work.					
10		PK5 The experience of school enterprise cooperation has made me more confident when facing practical problems.	1	1	1	1	1
11	3. Professional and Work Attitude (PA)	PA1 School enterprise cooperation has made me realize the importance of professional ethics.	1	1	1	1	1
12		PA2 I believe I have good teamwork skills.	1	1	1	1	1
13		PA3 Through school enterprise cooperation, I have developed a serious and responsible work attitude.	1	1	1	1	1
14		PA4 I am able to adapt to the pressure and challenges in my work.	1	1	0	1	1
15		PA5 School enterprise cooperation has enhanced my confidence and motivation for career development.	1	1	1	1	1
16	4. Teacher Guidance and Feedback (TK)	TK1 I believe that teachers have provided ample support and guidance in school enterprise cooperation.	1	1	1	1	1
17		TK2 I have benefited from the feedback from teachers and improved my professional ethics.	1	1	1	1	1
18		TK3 The guidance provided by the teacher during the internship project helped me better understand the workflow.	1	1	1	1	1
19		TK4 The advice given by teachers in school enterprise cooperation is of great significance to	1	1	0	1	1

	Variables and Definition	Questions	IOC Score				
			E1	E2	E3	E4	E5
	Dimension	Question items					
		my future career development.					
20		TK5 During the process of school enterprise cooperation, the guidance of teachers helped me better cope with workplace challenges.	1	1	1	1	1
21	5. Enterprise Practice Experience (EP)	EP1 I believe that practical experience in the enterprise is very important for improving my employability.	1	1	1	1	1
22		EP2 The enterprise practice in school enterprise cooperation has given me a better understanding of the actual work environment.	1	1	0	1	1
23		EP3 I have accumulated valuable work experience through corporate practice.	1	1	1	1	1
24		EP4 The enterprise practice in school enterprise cooperation has familiarized me with the workflow within the industry.	1	1	1	1	1
25		EP5 Corporate practice has helped me establish connections with professionals in the industry.	1	1	1	1	1
26	6. Learning Engagement (LE)	LE1 I actively participate in various learning and internship activities during the process of school enterprise cooperation.	1	1	1	1	1
27		LE2 The school enterprise cooperation project has given me more	1	1	1	1	1

	Variables and Definition		Questions	IOC Score				
	Dimension			E1	E2	E3	E4	E5
			motivation to devote myself to professional learning.					
28		LE3	I am willing to invest extra time to improve my performance in school enterprise cooperation.	1	1	1	1	1
29		LE4	Collaboration between schools and enterprises has sparked my interest in exploring new knowledge in my studies.	1	1	0	1	1
30	7. Student's Perception of Employability (SPE)	SPE1	I believe that through school enterprise cooperation, my employment competitiveness has been significantly improved.	1	1	1	1	1
31		SPE2	School enterprise cooperation has given me more confidence in my abilities in the future job market.	1	1	1	1	1
32		SPE3	Participating in school enterprise cooperation has given me a clearer understanding of the requirements of enterprises for talent.	1	1	1	1	1
33		SPE4	School enterprise cooperation helps me better prepare for my future career development.	1	1	0	1	1
34		SPE5	Through school enterprise cooperation, I have gained a clearer career plan and goals.	1	1	1	1	1

吉树 刘元 马跃 朱金友 孙嘉欣

APPENDIX E: Expert Review Committee Information

NO.	Name	Title	Institution	Position	Years of Experience
1	Zhao Lei	Professor of Education	ShanDong University	Dean	20
2	Zhang Yang	Professor of Education	ShanDong University of Technology	Dean	21
3	Wang Hui	Chair Professor	ShanDong Normal University	Dean	18
4	Liu Qiang	Chair Professor	Yanshan University	Dean	16
5	Sun Wei	Professor of Education	Shijiazhuang Tiedao University	Dean	17
6	Wang Chongguang	Senior Engineer	Shandong Mingshui Guokai Development Group Co., Ltd.	General Manager	18
7	Li Xiaoming	Professor of Education	North China University of Science and Technology	Dean	13
8	ShiZhong	Professor of Education	BinZhou vocational college	President	18
9	Chen Jing	Secretary General	Vocational Education Association	Chief Researcher	13



SU.0210.14/115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

๑ September 2025

Dear Professor Zhao Lei, PhD.
Dean, Shandong University

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

Questionnaire regarding current circumstances is a significant tool of the research which is needed to be considered and examined including suggestion for research outcomes. Mr. Liu Jie will contact you and coordinate all details himself.

We really appreciate your help.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Chanita'.

Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Professor Zhang Yang, PhD.
Dean, Shandong University of Technology


Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Yours sincerely,



Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Professor Wang Hui, PhD.
Dean, Shandong Normal University

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/ 115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

๑ September 2025

Dear Professor Liu Qiang, PhD.
Dean, Yanshan University


Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/ 115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Professor Sun Wei, PhD.
Dean, Shijiazhuang Tiedao University

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Mr. Wang Chong Guang,
General Manager, Shandong Mingshui Guokai Development Group Co., Ltd.

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education



SU.0210.14/ 115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Professor Li Xiaoming, PhD.
Dean, North China University of Science and Technology

Subject: Invitation to be an expert to examine research outcomes.

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Professor Emeritus Dr. Chanita Rukspolmuang
Dean of Graduate School of Education



SU.0210.14/115

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

9 September 2025

Dear Professor Shi Zhong, PhD.
President, BinZhou Vocational College

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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Dean of Graduate School of Education



SU.0210.14/116

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

๑ September 2025

Dear Chen Jing,
Chief Researcher, Vocational Education Association

Subject: Invitation to be an expert to examine research outcomes.

Since Mr. Liu Jie, student ID 6419000016, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Model to Enhance Students' Perception of Employability of University-Enterprise Cooperation in Shandong Province.*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to examine the research outcomes.

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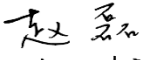
A handwritten signature in black ink, appearing to be 'Chanita Rukspollmuang'.

Professor Emeritus Dr. Chanita Rukspollmuang
Dean of Graduate School of Education

APPENDIX F: Result of the Experts Evaluation

E1. Zhao Lei

Dimension No.	Evaluation Indicator	1=StronglyDisagree,5=StronglyAgree				
		5	4	3	2	1
Propriety 0.3	P1* The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).	√				
	P2* Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3* The logic and structure of the model are theoretically consistent.		√			
	P4 Constructs are clearly defined and operationalized.	√				
	P5 The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1* Indicators can be effectively applied in vocational universities.			√		
	F2 Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3 Data collection and evaluation are manageable within existing resources.		√			
	F4 The model can be adapted to different institutional contexts.	√				
	F5 The model is sustainable in long-term application.	√				
Utility 0.3	U1* The model can guide educational policy-making.	√				
	U2 It provides practical value for vocational university administrators.		√			
	U3 It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4 It enhances students' employability and career readiness.		√			
	U5 The model contributes to ongoing university–enterprise engagement research.		√			


 Zhao Lei

E2. Zhang Yan

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).		√			
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.	√				
	P5	The model provides a valid framework for academic research.		√			
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.		√			
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).		√			
	F3	Data collection and evaluation are manageable within existing resources.	√				
	F4	The model can be adapted to different institutional contexts.		√			
	F5	The model is sustainable in long-term application.	√				
Utility 0.3	U1*	The model can guide educational policy-making.	√				
	U2	It provides practical value for vocational university administrators.		√			
	U3	It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4	It enhances students' employability and career readiness.	√				
	U5	The model contributes to ongoing university–enterprise engagement research.	√				

张彦
Zhang Yan

E3. Wang Hui

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).	√				
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.	√				
	P5	The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.		√			
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3	Data collection and evaluation are manageable within existing resources.	√				
	F4	The model can be adapted to different institutional contexts.	√				
	F5	The model is sustainable in long-term application.	√				
Utility 0.3	U1*	The model can guide educational policy-making.		√			
	U2	It provides practical value for vocational university administrators.	√				
	U3	It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4	It enhances students' employability and career readiness.	√				
	U5	The model contributes to ongoing university–enterprise engagement research.		√			

王辉
Wang Hui

E4. Liu Qiang

Dimension	No.	Evaluation Indicator	1=StronglyDisagree,5=StronglyAgree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).		√			
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).		√			
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.		√			
	P5	The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.	√				
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).				√	
	F3	Data collection and evaluation are manageable within existing resources.	√				
	F4	The model can be adapted to different institutional contexts.				√	
	F5	The model is sustainable in long-term application.				√	
Utility 0.3	U1*	The model can guide educational policy-making.	√				
	U2	It provides practical value for vocational university administrators.	√				
	U3	It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4	It enhances students' employability and career readiness.	√				
	U5	The model contributes to ongoing university–enterprise engagement research.	√				



E5. Sun Wei

Dimension No.	Evaluation Indicator	1=StronglyDisagree,5=StronglyAgree				
		5	4	3	2	1
Propriety 0.3	P1* The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).		√			
	P2* Indicators reflect the realities of university–enterprise cooperation (UEC).		√			
	P3* The logic and structure of the model are theoretically consistent.	√				
	P4 Constructs are clearly defined and operationalized.		√			
	P5 The model provides a valid framework for academic research.		√			
Feasibility 0.4	F1* Indicators can be effectively applied in vocational universities.	√				
	F2 Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3 Data collection and evaluation are manageable within existing resources.	√				
	F4 The model can be adapted to different institutional contexts.		√			
	F5 The model is sustainable in long-term application.		√			
Utility 0.3	U1* The model can guide educational policy-making.		√			
	U2 It provides practical value for vocational university administrators.		√			
	U3 It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4 It enhances students' employability and career readiness.		√			
	U5 The model contributes to ongoing university–enterprise engagement research.	√				

孙伟
Sun Wei

E6. Wang Chong Guang

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).		√			
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).		√			
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.		√			
	P5	The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.	√				
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3	Data collection and evaluation are manageable within existing resources.	√				
	F4	The model can be adapted to different institutional contexts.		√			
	F5	The model is sustainable in long-term application.		√			
Utility 0.3	U1*	The model can guide educational policy-making.	√				
	U2	It provides practical value for vocational university administrators.		√			
	U3	It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4	It enhances students' employability and career readiness.		√			
	U5	The model contributes to ongoing university–enterprise engagement research.	√				

王崇光
Wang Chong Guang

E7. Li Xiaoming

Dimension No.	Evaluation Indicator	1=StronglyDisagree,5=StronglyAgree				
		5	4	3	2	1
Propriety 0.3	P1* The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).	√				
	P2* Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3* The logic and structure of the model are theoretically consistent.	√				
	P4 Constructs are clearly defined and operationalized.	√				
	P5 The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1* Indicators can be effectively applied in vocational universities.	√				
	F2 Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).					√
	F3 Data collection and evaluation are manageable within existing resources.					√
	F4 The model can be adapted to different institutional contexts.	√				
	F5 The model is sustainable in long-term application.	√				
Utility 0.3	U1* The model can guide educational policy-making.	√				
	U2 It provides practical value for vocational university administrators.	√				
	U3 It supports enterprises in aligning talent cultivation with labor market needs.					√
	U4 It enhances students' employability and career readiness.					√
	U5 The model contributes to ongoing university–enterprise engagement research.	√				

刘晓明
Liu Xiaoming

E8. Shi Zhong

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).	√				
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.		√			
	P5	The model provides a valid framework for academic research.		√			
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.	√				
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3	Data collection and evaluation are manageable within existing resources.		√			
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	F5	The model is sustainable in long-term application.	√				
Utility 0.3	U1*	The model can guide educational policy-making.	√				
	U2	It provides practical value for vocational university administrators.		√			
Utility 0.3	U3	It supports enterprises in aligning talent cultivation with labor market needs.	√				
	U4	It enhances students' employability and career readiness.	√				
	U5	The model contributes to ongoing university–enterprise engagement research.	√				


 Shi Zhong

E9. Chen Jing

Dimension	No.	Evaluation Indicator	1=StronglyDisagree,5=StronglyAgree				
			5	4	3	2	1
Propriety 0.3	P1*	The research model aligns with established educational theories (e.g., human capital theory, social cognitive career theory).	√				
	P2*	Indicators reflect the realities of university–enterprise cooperation (UEC).	√				
	P3*	The logic and structure of the model are theoretically consistent.	√				
	P4	Constructs are clearly defined and operationalized.		√			
	P5	The model provides a valid framework for academic research.	√				
Feasibility 0.4	F1*	Indicators can be effectively applied in vocational universities.	√				
	F2	Cooperation items reflect real enterprise practices (e.g., internships, targeted training, R&D).	√				
	F3	Data collection and evaluation are manageable within existing resources.	√				
	F4	The model can be adapted to different institutional contexts.	√				
	F5	The model is sustainable in long-term application.	√				
Utility 0.3	U1*	The model can guide educational policy-making.	√				
	U2	It provides practical value for vocational university administrators.		√			
	U3	It supports enterprises in aligning talent cultivation with labor market needs.		√			
	U4	It enhances students' employability and career readiness.		√			
	U5	The model contributes to ongoing university–enterprise engagement research.	√				

陈静
Chen Jing.

Table Result of the Experts Evaluation

Criteria Category	NO.	Expert1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Expert 9	M
Propriety	P1*	5	4	5	4	4	4	5	5	5	4.56
	P2*	5	5	5	4	4	4	5	5	5	4.67
	P3*	4	5	5	5	5	5	5	5	5	4.89
	P4	5	5	5	4	4	4	5	4	4	4.44
	P5	5	4	5	5	4	4	5	4	5	4.56
Feasibility	F1*	4	4	4	5	5	5	5	5	5	4.67
	F2	5	4	5	4	5	5	4	5	5	4.67
	F3	4	5	5	5	5	5	4	4	5	4.67
	F4	5	4	5	4	4	4	5	5	5	4.56
	F5	5	5	5	4	4	4	5	5	5	4.67
Utility	U1*	5	5	4	5	4	5	5	5	5	4.78
	U2	4	5	5	5	4	4	5	4	4	4.44
	U3	5	4	5	5	5	5	5	5	4	4.78
	U4	4	5	5	5	4	4	4	5	4	4.44
	U5	4	5	4	5	5	5	4	5	4	4.56

赵磊
Zhao Li

张杨
Zhang Yang

孙伟
Sun Wei

王崇光
Wang Chongguang

石忠
Shi Zhong

王辉
Wang Hui

刘晓明
Liu Xiaoming

陈静
Chen Jing

刘强
Liu Qiang

RESEARCHER VITAE

Name and Surname : Liu Jie
Date of Birth : 1982.01.28
Nationality : Chinese
Birth of Place : Shan Dong
Address : No.6196 Jingshi East Road
E-mail : sdkwxy@sina.com
Work Position : Dean of the School of Business
Workplace : Shandong Engineering Vocational and Technical University
Education : 4

Bachelor's Degree

Degree : Bachelor
Major : Computer science and technology
Institution : Shandong Institute of Business and Technology
Country : China
Year : 2004

Master's Degree

Degree : Master
Major : Project Management
Institution : University of Qingdao
Country : China
Year : 2014

Key Academic and Social Appointments

Senior Qualifications : National Level 1 Career Instructor, Senior E-commerce Professional

Expert Role : Expert in the Ministry of Education's Industry-Academia Collaboration Collaborative Education Project Expert Database

Key Academic and Social Appointments

: Executive Council Member** of the Social Service Professional Committee under the Belt and Road and BRICS Skills Development International Alliance, actively promoting international skills development and exchange.

Appointed as Expert of the Digital Literacy Expert Committee of Shandong Electronic Labor Society, dedicating efforts to enhancing public digital literacy and skills.

Academic Publications : Served as the chief editor of 1 textbook.

Academic Innovation : Published 6 academic papers in domestic and international Journals.

Exceptional Mentorship : National First Prize in a national skills competition.

Provincial First Prize in a provincial skills competition.

Industry Recognition : Awarded the honorary title of "Outstanding Instructor" by the competition organizing committee for exemplary guidance.

