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Enterprise Practice Experience Mediates the Relationship Between University-Related Factors and Students' Perception of Employability

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ABSTRACT

Objective: This study aims to examine the mediating role of enterprise practice experience in the relationship between university-related factors and students' perception of employability. **Methods and Materials:** This quantitative study surveyed 561 students from five vocational colleges in Shandong Province, China, using stratified random sampling. Seven constructs were measured: Disciplinary and Industry Knowledge, Practical and Problem-Solving Skills, Professionalism and Work Attitude, Teacher Guidance and Feedback, Enterprise Practice Experience, and Students' Perception of Employability. Structural Equation Modeling using AMOS tested direct effects and mediating relationships within an integrated framework informed by Human Capital Theory, Constructivist Learning Theory, and Social Cognitive Career Theory.

Findings: The results indicate that disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, as well as teacher guidance and feedback, all have significant direct impacts on views of employability. More importantly, enterprise practice experience serves a partial mediating role, in the relationship between university-related factors and perceived employability. The model accounted for 58% of the variance observed in employability perception.

Conclusion: The results demonstrate that the perception of employability is influenced by both university-related factors and enterprise practice experience. Although university-related factors influence employability perception, enterprise practice allows students to apply knowledge, refine skills, and cultivate professional confidence, thereby augmenting the influence of formal education on employability results. These findings underscore the necessity of incorporating organized enterprise practices into vocational curriculum and connecting pedagogical approaches with industry requirements.

Keywords: Employability Perception, University-Related Factors, Vocational Education, Enterprise Practice Experience.

Introduction

The structure of labor markets has experienced significant alteration due to accelerating globalization and rapid technological innovation. Automation, digitalization, and the growth of knowledge-based economies have transformed skill requirements, necessitating that higher education institutions reevaluate the preparation of graduates for intricate and dynamic work contexts. This transformation places new demands on higher education institutions to cultivate graduates who possess both theoretical knowledge and the ability to apply it in complex, real-world contexts. The International Labour Organization emphasizes that enhancing employability—defined not merely as the acquisition of job-related skills but as a sustained capacity for career development—has become an urgent priority for universities worldwide (Citaristi, 2022). As a result, employability has transitioned from a limited emphasis on technical skills to a multifaceted concept that includes cognitive, behavioral, and adaptive abilities. Universities are progressively anticipated to not only impart discipline information but also to develop graduates capable of synthesizing knowledge, skills, and professional dispositions in evolving occupational environments.

This challenge is especially prominent in China. As the national economy shifts towards innovation-driven and service-oriented growth, the demand for highly flexible and practical people has increased (Chen, 2023; Qiana, 2024). Notwithstanding significant policy investments intended to enhance vocational education and university-enterprise collaboration (UEC), a continual disparity persists between educational outputs and labor market demands. Empirical research indicates that numerous graduates struggle to convert academic knowledge into professional skills, frequently owing to inadequate exposure to genuine work settings and restricted opportunities for experiential learning (Li et al., 2024; Wang & Wang, 2023). This disconnection is particularly pronounced in regional contexts like Shandong Province, where institutional inequalities and inconsistent industry involvement hinder the efficacy of employability-focused reforms.

Current literature has thoroughly examined the impact of university-enterprise collaboration on employability; however, a significant portion of this

research concentrates on policy frameworks or institutional configurations rather than the internal processes by which these collaborations affect student outcomes. Gan et al. (2025) also noted that macro-level frameworks frequently neglect the influence of individual-level learning processes and experiential mechanisms on developmental outcomes within community-based development. In vocational education, there is a paucity of empirical research on how enterprise practice experiences serve as a transformative mechanism connecting academic inputs—such as disciplinary knowledge, practical skills, professional attitudes, and instructional support—to students' perceptions of employability.

This study conceptualizes employability as a result of both structural opportunities and individual engagement, informed by Human Capital Theory, Constructivist Learning Theory, Social Cognitive Career Theory, and Self-Determination Theory. Although previous research recognizes the significance of practical exposure, limited studies have rigorously investigated how enterprise practice experience mediates the connection between university-based education and views of employability.

This study presents an integrated framework that identifies enterprise practice experience as a fundamental mediating mechanism via which disciplinary knowledge, practical skills, professional attitudes, and instructional assistance affect students' perceived employability. The study enhances the comprehension of how educational inputs convert into employment outcomes by integrating learner engagement as a crucial moderating component. This research provides a comprehensive and mechanism-oriented explanation of employability development through empirical analysis of vocational college students in Shandong Province, offering theoretical enrichment and practical guidance for policymakers, institutions, and industry partners aiming to enhance university-enterprise collaboration.

This study seeks to construct and validate a comprehensive strategic model that elucidates the interplay between university learning and enterprise practice in shaping students' perceptions of employability within the vocational education framework of Shandong Province, addressing the

identified theoretical and empirical gaps. The study specifically examines:

RQ1. Does disciplinary and industry knowledge directly effect students' perception of employability?

RQ2. Does practical and problem-solving skills directly effect students' perception of employability?

RQ3. Does professionalism and work attitude directly effect students' perception of employability?

RQ4. Does teacher guidance and feedback directly effect students' perception of employability?

RQ5. Does enterprise practice experience mediate the relationship between disciplinary and industry knowledge and students' perception of employability?

RQ6. Does enterprise practice experience mediate the relationship between practical and problem-solving skills and students' perception of employability?

RQ7. Does enterprise practice experience mediate the relationship between professionalism and work attitude and students' perception of employability?

RQ8. Does enterprise practice experience mediate the relationship between teacher guidance and feedback and students' perception of employability?

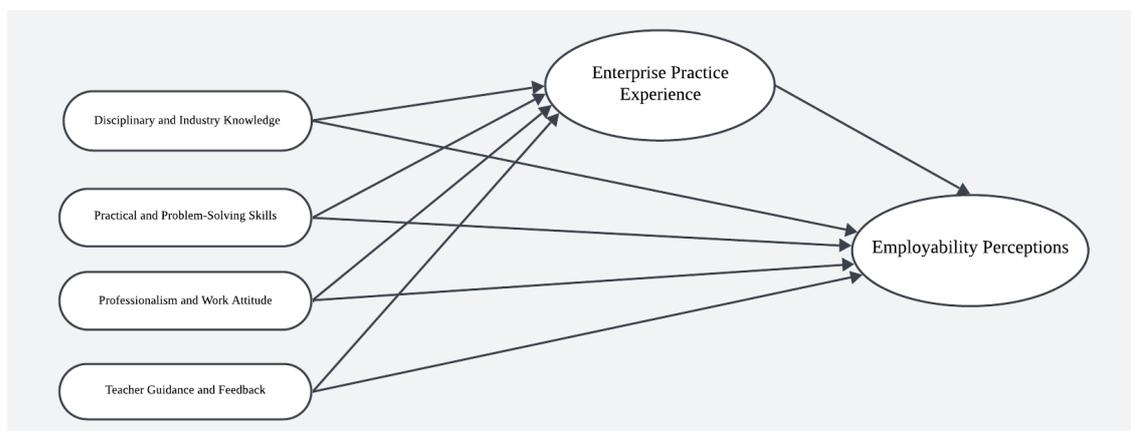
This research provides a thorough analytical framework for analyzing the construction of employability within higher vocational education by merging educational, experiential, and psychological perspectives. Rooted on Human Capital Theory, Constructivist Learning Theory, Social Cognitive Career Theory, and Self-Determination Theory, the paradigm defines employability as the result of institutional support and individual involvement. This research enhances existing literature by clarifying the mechanisms through which academic learning, experiential practice, and learner engagement influence employability outcomes, thus offering evidence-based implications for curriculum design, institutional policy, and university-enterprise collaboration.

This study presents a comprehensive conceptual model elucidating 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 students' perception of employability (SPE) via mediating role of enterprise practice experience (EP) (see [Figure](#)). University-related factors serve as precursors that enhance students' employability perceptions. Enterprise practice experience can function as sole mediating factor that converts employability perceptions by offering genuine job exposure, skill application, and professional socialization. Based on Human Capital Theory, Constructivist Learning Theory, and Social Cognitive Career Theory, the model emphasizes university factors are transformed into employability outcomes via experiential learning in university-enterprise collaboration.

Enterprise practice experience can function as sole mediating factor that converts employability perceptions by offering genuine job exposure, skill application, and professional socialization. Based on Human Capital Theory, Constructivist Learning Theory, and Social Cognitive Career Theory, the model emphasizes university factors are transformed into employability outcomes via experiential learning in university-enterprise collaboration.

Figure 1

Conceptual Framework



Methods and Materials

Research Design

This study employed a quantitative, cross-sectional research design to develop and validate a structural model explaining how university-related factors enhances students' perception of employability in Shandong Province. Quantitative, cross-sectional, and correlational methods were conducted to assess complex relationships among multiple latent variables. The study investigated six constructs—Disciplinary and Industry Knowledge (DK_IV1), Practical and Problem-Solving Skills (PK_IV2), Professionalism and Work Attitude (PA_IV3), Teacher Guidance and Feedback (TK_IV4), Enterprise Practice Experience (EP_MV), and Students' Perception of Employability (SPE_DV)—through a structured questionnaire comprising 34 items measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

Data analysis was conducted using SPSS 26.0 and AMOS 23.0. Descriptive statistics were used to summarize participant characteristics, while exploratory and confirmatory factor analysis (EFA & CFA) and structural equation modeling (SEM) were employed to assess measurement validity and test hypothesized relationships, including direct, and mediating effects. Cronbach's alpha was applied to assess reliability, and both construct validity and convergent/discriminant validity were verified through factor loadings and average variance extracted (AVE). This approach ensured methodological rigor and robustness in examining the structural pathways between UEC and employability perceptions.

Population and Sampling

The study was conducted among private vocational colleges in Shandong Province, China, a region noted for its economic diversity and rapidly expanding higher education system. As of 2024, Shandong had 24 private higher vocational institutions distributed across multiple cities, offering programs in engineering, business, cultural industries, and applied sciences. To ensure representativeness, the research targeted full-time diploma and undergraduate students actively engaged in university-enterprise cooperation (UEC) initiatives, including internships, joint training

programs, and collaborative research projects. The inclusion criteria required participants to (1) be full-time students, (2) have completed at least one enterprise-related training or internship, and (3) provide informed consent. Students who were not involved in UEC activities or who had incomplete enrollment status were excluded to maintain sample relevance.

A stratified random sampling technique was employed to ensure proportional representation across institutional types, academic disciplines, and regional economic levels. The stratification process was guided by five key criteria: (1) Type of University-Enterprise Cooperation (UEC) model, categorized as targeted training, internships and practices, or collaborative research and development; (2) Educational level, distinguishing between undergraduate and junior college programs; (3) City economic development level, classified as developed or less developed regions; (4) UEC intensity, defined as high, moderate, or low according to the frequency and depth of enterprise collaboration; and (5) School size and resource allocation, classified as large, medium, or small institutions. Based on these criteria, five representative colleges were selected to form the sample: Shandong Engineering Vocational and Technical University (Jinan), Rizhao Maritime Engineering Vocational College (Rizhao), Weifang Environmental Engineering Vocational and Technical College (Weifang), Shandong Cultural Industry Vocational College (Qingdao), and Dezhou Science and Technology Vocational College (Dezhou). The selected institutions were chosen to reflect diversity in university-enterprise cooperation models, regional economic development, and institutional size, thereby ensuring that the sample accurately represents the wider vocational education landscape in Shandong Province and improving the generalizability of the results.

A sample size of 550 students was determined using a 95% confidence level, a 5% margin of error, and a 70% expected response rate—meeting the statistical requirements for Structural Equation Modeling (SEM), which recommends at least 10 respondents per observed variable. Participants were proportionally drawn from the five selected colleges according to enrollment size, ranging from 46 to 183 respondents per institution. Data collection was conducted through both classroom-based surveys and online questionnaires,

increasing accessibility and response coverage. In total, 561 valid questionnaires were collected, exceeding the required sample size and meeting the reliability standards for SEM analysis. This methodologically rigorous sampling process ensured balanced representation and strengthened the study's external validity, allowing for robust conclusions regarding the influence of university–enterprise cooperation on students' perceptions of employability in Shandong Province.

Data Analytic Plan

All data were screened and analyzed in SPSS 26.0 and AMOS 23.0 following a multi-stage procedure. First, descriptive statistics profiled respondents by gender, major, grade level, and UEC participation type. Second, internal consistency reliability was evaluated via Cronbach's alpha, with $\alpha \geq .70$ indicating acceptable reliability. Third, construct validity was assessed in two steps: an Exploratory Factor Analysis (EFA) to identify latent structures, followed by a Confirmatory Factor Analysis (CFA) to verify factor loadings and compute composite reliability (CR) and average variance extracted (AVE). Fourth, Structural Equation Modeling (SEM) estimated the hypothesized paths among disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, teacher guidance and feedback, enterprise practice experience, and students' perception of employability, using standard model-fit indices. Finally, mediation effects was tested with Baron and Kenny method (Hayes, 2009).

Research Tools

A structured questionnaire survey was employed as the primary research tool to collect data on the impact of

university-related factors on university students' perceptions of employability in Shandong Province, China. The questionnaire was developed based on theoretical frameworks and prior validated studies to ensure content validity and reliability. It consisted of two main sections: the first gathered demographic information such as gender, age, school type, major, and grade; the second measured the core research constructs using a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree.

The instrument comprised 30 items across six key dimensions adapted from established scales in previous research (see Table 1). Each construct was aligned with a specific theoretical basis, and items were refined to fit the UEC context in China. For instance, items under Disciplinary and Industry Knowledge were adapted from González and Wagenaar (2006), Practical and Problem-solving Skills from Heppner and Petersen (1982), Professional and Work Attitude from Stern and Papadakis (2006), Teacher Guidance and Feedback from Ryan and Shim (2008), Enterprise Practice Experience from Eames and Coll (2010), and Student's Perception of Employability from Rothwell and Arnold (2007).

To ensure conceptual and linguistic equivalence, the questionnaire underwent a translation and back-translation procedure by bilingual experts. Minor revisions were made to improve cultural relevance and clarity for Chinese vocational students. The finalized version demonstrated strong face validity and internal consistency, with all constructs expected to achieve a Cronbach's alpha coefficient above 0.70. This instrument thus provided a robust and contextually appropriate measure for analyzing how UEC enhances students' employability perceptions through disciplinary knowledge, practical experience, and academic–industry collaboration.

Table 1

Questionnaire Items and Sources

| Dimension | Question items | Source |
|-------------------------------------|---|------------------------------|
| Disciplinary and Industry Knowledge | I believe that the courses offered by the school have helped me acquire sufficient professional knowledge. | González and Wagenaar (2006) |
| | 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. | |
| Practical and Problem-solving Skills | I am able to apply the theories I have learned to solve practical problems. | Heppner and 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 my work. | |
| | 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. | |
| Professional and Work Attitude | School enterprise cooperation has made me realize the importance of professional ethics. | Stern and 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. | |
| Teacher Guidance and Feedback | School enterprise cooperation has enhanced my confidence and motivation for career development. | Ryan and Shim (2008) |
| | I believe that teachers have provided ample support and guidance in school enterprise cooperation. | |
| | I have benefited from the feedback from teachers and improved my professional ethics. | |
| | 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. | |
| Enterprise Practice Experience | During the process of school enterprise cooperation, the guidance of teachers helped me better cope with workplace challenges. | Eames and Coll (2010) |
| | I believe that practical experience in the enterprise is very important for improving my employability. | |
| | 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 corporate practice. | |
| | The enterprise practice in school enterprise cooperation has familiarized me with the workflow within the industry. | |
| Student's Perception of Employability | Corporate practice has helped me establish connections with professionals in the industry. | Rothwell and Arnold (2007) |
| | 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. | |

A pilot study was performed to assess the clarity, feasibility, and internal reliability of the questionnaire prior to the primary data collection. A sample of 50 respondents from higher vocational colleges in Shandong Province was chosen for the pilot study. The participants were selected based on their pertinence to the target population and availability. Feedback gathered during this phase was utilized to clarify ambiguous language, improve question sequencing, and refine the overall design for validity and practicality. Cronbach's Alpha was utilized to evaluate internal consistency reliability, a well-established metric in social science research for determining the extent to which scale items uniformly represent the same underlying construct (Cronbach, 1951). Nunnally (1978) posits that values exceeding .70 denote strong dependability, however Hair et al. (2006) deem values ranging from .60 to .70 appropriate for exploratory research. Internal consistency was assessed via Cronbach's alpha. The

analysis of data from 50 respondents produced alpha coefficients between .814 and .90 (DK = .863, PK = .89, PA = .90, TK = .857, EP = .826, and SP = .814). All beyond the acceptable threshold of 0.70. The results demonstrate adequate internal consistency and validate the questionnaire's reliability for future data gathering.

Ethical Considerations

This study was executed in strict compliance with established ethical standards to safeguard the protection, dignity, and rights of all participants. Ethical approval was secured by the Human Research Ethics Committee at Panyapiwat Institute of Management (PIM) under Certificate No. PIM-REC 002/2568, affirming adherence to international ethical standards, pertinent national rules, and institutional mandates. The committee officially evaluated and sanctioned the research proposal titled "A Model to Enhance Students'

Perception of Employability in University–Enterprise Cooperation in Shandong Province,” concluding that the study fulfilled all ethical standards for execution.

Before data collection, all participants were thoroughly briefed on the study's goal, procedures, potential hazards, and benefits. Voluntary informed consent was acquired, and participants were guaranteed the freedom to withdraw at any point without repercussions. Ethical protections encompassed stringent confidentiality, anonymity, and prudent data management. All identifiable information was eliminated and substituted with coded data, which were securely stored in password-protected systems accessible solely to the research team. The data were utilized exclusively for academic and research purposes, with no personally identifiable information released in any papers or publications. These steps guaranteed the

integrity, transparency, and ethical rigor of the study process.

Findings and Results

Descriptive Statistics

Table 2 shows 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 of Some are aged 18-20 and 21-23, with 233 and 276 people respectively, accounting for 41.53% and 49.2% respectively; from the educational level, most are Vocational College, with a total of 441 people, accounting for 78.61%; Looking at the Member of Student Union situation, most of them are no, totaling 514, accounting for 91.62%.

Table 2

Demographic analysis

| Items | Categories | 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 |
| Education | Vocational College | 441 | 78.61 |
| | University | 120 | 21.39 |
| Member of Student Union | NO | 514 | 91.62 |
| | YES | 47 | 8.38 |
| Total | | 561 | 100 |

Descriptive statistics for all study dimensions pertinent to hypothesis testing, encompassing mediation and moderation analyses, were derived from 561 respondents (refer to

Table 3). The results demonstrate moderate to high levels of consensus among participants. The average scores across components varied from 15.97 to 18.58, with standard deviations ranging from 3.37 to 4.47, indicating acceptable variability and somewhat consistent responses. Disciplinary and Industry Knowledge (DK) exhibited ($M = 17.14$, $SD = 4.06$), whereas Practical and Problem-Solving Skills (PK) demonstrated ($M = 17.21$, $SD = 3.90$). Professionalism

and Work Attitude (PA) demonstrated the highest mean score ($M = 18.58$, $SD = 4.47$), reflecting the most positive perceptions among respondents. Teacher Guidance and Feedback (TK) exhibited the lowest mean ($M = 15.97$, $SD = 3.99$), indicating a possible area for enhancement. Enterprise Practice Experience (EP) exhibited ($M = 18.09$, $SD = 3.68$), whilst Students' Perception of Employability (SPE) revealed ($M = 18.35$, $SD = 3.37$). The skewness and kurtosis values for all variables were within acceptable limits, suggesting approaching normalcy and validating the data's appropriateness for subsequent multivariate analysis.

Table 3*Descriptive statistic of study construct (N=561)*

| Total | Mean | Std. | Min | Max | Skewness | Kurtosis |
|-------|---------|---------|-----|-----|----------|----------|
| DK | 17.1373 | 4.06299 | 5 | 25 | .161 | -.788 |
| PK | 17.2050 | 3.89675 | 6 | 25 | -.347 | .334 |
| PA | 18.5775 | 4.46952 | 5 | 25 | -.752 | .231 |
| TK | 15.9661 | 3.99472 | 7 | 24 | .085 | -.578 |
| EP | 18.0856 | 3.68343 | 7 | 25 | -.716 | .492 |
| SPE | 18.3458 | 3.36763 | 6 | 25 | -.416 | .205 |

Table 4 displays the bivariate correlations among the study variables derived from replies of 561 participants. All correlations are positive and statistically significant, indicating meaningful associations among the constructs. Enterprise Practice Experience exhibits moderate correlations with all academic and professional factors, especially with Students' Perception of Employability ($r = .577$, $p < .01$), indicating

the strongest association in the matrix. The disciplinary and industry knowledge (DK) and practical and problem-solving skills (PK) among students exhibits small positive relationships ($r = .107$, $p < .05$). Overall, the correlation results support the proposed associations among variables and offer initial evidence for forthcoming mediation analysis.

Table 4*Bivariate Correlation (N=561)*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------|--------|--------|--------|--------|--------|---|
| DK_T | 1 | | | | | |
| PK_T | .107* | 1 | | | | |
| PA_T | .220** | .129** | 1 | | | |
| TK_T | .231** | .268** | .150** | 1 | | |
| EP_T | .359** | .299** | .238** | .353** | 1 | |
| SP_T | .337** | .381** | .259** | .405** | .577** | 1 |

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Data Analysis

This research utilized a strictly quantitative methodology, implementing Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to authenticate the measurement model. Exploratory Factor Analysis (EFA) was performed to ascertain the fundamental factor structure and diminish data complexity. The Kaiser–Meyer–Olkin (KMO) value of 0.902 and a significant Bartlett's Test of Sphericity ($\chi^2 = 9625.554$, $df = 561$, $p < .001$) validated the adequacy of the sample and the appropriateness of the dataset for factor analysis. Seven factors with eigenvalues exceeding

one were preserved, collectively accounting for 65.78% of the total variance, signifying a robust and well-defined factor solution. The rotated factor loadings aligned with the hypothesized theoretical dimensions.

Consequently, confirmatory factor analysis (CFA) was conducted utilizing AMOS to evaluate model fit and concept validity. The fit indices indicated an acceptable model fit ($\chi^2/df = 1.830$, $RMSEA = 0.035$, $GFI = 0.925$, $CFI = 0.960$). All standardized factor loadings above 0.60 and were statistically significant. Convergent validity was evidenced by Average Variance Extracted (AVE) values exceeding 0.50 and Composite Reliability (CR) values surpassing 0.70, and discriminant validity was validated by the Fornell–Larcker criterion. These findings confirm

the reliability and validity of the measurement model, endorsing its appropriateness for later Structural Equation Modeling (SEM) analysis.

Measurement model fit

Measurement model fit Kline (2023) advised employing 4 to 5 indices to evaluate model fit. In accordance with Kline's advice, the subsequent indices were utilized in this study: Chi Square/df, comparative-fit index (CFI), Tucker-Lewis index (TLI), goodness-of-fit index (GFI), and root mean squared error of approximation (RMSEA). The RMSEA value is within the recommended range (RMSEA < 0.08), indicating a reasonable level of model fit. Furthermore, a model is considered to fit adequately if the values of the CFI, TLI, and GFI indices above .90 and the Chi Square is below 5 (Kline, 2023). The measurement model included six latent constructs: Disciplinary and Industry Knowledge (DK), Practical and Problem-Solving Skills (PK), Professionalism and Work Attitude (PA), Teacher Guidance and Feedback (TK), Enterprise Practice Experience (EP), and Students' Perception of Employability (SPE). Each construct was operationalized using various observed indicators that represent students' learning experiences, competencies, and perspectives. The model delineates the connections between observed variables and their corresponding latent constructs, encompassing both academic and experiential aspects of employability development. This assessment framework established the basis for analyzing the combined influence of university-related characteristics and enterprise practices on students' perceived employability. The analysis of the measurement model indicated that it satisfied the prescribed criteria (CMIN = 713.817, DF = 390, Chi square/df = 1.83, CFI = .96; TLI = .96; GFI = .92, and RMSEA = .039).

Structural Equation Modeling

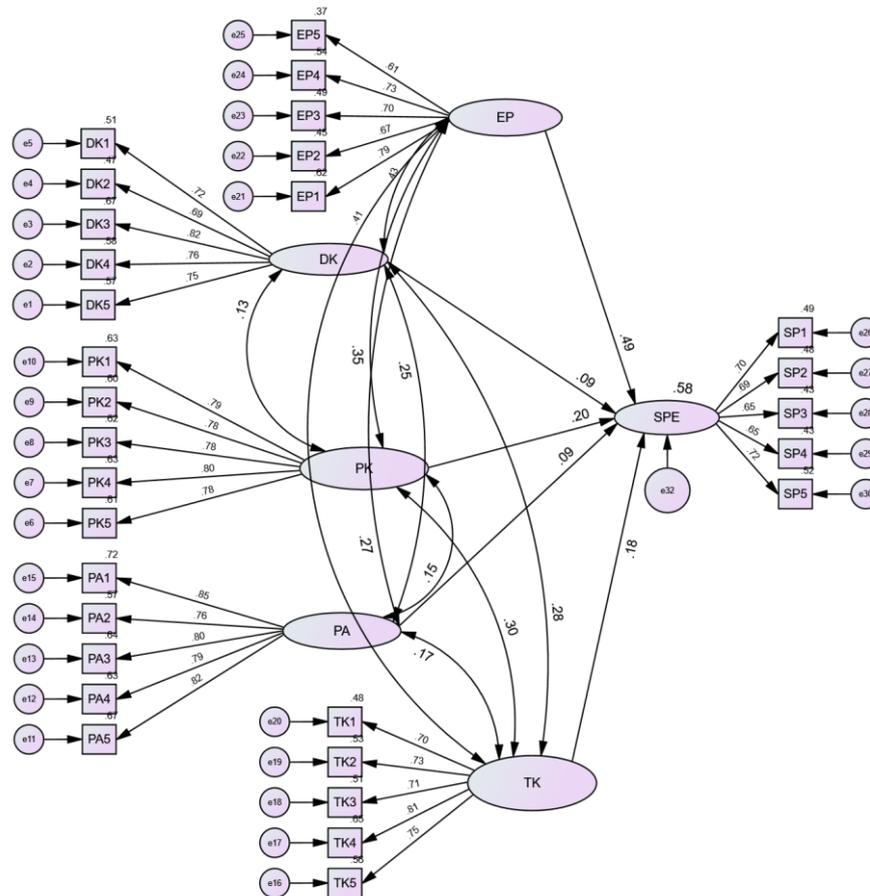
Structural Equation Modeling (SEM) was conducted to examine the direct effects of university-related factors

and enterprise practice experience on students' perception of employability (SPE). The results of the structure model showed that the model fit the data well (CMIN = 1.830, DF = 390, Chi square/df = .0046, CFI = .925, IFI = .960, GFI = .925, TLI = .955, and RMSEA = .039). The proposed structural model, as illustrated in **Error! Reference source not found.**, exhibited an acceptable fit to the data, supporting the hypothesized relationships among the latent constructs. As shown in the model, Enterprise Practice Experience (EP) had a strong and significant positive effect on students' perception of employability ($\beta = .49$, $p < .001$), indicating that engagement in authentic enterprise-based learning substantially enhances students' confidence in their employability. Among the academic predictors, Practical and Problem-Solving Skills (PK) exerted a significant positive influence on SPE ($\beta = .20$, $p < .001$), suggesting that students who perceive themselves as capable problem solvers report higher employability perceptions. Teacher Guidance and Feedback (TK) also showed a significant positive relationship with employability perception ($\beta = .18$, $p < .001$), highlighting the importance of instructional support and feedback in shaping students' career readiness. In contrast, Disciplinary and Industry Knowledge (DK) had a small negative direct effect on SPE ($\beta = -.09$, $p < .05$), while Professionalism and Work Attitude (PA) demonstrated a modest positive effect ($\beta = .09$, $p < .05$). These findings suggest that theoretical knowledge alone may not directly translate into employability confidence without adequate practical application and support.

The model reveals an important proportion of the variance in students' perceptions of employability, with the predictors accounting for 58% of the variance in SPE among vocational students. This suggests that perceptions of employability are predominantly influenced by experience learning and practical abilities rather than by academic knowledge alone. The results highlight the essential importance of practical enterprise experience in successfully connecting academic education with workforce preparedness.

Figure 2

Structural model for university-related factors and enterprise practice experience on students' perception of employability



Mediating Effect Test

Table 5 indicate that Enterprise Practice Experience (EP) exerts a strong and statistically significant direct effect on Students' Perception of Employability (SPE) ($\beta = .402, p = .001$), confirming its central role in shaping employability perceptions. When mediation is considered, the effect remains significant ($\beta = .386, p = .001$), indicating that EP continues to influence SPE robustly even after accounting for indirect pathways. Practical and Problem-Solving Skills (PK) show a significant direct effect on SPE ($\beta = .166, p = .001$), which increases under the mediation model ($\beta = .190, p = .001$), suggesting that experiential learning strengthens the translation of practical skills into employability perceptions. Professionalism and Work Attitude (PA) demonstrate a modest but significant direct effect ($\beta = .064, p = .022$). This relationship becomes stronger in the

mediated model ($\beta = .077, p = .003$), indicating partial mediation through enterprise practice experience. Similarly, Disciplinary and Industry Knowledge (DK) has a significant direct effect on SPE ($\beta = .075, p = .035$), with a stronger mediated effect ($\beta = .105, p = .001$), suggesting that academic knowledge contributes more effectively to employability perceptions when reinforced by practical exposure. Teacher Guidance and Feedback (TK) also significantly predicts SPE directly ($\beta = .137, p = .001$) and shows an enhanced effect through mediation ($\beta = .162, p = .001$), highlighting the importance of instructional support in facilitating the conversion of learning into employability confidence.

Overall, the persistence of significant direct effects alongside strengthened mediated effects confirms partial mediation, demonstrating that enterprise practice experience serves as a critical mechanism through which academic, professional, and instructional factors enhance students' perceptions of employability.

Table 5

Results of direct and mediating effect test

| Effect | | Direct Effect | | | | Mediation Effect | | | |
|-------------|----|---------------|------|-------|------|------------------|------|-------|------|
| DV | IV | Estimate | SE | C.R. | p | Estimate | SE | C.R. | p |
| SPE <--- EP | | .402 | .047 | 8.556 | .001 | .386 | .039 | 9.798 | .001 |
| SPE <--- PK | | .166 | .037 | 4.535 | .001 | .190 | .034 | 5.603 | .001 |
| SPE <--- PA | | .064 | .028 | 2.283 | .022 | .077 | .026 | 2.932 | .003 |
| SPE <--- DK | | .075 | .036 | 2.109 | .035 | .105 | .031 | 3.383 | .001 |
| SPE <--- TK | | .137 | .035 | 3.953 | .001 | .162 | .031 | 5.214 | .001 |

DK: Disciplinary and Industry Knowledge; EP: Enterprise Practice Experience; PA: Professionalism and Work Attitude; PK: Practical and Problem-solving Skills; SPE: Student's Perception of Employability; TK: Teacher Guidance and Feedback

Discussion

Direct Effects of University Related Factors on Students' Perception of Employability

The results offer substantial empirical evidence for the direct impact of significant university-related factors on students' perception of employability, consequently validating Hypotheses H1–H4. Among these criteria, Disciplinary and Industry Knowledge stands out as a significant predictor of successful involvement in perception of employability. This indicates that students' capacity for meaningful participation in industrial environments relies not solely on theoretical knowledge but also on their comprehension of industry standards, norms, and expectations.

Recent research indicates that disciplinary knowledge equips students with analytical frameworks for interpreting complex workplace challenges, whereas industry-specific knowledge allows them to anticipate employer expectations and respond adeptly to changing labor market demands (Soltani et al., 2024). Zhang et al. (2024) assert that Students' Perception of Employability is enhanced when academic learning is well connected with authentic industry scenarios. Tomlinson and Jackson (2021) contend that the development of professional identity relies on students' capacity to amalgamate disciplinary knowledge with a grasp of occupational norms and practices, thus facilitating the transfer from education to employment. These findings indicate that disciplinary and industry knowledge serve not only as technical inputs but also as essential facilitators of students' perception of employability. By cultivating confidence, adaptability, and contextual awareness, this knowledge improves students' preparedness to engage effectively in professional settings. This alignment substantiates Human Capital Theory by illustrating that employability arises not merely from information acquisition, but from the significant application of that knowledge in genuine professional environments.

The outcomes of this study indicate that practical and problem-solving abilities have a substantial direct impact on students' perception of employability, highlighting their essential role in facilitating meaningful interaction with actual workplace environments. Students with robust analytical, problem-identification, and solution-development skills are more adept at converting academic knowledge into effective professional performance. Heppner and Petersen (1982) assert that proficient problem-solving necessitates the diagnosis of intricate problems, the assessment of alternatives, and the execution of suitable actions—skills vital for maneuvering in modern work settings. Empirical evidence from China supports this perspective, indicating that students with enhanced practical and problem-solving abilities exhibit superior adaptability, innovation, and preparedness for employment during internships and enterprise-based learning experiences (Li & Jansaeng, 2025; Wang et al., 2024). These qualities augment students' perception of employability by bolstering confidence, task autonomy, and job efficacy. In accordance with constructivist learning concepts, such experiential interaction allows learners to generate information through active participation instead of passive absorption (Chen & Gan, 2021). These findings collectively affirm that practical and problem-solving abilities are essential processes that convert academic preparation into employability outcomes, hence underscoring their pivotal role in influencing students' perceptions of employability.

Furthermore, the results of this study affirm that professionalism and work attitude have a substantial direct impact on students' perception of employability, underscoring their essential role in preparing students for professional practice. Professionalism and work ethic—comprising accountability, integrity, adaptability, collaboration, and initiative—empower students to operate efficiently within organizational environments and fulfill workplace standards. Stern and Papadakis

(2006) assert that these attributes are developed through reflective engagement and socialization processes that facilitate the absorption of professional standards and values. In accordance with previous studies, the findings suggest that students exhibiting robust professional attitudes are more adept at converting academic knowledge into effective workplace conduct, hence enhancing their Perception of Employability. Empirical evidence from Chinese vocational and applied higher education indicates that structured practical experiences improve accountability, ethical awareness, and collaborative competence, all essential for employability development (Wang et al., 2023; Yang, 2020). By consistently participating in genuine job activities, students enhance their interpersonal abilities, adaptability, and professional self-assurance. According to Social Cognitive Career Theory, professionalism and work attitude enhance self-efficacy and positive result expectations, allowing students to confront workplace problems with confidence and perseverance (Lent et al., 1994). Thus, these features significantly influence students' perceptions of employability, affirming that professional conduct and work attitudes are essential elements of employability development rather than merely supplementary traits.

The outcomes of this study indicate that teacher guidance and feedback are essential in influencing students' perceptions of employability by mediating the conversion of academic learning into significant professional competence. Effective instructional advice serves not only as academic assistance but also as a developmental tool that allows students to understand professional expectations, enhance abilities, and apply knowledge in real-world situations. In accordance with previous studies, organized mentorship and prompt feedback assist students in identifying performance deficiencies, assimilating professional norms, and enhancing their confidence in occupational proficiency (Arinaitwe, 2021; Jackson et al., 2022). The efficacy of advice is contingent upon its quality and relevance; feedback that is reflective, contextualized, and congruent with working conditions significantly enhances employability development compared to mere procedural supervision. Research demonstrates that continuous instructional involvement improves self-efficacy, professional identity, and adaptive capacity—crucial psychological factors influencing Students'

Perception of Employability (Lyu et al., 2024). Through the promotion of reflective learning and contextual comprehension, teacher mentoring empowers students to convert academic training into professional readiness. These findings affirm that instructor assistance and feedback serve as a crucial mediating mechanism by which entrepreneurial practice improves students' perceived employability.

The Mediating Role of Enterprise Practice Experience

The results of this study demonstrated that enterprise practice experience (EPE) partially mediates the association between disciplinary and industry knowledge and students' perceived employability (H5). Disciplinary and industrial knowledge provide students with the cognitive framework necessary to comprehend professional environments; nevertheless, this information alone does not guarantee employability. According to Eraut (2002), professional competence develops when formal information is used, evaluated, and enhanced through contextual practice rather than obtained in isolation. EPE serves as the essential method for converting academic information into practical skill. By participating in genuine work settings, students can apply theoretical concepts, enhance contextual judgment, and connect their skills with actual job requirements (Eames & Coll, 2010). Empirical research demonstrates that enterprise-based experiences bolster self-efficacy, elucidate career aspirations, and improve perceived employability by allowing learners to assess their competencies against industry benchmarks (Gazi et al., 2024; Pitan & Muller, 2019). The found partial mediation effect in this study suggests that disciplinary and industrial knowledge directly impacts employability, whereas enterprise practice enhances this effect by converting information into practical competence. This conclusion emphasizes that employability growth is not exclusively knowledge-based or simply experienced; rather, it arises from the dynamic interplay between academic preparation and genuine job involvement.

The results suggested that enterprise practice experience partially mediates the association between practical and problem-solving skills and students' perceived employability (H6). Practical and problem-solving skills allow students to convert theoretical knowledge into effective working abilities, with their

influence on employability being most significant when applied in genuine professional environments. Empirical data indicates that structured practice environments—such as internships and work-integrated learning—improve students' ability to apply knowledge, adjust to real-world obstacles, and cultivate professional judgment (Gazi et al., 2024; Pianda et al., 2024). Research further indicates that experiential learning enhances essential employability traits, such as communication, adaptability, and collaborative problem-solving, which are vital for effective job integration (Musa et al., 2025; Pitan & Muller, 2019). Through ongoing involvement, criticism, and reflection, students enhance their skills, recognize performance deficiencies, and cultivate confidence in their professional abilities. These mechanisms facilitate the transition from abstract ability to functional expertise through the development of practical and problem-solving skills. The partial mediation identified in this study indicates that although practical and problem-solving abilities directly improve employability, their complete impact is achieved through enterprise practice experience, which contextualizes learning and converts academic preparation into workplace ready.

The results showed that enterprise practice experience serves a partial mediating role in the relationship between professionalism and work attitude and students' perceived employability (H7). Although professionalism and work attitude—manifested via accountability, integrity, adaptability, and collaborative orientation—are critical personal traits for workplace success, their impact on employability is not guaranteed. These traits have significance when applied inside genuine organizational environments. Empirical data demonstrates that enterprise practice establishes the contextual conditions necessary for the operationalization, testing, and refinement of professionalism (Jackson & Bridgstock, 2021; Tomlinson & Holmes, 2016). Studies indicate that work-integrated learning environments facilitate the internalization of professional norms, the exercise of ethical judgment, and the development of adaptive work behaviors in students through real-world interaction (Adegbite, 2024). Such experiences enable learners to convert abstract values into tangible professional behavior, so enhancing confidence and perceptions of employability. Furthermore, in alignment with Social Cognitive Career

Theory, enterprise practice provides mastery experiences and feedback that enhance self-efficacy and bolster positive career expectations (Lent et al., 1994). Recent research indicate that students who actively participate in occupational tasks cultivate more robust professional identities, improved communication skills, and increased preparedness for employment (Musa et al., 2025; Pitan & Muller, 2019). Consequently, professionalism and work attitude impact employability chiefly through practical experience, which serves as the essential conduit for converting personal qualities into observable job proficiency.

The findings of the current study revealed that enterprise practice experience serves a significant partial mediating effect in the relationship between teacher guidance and feedback into students' perceived employability (H8). Although disciplinary education imparts essential knowledge, the efficacy of instructional supervision and feedback is what ultimately influences students' ability to internalize, apply, and transfer this knowledge to practical professional situations. Previous studies demonstrate that teacher support not only improves academic achievement but also bolsters students' confidence, motivation, and career-related self-efficacy (Ma & Bennett, 2021). Educators facilitate students' understanding of performance objectives, enhance professional abilities, and link academic learning to occupational realities through structured mentoring, prompt feedback, and guided reflection. In accordance with Social Cognitive Career Theory, teacher feedback serves as a crucial source of social persuasion and mastery experiences, bolstering students' self-efficacy beliefs and influencing favorable result expectations (Bandura, 2001). Empirical research indicates that continuous instructional support enhances students' engagement, adaptive learning strategies, and tenacity in professional tasks (Yang & Zhang, 2022). Moreover, teacher-assisted entrepreneurship practice allows students to use theoretical knowledge in practical work settings, so enhancing their professional identity and self-assurance (Gazi et al., 2024). The findings suggest that instructor supervision alone does not immediately enhance employability; instead, its impact is mediated through enterprise practice, where feedback is applied, evaluated, and assimilated. This study establishes that enterprise practice experience considerably influences

the association between instructor guidance and feedback and students' impression of employability.

Recommendations

This study's empirical findings yield several critical recommendations to improve students' employability via coordinated educational and institutional strategies. The results indicate that disciplinary and industry knowledge, practical and problem-solving abilities, professionalism and work attitude, as well as instructor assistance and feedback, all have substantial direct impacts on students' perceived employability (RQ1–RQ4). This underscores the imperative for higher education institutions to transcend mere material delivery and deliberately construct learning environments that amalgamate knowledge acquisition with practical, introspective, and career-focused experiences. The results indicate that enterprise practice experience significantly mediates all evaluated relationships (RQ5–RQ8). This suggests that although academic and personal skills are crucial, their influence on employability is significantly enhanced when students receive genuine industry experience. Enterprise practice serves as the essential conduit for converting theoretical knowledge, skills, and attitudes into recognized job preparedness.

Universities should enhance organized business collaborations, integrate experiential learning throughout curriculum, and guarantee that enterprise internships incorporate mentoring, feedback, and reflective elements. Educators must synchronize instruction and evaluation with professional standards, while businesses should engage as collaborative educators. These findings collectively endorse a comprehensive, practice-oriented methodology for enhancing employability, with enterprise experience as the primary conduit for converting educational inputs into labor market preparedness.

Research Contribution

Theoretical Contribution

This study enhances theoretical understanding by synthesizing Human Capital Theory (HCT), Constructivist Learning Theory (CLT), and Social Cognitive Career Theory (SCCT) into a cohesive

framework that elucidates the development of employability in vocational education. The findings affirm that disciplinary knowledge, practical skills, and professional attitudes are vital components of human capital; nevertheless, their influence on employability is considerably enhanced by company practice. The study indicates that skills and knowledge create value solely when utilized in genuine work environments, hence extending HCT. From a CLT perspective, enterprise practice facilitates the conversion of theoretical knowledge into significant competence via reflection, problem-solving, and social engagement. Furthermore, based on SCCT, the findings indicate that enterprise practice improves self-efficacy, outcome expectations, and professional identity, thus bolstering perceived employability. Instructor supervision further enhances this process by bolstering confidence and promoting knowledge transmission. The paper provides a thorough theoretical framework illustrating the transformation of educational inputs into employable outcomes, using enterprise practice as the pivotal mechanism connecting learning, cognition, and career development in vocational education.

Practical Contribution

The study provides practical consequences for government, institutions, and businesses. It delineates strategies for enhancing university–enterprise collaboration, underscoring that superior practical experiences and reflective learning activities are essential for bolstering employability. It advocates for student-centered educational change by emphasizing the mediating function of involvement, urging schools to incorporate reflective journaling, goal-setting, and formative assessment. The study additionally guides policy formulation, advocating for mechanisms like collaborative education funds and employability certification systems. For employers, it underscores the strategic importance of educational engagement, advocating for long-term internship initiatives, collaborative course design, and internal competency assessments to develop sustainable talent pipelines. This research integrates theoretical innovation and practical approach to improve employability development in contemporary vocational education systems.

Research Limitations

This study provides significant insights into the impact of university-related factors on students' perception of employability with the mediating role of enterprise practice experience; yet, numerous limitations must be recognized. The sample was solely obtained from vocational institutions in Shandong Province. Despite the region's robust industrial foundation, its economic and educational circumstances may not adequately reflect those of other provinces in China, hence constraining the generalizability of the findings. The study utilized a cross-sectional, self-reported questionnaire, potentially introducing common technique bias and limiting causal interpretation. Employability perceptions were assessed at a singular moment, failing to account for variations over different phases of education or work transitions. The exclusive use of quantitative methodologies limits a thorough investigation of students' subjective experiences, motivations, and contextual factors. Crucial elements including familial history, labor market dynamics, and individual career ambitions were not analyzed. Subsequent study ought to apply longitudinal and mixed-method methodologies, encompass a broader range of regional samples, and integrate qualitative data to enhance the understanding of how enterprise practices influence employability development.

Future Direction

Subsequent investigations ought to broaden this research across three principal dimensions. The incorporation of multidisciplinary frameworks, such as Social Cognitive professional Theory or Organizational Socialization Theory, elucidates the processes by which students cultivate professional confidence and assimilate workplace norms. Utilizing hierarchical SEM can distinguish between individual (student) and organizational (institution or firm) levels, elucidating how institutional support, culture, and management indirectly affect perceptions of employability. Cross-disciplinary and cross-industry analyses (e.g., engineering versus humanities, manufacturing versus digital sectors) might uncover unique employability trajectories and guide specific vocational plans. Future endeavors could establish data systems among schools, government, and enterprises to monitor employability

outcomes and align them with regional industry requirements. Implementing graduate monitoring systems could correlate perceived employability with real employment quality metrics—such as compensation, job alignment, and career advancement—to assess predictive validity. International comparative studies, such as Germany's dual system and Australia's industry-led training model, would facilitate the identification of adaptable practices, allowing China to transition from policy-driven to mechanism-enhanced vocational education and establish a globally informed employability framework.

Conclusions

This study developed and empirically validated an integrated model elucidating the impact of university-related factors on students' perceived employability, mediated by enterprise practice experience. The results indicate that disciplinary and industry knowledge, practical and problem-solving skills, professionalism and work attitude, as well as teacher guidance and feedback, all have significant direct impacts on views of employability. More importantly, enterprise practice experience serves a vital mediating role, converting university-related factors into perceived employability. The findings indicate that employability development is attained not solely through theoretical education, but through the dynamic interplay between university related-factors with genuine enterprise involvement. Practical exposure allows students to implement knowledge, enhance abilities, and cultivate professional confidence, so augmenting the influence of academic preparation on employability results. These findings underscore the imperative of incorporating organized corporate practices into vocational curriculum and linking pedagogical tactics with industry standards. Overall, this study provides empirical evidence that supports a comprehensive, practice-oriented approach to vocational education. It emphasizes the necessity of collaborative initiatives among institutions, educators, and industry stakeholders to enhance employability perception through experiential learning, accordingly promoting more efficient and sustainable talent development frameworks.

Abbreviation

AMOS: Analysis of Moment Structures;
AVE: Average Variance Extracted;
CFA: Confirmatory Factor Analysis;
CFI: Comparative-Fit Index;
CLT: Constructivist Learning Theory;
CMIN: Chi-square Minimum Fit Function Value;
DK: Disciplinary and Industry Knowledge;
EFA: Exploratory Factor Analysis;
EP: Enterprise Practice Experience;
GFI: Goodness-of-Fit Index;
HCT: Human Capital Theory;
PA: Professionalism and Work Attitude;
PK: Practical and Problem-solving Skills;
SCCT: Social Cognitive Career Theory;
SEM: Structural Equation Modeling;
SPE: Student's Perception of Employability;
TK: Teacher Guidance and Feedback;
TLI: Tucker–Lewis Index;
UEC: University–Enterprise Cooperation;
RMSEA: Root Mean Squared Error of Approximation

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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