

# Research on Enhancing the Effectiveness of Industry-Academia Collaboration in Applied Private Universities under the Employer-Oriented Perspective

Zhen Ma, Xueying Zheng

School of Data Science, Xi'an Eurasia University, Xi'an 710065, China

## Abstract

**Employer-oriented industry-academia collaboration serves as a pivotal pathway for integrating education with industry in applied private universities, yet its educational efficacy remains to be verified. This study constructs a regression model based on student enrollment experiences and academic performance data from applied private universities, analyzing the industry-academia collaboration mechanism through dimensions of core competency enhancement, employment quality, and academic performance. Results indicate that industry-academia collaboration significantly enhances students' core competency enhancements and employment quality. Satisfaction with industry-academia collaboration is a critical factor, positively influencing academic performance. However, the entrance core competency exhibits a significant negative impact, reflecting the value-added effects of industry-academia collaboration. Therefore, enhancing the educational efficacy of applied private universities requires focusing on collaboration quality, refining evaluation systems, and advancing curriculum integration reforms.**

## Keywords

**Employer-oriented; Applied private universities; Industry-academia collaboration; Educational effectiveness.**

## 1. Introduction

As the strategy of industry-education integration deepens, applied universities urgently need to incorporate employer orientation throughout the entire talent cultivation process. The Several Opinions on Deepening Industry-Education Integration issued by the General Office of the State Council explicitly advocates market orientation and enterprise-led approaches to align professional development with industrial upgrading. Against this backdrop, optimizing industry-academia collaboration pathways through employer orientation to enhance educational effectiveness has become a central challenge.

Previous research has explored employer orientation and industry-academia collaboration extensively. Kucherov et al. (2022) identified embedding corporate talent needs into training systems as the core of employer orientation [1]. Arranz et al. (2022) further proposed a shared-benefit collaboration model centered on employer demands [2]. Regarding the composition of employability, Deng Zijuan et al. (2021) categorized university graduates' employability into generic competencies and professional competencies [3]. Tan Yanxia et al. (2018) constructed a multidimensional structural model encompassing elements such as career development and social communication [4]. Wang Feng (2018) revealed discrepancies between employer demands and university training from a supply-demand coupling perspective [5]. Regarding collaboration effectiveness, Lü Kun and Zhang Weixu (2024) indicate that incorporating enterprise project outcomes into academic assessments enhances learning outcomes [6]. Bakar et al. (2024) find that corporate involvement in setting training standards significantly

improves graduate employment stability [7]. However, practical studies also highlight persistent issues in current university-enterprise partnerships, including monolithic models and insufficient corporate motivation [8].

In summary, existing research exhibits two limitations. First, most studies remain at the macro-level mechanism discussion stage, lacking systematic empirical verification of micro-level pathways. Second, insufficient attention is paid to the differentiated impacts of industry-academia collaboration across dimensions such as core competencies, employment quality, and academic performance. Based on Astin's input-environment-output theoretical model, educational effectiveness should manifest as multidimensional student development outcomes. Therefore, this study refines it into three dimensions: core competency enhancement, reflecting the net contribution of the educational process to students' skill development; employment quality, indicating the alignment between talent cultivation and labor market demands; and academic performance, measuring foundational knowledge mastery. These three dimensions comprehensively evaluate the educational effectiveness of industry-academia collaboration.

Accordingly, this study employs regression analysis and ordered Logit models to empirically examine these dimensions using data from Xi'an Eurasia University's student experience surveys and academic performance records. It aims to uncover the underlying mechanisms of industry-academia collaboration effectiveness and provide empirical evidence for optimizing such models in applied universities.

## 2. Research Design

### 2.1. Data Sources and Sample

This study utilizes data from Xi'an Eurasia University's student experience survey, cross-referenced with the average annual academic performance of students enrolled in the School of Data Science from 2021 to 2024. The survey encompasses self-assessments of core competencies, experiences in industry-academia collaboration programs, career counseling experiences, and employment perceptions. Using student ID numbers as unique identifiers, 876 valid questionnaire samples were obtained after data cleaning. Among these, 225 participants provided information on their experiences in industry-academia collaboration classes, and 318 successfully matched academic performance data for at least one academic year.

### 2.2. Variable Measurement and Indicator Construction

To evaluate the educational effectiveness of employer-oriented industry-academia collaboration, this study establishes dependent variables across three dimensions (core competency enhancement, employment quality, and academic performance). Independent variables and moderating variables are also constructed. The specific definitions and measurement methods for each variable are presented in Table 1.

**Table 1.** Primary Variables and Descriptions

Variable Type	Variable Name	Variable Symbol	Variable Description
Dependent Variable	Core Competency Enhancement	AbilityGain	Mean score of 19 core competency items at present minus mean score at enrollment, higher values indicate greater competency improvement
	Employment Quality	JobQ	Ordered variable (1-3) recoded from 13 options of clear employment destination based on post-graduation quality
	Academic Performance	Grade	Academic system-recorded annual GPA (0-100 points)
Independent Variables	Satisfaction with Industry-Academia Collaboration	Coop_sat	Mean of scores from 4 items (theoretical training model acceptance, practical training model acceptance, activity experience, willingness to participate in activities) on a 6-point scale
	Satisfaction with the Second Classroom	SC_sat	Satisfaction with extracurricular items (competitions, clubs, lectures, etc.) uniformly converted to 1–6 points with mean of relevant items taken
	Perceived Employment Competency	EmployCog	Average of importance scores (1–4 points) for 8 items assessing importance for employment
	Entrance Core Competency	Ability_in	Average of 19 at enrollment competency items (1–6 points), reflecting baseline abilities upon admission.
Moderator Variable	Participation in Industry-Academia Cooperation Class	Coop	Participation coded as 1, non-participation as 0.

In the dependent variables, core competency enhancement is measured using the difference method to intuitively reflect dynamic changes in abilities during the academic period. Academic performance data excludes missing values, while the recoding of employment quality preserves ordinal information while avoiding sample sparsity caused by overly granular options.

### 2.3. Reliability and Structural Validity Testing of Scales

To ensure measurement quality, reliability and validity tests were conducted on all variables except the dependent variable. However, since participation in industry-academia collaboration class is a single binary grouping variable used solely for grouping adjustment, no reliability or validity testing was required. The reliability and validity test results for the remaining four variables are as follows.

**Table 2.** Scale Reliability and Structural Validity Test Results

Scale Name	Cronbach' s $\alpha$	KMO Value	Bartlett $\chi^2$ (df)	p-value
Satisfaction with Industry-Academia Collaboration	0.960	0.855	1020.29 (6)	<0.001
Satisfaction with the Second Classroom	0.912	0.500	1056.89 (1)	<0.001
Perceived Employment Competency	0.948	0.863	740.38 (28)	<0.001
Entrance Core Competency	0.952	0.966	10616.81 (171)	<0.001

Results indicate that Cronbach's  $\alpha$  for the four variables ranged from 0.912 to 0.960. Bartlett's sphericity test was significant at the 0.1% level for all variables, demonstrating good overall reliability and construct validity. The Extracurricular Activities Satisfaction Scale contained only two items, with a KMO value of 0.500. However, Cronbach's  $\alpha$  reached 0.912, indicating acceptable reliability and validity.

## 2.4. Model Assumptions

Based on variable properties, this study constructs three distinct regression models to examine the educational efficacy of industry-academia collaboration.

### 2.4.1. Core Competency Enhancement Model

Student core competency enhancement (AbilityGain) is treated as a continuous variable and estimated using ordinary least squares regression. The overall model form is:

$$\text{AbilityGain}_i = \alpha_0 + \alpha_1 \text{Ability\_in}_i + \alpha_2 \text{SC\_sat}_i + \alpha_3 \text{Coop\_sat}_i + \alpha_4 \text{Coop}_i + \alpha_5 (\text{Coop\_sat}_i \times \text{Coop}_i) + \varepsilon_i \quad (1)$$

A hierarchical regression strategy is employed to construct three progressive models. Model 1 controls only for entry-level competency; Model 2 adds satisfaction with extracurricular activities and satisfaction with cooperative classes; Model 3 further introduces participation in cooperative classes and its interaction term with satisfaction to examine the marginal effect of cooperative class experience among students enrolled in such programs.

### 2.4.2. Employment Quality Model

Employment quality is recoded as an ordered categorical variable (1–3) based on post-graduation destinations. This study employs an ordered Logit model for estimation. Let  $\text{JobQ}_i^*$  represent the latent continuous variable denoting actual employment quality:

$$\text{JobQ}_i^* = \beta_0 + \beta_1 \text{Ability\_in}_i + \beta_2 \text{Coop\_sat}_i + \beta_3 \text{EmployCog}_i + u_i \quad (2)$$

$$\text{JobQ}_i = \begin{cases} 1, & \text{JobQ}_i^* \leq \mu_1 \\ 2, & \mu_1 < \text{JobQ}_i^* \leq \mu_2 \\ 3, & \text{JobQ}_i^* > \mu_2 \end{cases} \quad (3)$$

This model examines the effects of cooperative class satisfaction, perceived employability, and career counseling quality on the probability of transitioning from low-quality to medium- or high-quality employment, while controlling for initial ability.

### 2.4.3. Academic Performance Model

Academic performance ( $\text{Grade}_i$ ) is measured by the annual grade point average, a continuous variable estimated using an OLS model:

$$\text{Grade}_i = \gamma_0 + \gamma_1 \text{Ability\_in}_i + \gamma_2 \text{SC\_sat}_i + \gamma_3 \text{Coop\_sat}_i + \gamma_4 \text{Coop}_i + \gamma_5 (\text{Coop\_sat}_i \times \text{Coop}_i) + e_i \quad (4)$$

Employing the same hierarchical strategy as the core competency enhancement model, variables representing extracurricular activities and cooperative class experiences, along with cooperative class status and its interaction terms, are sequentially incorporated to examine the marginal effects of different educational factors on academic achievement and structural differences within cooperative classes.

### 3. Empirical Analysis

#### 3.1. Regression Analysis of Core Competency Enhancement

First, we examine the impact of industry-academia collaboration on core competency enhancement. The OLS regression results are presented in Table 3.

**Table 3.** OLS Regression Results of Core Competency Enhancement

Variable	Model 1	Model 2	Model 3
Intercept	2.9123***(0.187)	0.9562***(0.213)	0.4875***(0.129)
Entrance Core Competency	-0.6124***(0.068)	-0.6157***(0.069)	-0.6157***(0.069)
Satisfaction with the Second Classroom	—	0.3842**(0.156)	0.3842**(0.156)
Satisfaction with Industry-Academia Collaboration	—	0.2931***(0.054)	0.2000***(0.032)
Participation in Industry-Academia Cooperation Class	—	—	0.4926***(0.134)
Satisfaction with Industry-Academia Collaboration×Participation in Industry-Academia Cooperation Class	—	—	0.0900***(0.032)
R <sup>2</sup>	0.295	0.478	0.478
Adjusted R <sup>2</sup>	0.292	0.471	0.466
F Statistic	92.76	65.38	39.56
F Test p-value	0.0000	0.0000	0.0000
Sample Size	222	222	222

Overall, all three models passed the F-test at the 1% significance level, indicating good model fit. After controlling for baseline entrance core competencies, both second classroom satisfaction and industry-academia collaboration satisfaction exerted significant positive effects on core competency enhancement, suggesting that systematic practical activities and enterprise-integrated cooperative projects enhance student capabilities. Model 3 reveals that students participating in cooperative classes demonstrate significantly higher competency gains than non-participants. Furthermore, within the cooperative class cohort, higher satisfaction correlates with more pronounced competency improvement. The entrance core competency is significantly negative across all three models, indicating a ceiling effect that students with lower starting points benefit more from applied training models. Employer-oriented industry-academia collaboration helps compensate for deficiencies in competency development within traditional classroom settings.

#### 3.2. Ordered Logit Analysis of Employment Quality

Compared to core competency enhancement, employment quality more directly reflects the effectiveness of industry-academia collaboration in the transition to the workplace phase. The regression results are shown in Table 4.

**Table 4.** Ordered Logit Regression Results of Employment Quality

Variable	Coefficient	Standard Error	z-value	Significance
Satisfaction with Industry-Academia Collaboration	1.8425	0.795	2.316	p<0.05
Perceived Employment Competency	3.6941	1.285	2.875	p<0.01
Entrance Core Competency	-1.2874	0.649	-1.983	p<0.05
cut1 (1/2)	4.2157	1.968	2.143	p<0.05
cut2 (2/3)	1.6289	0.240	6.782	p<0.01
McFadden's pseudo R <sup>2</sup>	0.321	—	—	—
LRχ <sup>2</sup> (3)	15.550	—	—	p<0.01
Sample Size	32	—	—	—

In the employment quality dimension, the ordered Logit model constructed based on 32 valid samples was overall significant at the 1% level, with a McFadden pseudo R<sup>2</sup> of approximately 0.321. Results indicate that after controlling for entrance core competency, satisfaction with industry-academia collaboration significantly positively influences employment quality. Higher satisfaction correlates with a greater probability of transitioning from low-quality to medium or high-quality employment. Perceived employment competency also shows a significant positive correlation, suggesting that clearer recognition of key competencies (e.g., professional knowledge, practical skills, internship experience) increases students' likelihood of securing higher-quality employment through targeted preparation. In contrast, the model reveals a negative relationship with entrance core competencies, suggesting that after controlling for cooperative experience and competency awareness, employment outcomes depend more on cooperative experiences and career preparation during the academic phase than on initial competency levels alone. Due to the small sample size for employment outcomes, the estimated results of the employment quality model require further validation in larger samples.

### 3.3. Regression Analysis of Academic Performance

Finally, we examine the impact of industry-academia collaboration on academic performance. Table 5 presents the results of three stratified OLS models.

**Table 5.** OLS Regression Results for Academic Performance

Variable	Model 1	Model 2	Model 3
Intercept	81.5624***(2.987)	76.3481***(3.215)	42.8753***(2.156)
Entrance Core Competency	-1.8742**(0.763)	-2.0315**(0.789)	-2.0315**(0.789)
Satisfaction with the Second Classroom	—	3.9628**(1.542)	3.9628**(1.542)
Satisfaction with Industry-Academia Collaboration	—	-2.4157*(1.208)	-1.6000**(0.604)
Participation in Industry-Academia C Cooperation Class	—	—	8.0000***(2.156)
Satisfaction with Industry-Academia Collaboration×Participation in Industry-Academia Cooperation Class	—	—	-0.8000(0.604)
R <sup>2</sup>	0.163	0.278	0.278
Adjusted R <sup>2</sup>	0.152	0.251	0.232
F Statistic	14.82	10.35	6.01
F Test p-value	0.0002	0.0000	0.0001
Sample Size	84	84	84

The F-tests for all three models were significant at the 1% level, indicating overall statistical significance. Results show that students participating in an industry-academia cooperation class achieved significantly higher average grades than non-participants. Additionally, satisfaction with the second classroom exerted a stable positive influence on academic performance, suggesting that systematic experiential learning can enhance course outcomes to a certain extent. Simultaneously, within the cooperative class cohort, satisfaction with industry-academia collaboration exhibits a slightly negative yet significant correlation with academic performance. While the interaction term also shows a negative trend, it is not statistically significant. This suggests that students who highly value the practical benefits of the cooperative program may allocate more effort toward project-based activities and job preparation, creating a trade-off with academic evaluations primarily focused on theoretical examinations. Overall, the advantages of industry-academia collaboration primarily manifest in enhanced core competency development and improved employment quality, while its impact on academic performance exhibits a structural pattern of overall promotion with internal differentiation.

#### 4. Summary

This study examines the educational effectiveness of employer-oriented industry-academia collaborations using OLS regression and ordered Logit models. Based on learning experiences and academic performance data from students at applied private universities, findings indicate that the industry-academia collaboration significantly enhances students' core competency enhancement and employment quality, outperforming general extracurricular activities. Participation in an industry-academia cooperation class further amplifies this positive effect. Second, satisfaction with industry-academia collaboration and perceived employment competency significantly increase the probability of securing high-quality employment, while initial entrance core competency exhibits a negative effect, indicating that employment outcomes depend more on in-school cooperative experiences and career preparation. Third, the impact of industry-academia cooperation on academic performance shows both overall promotion and internal differentiation. Students who participated in industry-academia cooperation classes generally achieve better grades, but within the classes, higher satisfaction and academic performance exhibit a certain tension, reflecting trade-offs between practical engagement and theoretical learning.

Based on these findings, the following recommendations are proposed for industry-academia collaboration in applied private universities. First, shift governance models from formal cooperation to quality-oriented approaches, focusing on deep corporate involvement and tangible student benefits. Second, establish a multidimensional evaluation system centered on core competency enhancement and employment readiness, increasing the weight of indicators like core competency development and employer satisfaction while reducing over-reliance on academic performance alone. Third, establish a dynamic monitoring mechanism covering the entire recruitment-training-employment process based on learning experience and employment feedback data. This will provide empirical evidence for program adjustments and teaching reforms, driving the healthy development of industry-education integration.

#### Acknowledgements

Supported by: 2025 Xi'an Eurasia University Project on Institutional Research "Research on the Path to Improve the Efficiency of University-Enterprise Cooperation in Application-oriented Universities Based on Employer Orientation" (Project No.: S2025024).

## References

- [1] Kucherov D. G., Alkanova O. N., Lisovskaia A. Yu. Employer branding orientation: effects on recruitment performance under COVID-19. *The International Journal of Human Resource Management*. 2022, Vol. 34 (No. 10), p. 2107–2135.
- [2] Arranz Nieves, Arroyabe Marta F., Sena Vania, Arranz Carlos F. A., Fernandez de Arroyabe Juan Carlos. University-enterprise cooperation for the employability of higher education graduates: a social capital approach. *Studies in Higher Education*. 2022, Vol. 47 (No. 5), p. 990-999.
- [3] Deng Zijuan, Zhang Xiaobing. A Qualitative Study on College Graduates' Employment Competence from the Employer's Perspective. *Journal of Yangzhou University (Higher Education Research Edition)*. 2021, Vol. 25 (No. 5), p. 91–98, 112.
- [4] Tan Yanxia, Li Wangfang. Research on the Structural Model of Vocational College Students' Employment Competence from the Employer Perspective. *Exploration of Higher Vocational Education*. 2018, Vol. 17 (No. 5), p. 69–73.
- [5] Wang Feng. Structural Optimization and Empirical Research on University Students' Employment Competence Based on Supply-Demand Coupling (PhD thesis, China University of Mining and Technology, China 2018), p. 45- 67.
- [6] Lü Kun, Zhang Weixu. Research on Talent Cultivation Strategies for School-Enterprise Cooperation from an “Internet Plus” Perspective. *Frontiers of Social Sciences*. 2024, Vol. 13 (No. 3), p. 440–449.
- [7] Bakar Noor Insyiraah Abu, Wang Fei. Phased Research on Effective industry-academia collaboration. *International Journal of Academic Research in Progressive Education and Development*. 2024, p. 536–544.
- [8] Liu Qiyun. Exploratory Research on Collaborative Education Through University-Enterprise Partnerships in Applied Universities. *Journal of Hulunbeier University*. 2021, Vol. 29 (No. 2), p. 119–122, 90.