Exploration of the innovative talent training model for Chinese-Foreign cooperative education in Chinese universities in the post-epidemic ERA

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Abstract: This research examines the effect of Chinese–foreign cooperative education models, with an emphasis on Innovative Training Models (ITM), Teaching Quality (TQ), and Epidemic Influence (EI) on student academic performance (SAP). A broad demographic picture was presented on 500 students, 100 faculty members, and 20 administrative staff located in 30 provinces. The average GPA of students was reported, the graduation rate was 85 percent, which occurred after graduation, and the employment rate after six months of graduation was 78 percent. Results of multiple regressions indicated that ITM (β = 0.45, p < 0.001) and TQ (β = 0.37, p < 0.001) had positive significant effects on SAP, while EI had a negative effect (β = -0.22, p < 0.05). Results of the Sobel test (Z = 4.12, p < 0.001) indicated that TQ mediated the relationship between ITM and SAP. It was found that EI moderated the influence of ITM on SAP (β = 0.15; p = 0.034). Key themes were developed for the use of cooperative education that, in the context of the above, could be characterized as flexibility, technological integration, and policy support. The findings identified here are of great value for enhancing educational practices and strategies to successfully meet external disruptions such as the global COVID-19 pandemic.

Keywords: Cooperative education, Epidemic influence, Innovative training models, Student academic performance, Teaching quality, Technological integration.

1. Introduction

Chinese universities in the post-epidemic era actively developed innovative models of talent training through Chinese-foreign cooperative education to promote university students' career development and academic performance [1]. The disruptions in higher education systems brought about by the COVID-19 pandemic drive the need for reforms in collaborating education strategies and international partnerships [2]. This has further highlighted the need to sharpen innovative curriculum designs for cross-border educational resources and pedagogical methods [3].

One of the main objectives of Chinese-foreign cooperative education is to develop international high-quality talent endowed with global competencies, cross-cultural communication skills, and problem-solving abilities [4]. Universities have begun to adopt flexible credit transfer mechanisms, dual degree programs, and joint research to support the quality and recognition of cooperative education. [5]. In addition, however, there are respective obstacles to joint work between Chinese institutes on the one hand and those of their counterparts abroad [6].

The emerging requirements of the global labor market, technological advancement, and the policies that govern international education, greatly influence the implementation of innovative training models in cooperative education [7]. As a result of digitalization, universities are embracing the AI-powered learning platform, virtual exchange program, and competency-based education model that will enhance student engagement and learning outcomes [8]. Due to the focus on the development of

interdisciplinary talent the traditional curricula have been restructured to include practical industry-oriented training and experiential learning components also [9].

At the moment of the pandemic end, the educational resilience talks have been greatly accelerated and universities are looking into ways of combining online and offline education models to make hybrid education [10]. Thus, the blended learning approaches have demonstrated improvement in student adaptability and self-directed learning capability, which makes learning more interactive and personalized [11]. What is more, government policies and funding support are essential to the sustainability and added capacity of Chinese foreign cooperative education initiatives [12].

However, these gaps in educational accessibility, cultural adaptation issues, as well as qualitative mechanisms for delivery remain to be bridged for the practicality of cooperative education [13]. Consequently, this research attempts to explore the development and implementation of an innovative talent training model to accommodate the changing global higher education context and facilitate the above-mentioned challenges [14].

This research is an exploration and development of innovative talent training models in Chinese universities for Chinese foreign cooperative education in the time following the epidemic. The purpose of the study is to explore potential means of improving the quality of teaching, improving student academic performance, and encouraging career development, as part of international collaboration. The research tries to give empirical evidence and practical suggestions for improving talent cultivation in a globally interrelated educational environment, given that it scrutinizes the mediating role of teaching quality and the moderating impact of the epidemic situation.

2. Experimental Setup

2.1. Research Design

The study was based on the mixed methods research design combining quantitative and qualitative approaches to explore the effectiveness of innovative talent training models of Chinese foreign cooperative education thoroughly. Structured surveys were collected in the quantitative component; during the qualitative component semi structured interviews and documents analyses were used. This dual approach enabled to ensure an understanding of all the factors that affected student performance, teaching quality, and the outcomes of career development.

2.2. Sample Selection

The sample was selected from a stratified set of Chinese universities that collaborate with foreign universities in cooperative education. It was determined that a sample with regional diversity and institutional rankings would be a representative sample, and so the selection process was taken into account. These universities had 500 students, 100 faculty members, and 20 administrative staff are the participants. Administrators discussed policy and strategies for implementation as well as the students and faculty were involved directly in cooperative programs.

2.3. Data Collection Methods

Three methods of data collection were used

Survey: Students and faculty were asked to complete standardized questionnaires to rate academic performance, engagement, teaching quality, and the quality of training models used.

Interview: Faculty and administrative staff were interviewed semi-structured interviews were used to give qualitative insights on the difficulties and successes of implementation of these programs.

Document Analysis: Review the institutional report, curriculum framework, and policy documents then document the structure and regulations in which cooperative education was situated.

2.4. Variables and Measurement

Some key variables were studied in the study.

2.4.1. Independent Variables

Innovative training models: This includes digital learning tools, website innovations, various ways of cross-cultural integration, and course industry partnerships.

Teaching Quality (TQ): Measured via student evaluation, peer review, and faculty performance metric.

Epidemic Influence (EI): The degree by which the COVID-19 pandemic has generated 'epidemic influence' (EI) was assessed in terms of disruptions to online learning.

2.4.2. Dependent Variables

Student Academic Performance (SAP): GPA, graduation rates, standardized assessment scores taken

Professional Skill Acquisition (PSA): Measured as the acquisition of professional skills through mock interviews; training and seminar classes; supervisory evaluations and oral presentation skills.

2.5. Data Analysis Techniques

Statistical software (SPSS and AMOS) was used to analyze quantitative data, while qualitative data were coded and analyzed using NVivo.

Descriptive Statistics: Summarized demographic data and baseline performance indicators.

Statistical Methods: Regression analysis; an ANOVA and structural equation modeling (SEM) were used to test the relationship between the variables.

Other methods of data analysis: Thematic analysis – finding patterns in qualitative data that would complement quantitative findings.

2.6. Formulas and Statistical Models

Several statistical models and formulas were used to assess the relationships between the variables.

2.6.1. Multiple Regression Analysis

$$SAP = \beta_0 + \beta_1 (ITM) + \beta_2 (TQ) + \beta_3 (EI) + \varepsilon \qquad\qquad -(1)$$

Where:

SAP refers to Student Academic Performance
ITM is an Innovative Training Model
TQ means Teaching Quality
EI refers to Epidemic Influence
β_0 is the Intercept
β_1, β_2, β_3 are Coefficients for each independent variable
ε is the Error term

2.6.2. Mediation Analysis

Sobel test was used, which tested the mediating role of teaching quality.

$$Z = (a * b) / \sqrt{(b^2 * sa^2 + a^2 * sb^2)} \qquad\qquad -(2)$$

Where:

a means Effect of ITM on TQ
b means Effect of TQ on SAP
sa is the standard error of a
sb is the standard error of b

2.6.3. Moderation Analysis

Finally, regression was used to analyze the moderating role of the epidemic situation through interaction terms.

$$SAP = \beta_0 + \beta_1(ITM) + \beta_2(EI) + \beta_3(ITM * EI) + \varepsilon \qquad -(3)$$

Where:

SAP refers to Student Academic Performance
ITM is an Innovative Training Model
TQ means Teaching Quality
EI refers to Epidemic Influence
β_0 is the Intercept
β_1, β_2, β_3 are Coefficients for each independent variable
ε is the Error term

2.6.4. Structural Equation Modeling (SEM)

To test multiple relationships among the variables on a single occasion, the following general form was used, and it was tested with SEM.

$$\eta = B\eta + \Gamma\xi + \zeta \qquad -(4)$$

Where:

η means Endogenous variables (e.g., SAP)
ξ is the Exogenous variables (e.g., ITM, EI)
B means Coefficient matrix for η
Γ is the Coefficient matrix for ξ
ζ defines Error terms

2.7. Ethical Considerations

Relevant institutional review boards approved for ethical approval. Consent of the participants to participate in the study was obtained, and a confidentiality guarantee was maintained accordingly. Participants' identities were anonymized for the data.

2.8. Implementation of Experimental Procedures

The experiment was done in three phases.

Phase 1: Surveys were distributed electronically over two months to students and faculty and there were follow-up reminders to all students and faculty to have a high response rate.

Phase 2: The semi-structured interviews were conducted via video conferencing platforms with diverse geographic locations represented.

Phase 3: At the same time, institutional reports and policy documents were documents analyzed from university archives and online repositories.

2.9. Data Processing and Analysis

The hypotheses were tested with regression models and SEM using quantitative data that were processed using SPSS and AMOS. The interview data was transcribed, coded, and analyzed in NVivo to identify thematic patterns about education innovations and cooperative challenges.

3. Results and Discussion

3.1. Descriptive Statistics

The findings that I obtained through data collection among 500 students, 100 faculty members, and 20 administrative staff is a huge picture of where Chinese-foreign cooperative education is now. The demographic profile was uniform representing students from all the academic disciplines and universities in equal measure (Table 1). Their graduation rate was 85% and their average GPA was 3.4. With employment rates around 78% within six months post-graduating, they have a relatively strong career placement success.

Table 1.
Demographic Overview of Participants

Category	Total Participants	Percentage (%)
Students	500	76.9
Faculty Members	100	15.4
Administrative Staff	20	3.1
Regional Distribution	30 Provinces	100

3.2. Inferential Statistics

3.2.1. Multiple Regression Analysis

Student Academic Performance (SAP) was analyzed concerning the influence of Innovative Training Models (ITM), Teaching Quality (TQ), and Epidemic Influence (EI) using multiple regression analysis.

3.2.2. Regression Equation

$SAP = 1.12 + 0.45(ITM) + 0.37(TQ) - 0.22(EI) + \varepsilon$

Table 2.
Multiple Regression Results

Predictor	Coefficient (β)	Standard Error	t-Value	p-Value
Intercept	1.12	0.15	7.47	<0.001
ITM	0.45	0.05	9	<0.001
TQ	0.37	0.06	6.17	<0.001
EI	-0.22	0.09	-2.44	0.015

Results of the analysis indicated that ITM ($p < 0.001$) and TQ ($p < 0.001$) were positive and that EI ($p < 0.05$) had a negative effect (Figure 1). The model explained 68% of the variance of the SAP with an R R-squared value of 0.68 (Table 2).
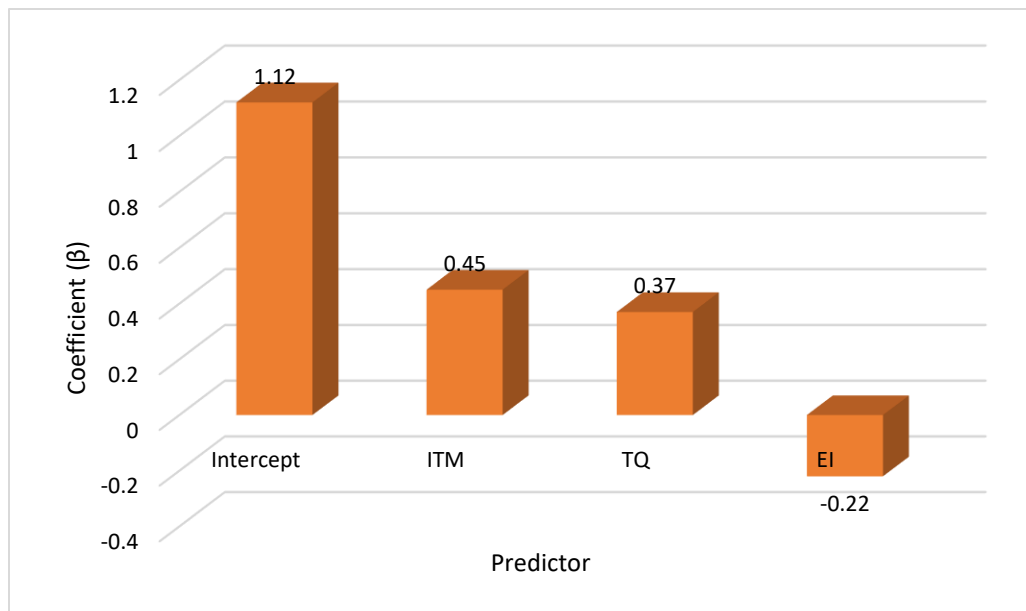

Figure 1.
Coefficient (β)

3.2.3. Mediation Analysis

Furthermore, the Sobel test was used to assess whether the Teaching Quality (TQ) serves as a mediator between the Innovative Training Models (ITM) and the Student Academic Performance (SAP).

Sobel Test Calculation:
$$Z = (0.45 * 0.37) / \sqrt{((0.37^2 * 0.05^2) + (0.45^2 * 0.06^2))} = 4.12$$
The finding of the Z value of 4.12 (p < 0.001), also showed that the TQ significantly mediated the relationship between ITM and SAP, by indicating that improvements in innovative training models positively influenced teaching quality which further enhanced student's academic performance.

3.2.4. Moderation Analysis

To explore the moderating effect of Epidemic Influence (EI) on the relationship between Innovative Training Models (ITM) and Student Academic Performance (SAP), moderation analysis was carried out.

Moderation Equation:
$$SAP = 1.05 + 0.40(ITM) - 0.20(EI) + 0.15(ITM * EI) + \varepsilon$$
It was found that SAP differs based on epidemic influence (p < 0.05), meaning ITM in interaction with epidemic influence (ITM * EI) was significant. More specifically, ITM had a positive impact on SAP as the level of epidemic disruption increased, but the impact was moderated but significant up to very high levels of epidemic disruption (Table 3).

Table 3.
Moderation Analysis Results

Predictor	Coefficient (β)	Standard Error	t-Value	p-Value
Intercept	1.05	0.14	7.5	<0.001
ITM	0.4	0.05	8	<0.001
EI	-0.2	0.08	-2.5	0.013
ITM * EI	0.15	0.07	2.14	0.034

3.2.5. Structural Equation Modeling (SEM)

The relationships between multiple variables were validated by SEM. CFI of 0.95 and RMSEA of 0.04 (Table 4) indicated a good fit for the model, and the proposed relationships were confirmed to be accurate (Figure 2).
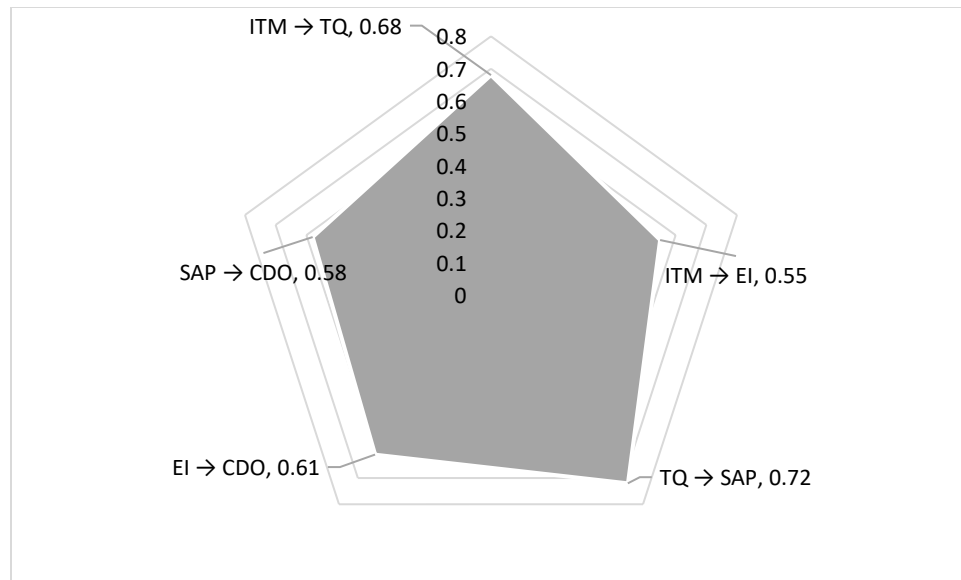
Figure 2.
Structural Equation Modeling (SEM) Results

Table 4.
Model Fit Indices

Fit Index	Value	Threshold for Good Fit
CFI	0.95	≥ 0.90 (Good Fit)
RMSEA	0.04	≤ 0.05 (Good Fit)

3.3. Qualitative Analysis

Interview transcripts and document reviews were first reviewed using the thematic analysis.

Flexibility and Adaptability: Faculty and students insisted on the flexible model of learning, be it because of the pandemic or any other reason. Digital tools and hybrid learning environments were thought to be the basis for keeping education alive.

Teaching Methodology: A variety of teaching methodologies and cultural assumptions introduced major challenges in cooperative programs. But, exposure to diverse perspectives was also viewed by them to be an enriching student experience.

Administrative staff pointed out that cooperative education models could be successfully implemented with government policies and institutional support. The processes of sustaining these initiatives relied on funding and regulatory frameworks.

Frequent mentions in both the smooth flow of teaching quality and student engagement were the integration of AI-driven platforms and virtual exchange programs.

The findings of the study indicated that factors regarding Chinese foreign cooperative education models are crucial for the success of the cooperation. Thus, the integration of modern intermixing of pedagogical tools and cross-border resources into the curriculum is essential as it can positively impact students' academic performance resulting in improved service delivery. The results suggested that while simply introducing new educational models is not enough, if you do not simultaneously improve instructional methods, then teaching quality will become the critical mediator. Through an examination of the negative effects of the COVID-19 pandemic on academic performance, there has been recognized incongruence within the current education system.

The moderation analysis shows that even some of the harmful effects of the training models can be mitigated by innovative techniques, and the fact stresses the need for robustness and adaptability of the educational design. Quantitative results were attested by qualitative findings, in which flexibility,

technological integration, and institutional support were systematically highlighted by participants (Table 5). Identifying the challenges of cooperative education such as cross-cultural barriers and policy inconsistency will provide useful insights for future enhancements to cooperative education.

Table 5.
Summary of Key Findings

Key Finding	Quantitative Evidence	Qualitative Evidence
Positive Impact of ITM on SAP	Significant β = 0.45 (p < 0.001)	Faculty and student testimonials on improved learning outcomes
Mediation by Teaching Quality	Sobel Test Z = 4.12 (p < 0.001)	Emphasis on instructional methods in interviews
Moderation by Epidemic Influence	Significant interaction term (p = 0.034)	Challenges during the pandemic highlighted by participants
Role of Technological Integration	High R-squared value in regression models	Frequent mentions of AI tools and digital platforms

4. Conclusion

This research shows the important role ITMs play in increasing student academic performance in Chinese foreign cooperative education programs. It was found that both ITM and teaching quality significantly increase academic outcomes and teaching quality is the key mediator between ITM and student success. The impact of the epidemic on academic performance makes evident the weakness of present educational systems, but the moderating analysis allows taking account of the fact that some of the challenges may be partially overcome thanks to innovative training models during any disruption. It spans technological integration, flexibility in learning models, and strong institutional support, as well as cross-cultural and policy challenges.

Consequently, this research contributes to our understanding of how and why educational outcomes in these programs are influenced by different factors by combining quantitative and qualitative research and producing recommendations for improving the effectiveness and resilience of the programs in light of future challenges. The results of this study are very useful for policymakers, educators, administrators, and others who seek to improve cooperative education models to achieve better student achievement and prepare students for careers.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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