

## ORIGINAL RESEARCH

# How does praxis education affect university students' employability skills? Evidence from transformations of higher education institutions in China

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Drawing on survey data from 10,235 undergraduate students across 41 Chinese higher education institutions, this study assesses the impact of on-campus and off-campus praxis education on the development of key employability skills within the context of China's large-scale transformation of traditional universities into application-oriented higher education institutions (AHEIs). Multivariate modeling results indicate that practical teaching (as on-campus praxis education) and internships (as off-campus praxis education) are significantly associated with higher levels of three employability skills: Innovation, team cooperation, and field expertise. Comparative analysis further reveals institutional differences: Practical teaching exerts a stronger influence on field expertise for students in transformed AHEIs, whereas internships have a greater impact on field expertise for students in non-transformed universities. This study provides large-scale empirical evidence on how on-campus and off-campus praxis education function as mechanisms for cultivating employability skills in higher education. The findings offer practical implications for curriculum design, institutional capacity building, and policy development, emphasizing the need for context-sensitive approaches that integrate both forms of experiential learning to prepare graduates effectively for the demands of contemporary labor markets.

**Keywords**

on-campus and off-campus praxis education, practical teaching, student internships, application-oriented higher education institutions, employability skills

**INTRODUCTION**

In higher education, the cultivation of employability skills increasingly requires an emphasis on praxis education that integrates practical experience with theoretical learning. Although theoretical education plays a crucial role in developing critical thinking and foundational knowledge, it is through praxis—the application of theory in authentic contexts—that students develop the hands-on skills and competencies required in the workplace (Kolb, 2014). Prior research indicates that graduates who have engaged in

praxis education are better prepared for the transition from university to work and tend to demonstrate stronger problem-solving, teamwork, and communication skills valued by employers (Billett, 2006, 2020). In addition, praxis-based learning promotes deeper engagement by enabling students to experiment, reflect, and iteratively refine their skills in dynamic learning environments, thereby narrowing the gap between academic preparation and professional readiness (Fortenberry, 2011).

University praxis education is commonly implemented

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through both on-campus and off-campus arrangements. On-campus praxis education often takes the form of practical teaching, including laboratory-based courses, simulations, and experiment-oriented classes. These structured and supervised learning environments allow students to develop technical competencies and problem-solving skills within an academic setting (Crawley *et al.*, 2014). Off-campus praxis education is typically realized through internships and industry placements, which provide students with exposure to professional contexts and labor-market expectations (Rose, 2013). On-campus practical teaching and off-campus internships together constitute a complementary experiential learning framework that supports the development of both technical and transferable employability skills.

Against this background, the present study examines the impact of university praxis education—encompassing on-campus practical teaching and off-campus internships—on multiple dimensions of university students' employability skills. The analysis draws on survey data from 10,235 students enrolled in 41 local undergraduate colleges and universities across different regions of China. As in many national higher education systems, China's higher education landscape is dominated by application-oriented higher education institutions (AHEIs) rather than a small number of elite or research-intensive universities. In contrast to elite institutions that prioritize academic research, AHEIs emphasize the development of applied knowledge, technical competencies, and workplace-relevant soft skills aligned with labor-market demands (Mason *et al.*, 2009; Yorke, 2004).

This study addresses two notable gaps in the existing literature. First, although employability has been extensively examined (Aliu & Aigbavboa, 2021; Borah *et al.*, 2021), relatively few studies assess the combined effects of both on-campus and off-campus praxis education on students' employability skills. Examining these dimensions jointly allows for a more comprehensive understanding of how employability is shaped through the integration of academic and experiential learning. Second, research on Chinese higher education has tended to focus on elite, first-tier universities (Marginson, 2017; Song, 2018), whereas comparatively little attention has been paid to AHEIs, which constitute the backbone of the system. By focusing on AHEIs and their emphasis on practice-oriented talent cultivation and close engagement with local labor markets, this study provides contextualized insights into how employability skills are developed, thereby contributing to theoretical, practical, and policy discussions on praxis education in application-oriented higher education.

## LITERATURE REVIEW AND PROPOSED HYPOTHESES

### *Key components of employability in contemporary contexts*

Although employability has been conceptualized in diverse ways across the literature, a substantial body of research points to several common components that are widely regarded as central to employability in contemporary labor markets. These components are increasingly framed as measurable learning outcomes within higher education.

Innovation capability is frequently identified as a critical dimension of employability in modern workplaces (Singh *et al.*, 2017; Stoffers *et al.*, 2020). It enables individuals to respond to changing environments, address complex problems, and contribute to organizational development. In the context of Industry 4.0, higher education institutions have placed growing emphasis on cultivating students' innovation capability to support their employability and capacity to function in dynamic and evolving work settings (Zhuang & Zhou, 2023; Zhuang *et al.*, 2024).

Team spirit is another core employability component that has been consistently highlighted in the literature, reflecting the collaborative nature of contemporary professional work. Research suggests that teamwork encompasses skills such as coordination, decision-making, leadership, interpersonal development, adaptability, and communication (Pazos *et al.*, 2022). Although empirical evidence indicates that teamwork abilities may vary across demographic characteristics, including gender, academic experience, and performance (Hotapeti *et al.*, 2020), studies at the aggregate level associate effective teamwork skills with improved academic outcomes and strong labor-market relevance, as they support collaboration and productivity in professional contexts (Gajderowicz *et al.*, 2023).

Furthermore, research suggests that higher education institutions need to integrate professional expertise into their curricula to prepare graduates for the demands of the workforce (Avery & Reeve, 2013). The long-standing industry–academia disconnect—which highlights the weakness of higher education institutions in cultivating genuine professionalism among students—is commonly perceived as a barrier that global higher education must address (Zhuang & Tao, 2024). Although soft skills—such as effective communication, teamwork, and time management—are important for graduates to develop sound interpersonal relationships conducive to career development, hard skills such as disciplinary expertise lay the foundation for higher education to cater to industrial demands and practically advance science and technology in

the industry sector (Chell & Athayde, 2017; Koh & Zhuang, 2021).

### ***The contribution of on-campus praxis education to students' employability cultivation***

The relationship between praxis-oriented instruction and students' innovation capabilities has attracted considerable scholarly attention. Research on innovation pedagogy highlights the importance of engaging students in active knowledge construction through real-life situations, project-based activities, and multidisciplinary learning environments (Kettunen *et al.*, 2013), which integrate working-life orientation with research, development, and innovation activities. Within this framework, curriculum design plays a central role by providing flexibility and opportunities for creative and nonlinear thinking (Keinänen & Kairisto-Mertanen, 2019). Evidence from studies conducted during the COVID-19 pandemic further suggests that virtual team projects, as a form of practical teaching, positively influence students' propensity to innovate, with knowledge management and communication acting as mediating mechanisms through support for innovation (Iddris *et al.*, 2023). Similarly, research examining the association among pedagogical methods, creativity, and entrepreneurial intentions indicates that work-integrated and practice-based teaching approaches enhance individuals' perceived innovation, which in turn shapes students' entrepreneurial intentions (Nguyen & Do, 2023). Collectively, these findings suggest that praxis-oriented teaching practices are positively associated with students' innovation-related outcomes.

Beyond innovation, empirical studies have documented the potential influence of practical teaching on students' teamwork and collaborative competencies. Research on project-based learning demonstrates that engagement with real-world projects encourages students to collaborate in groups to generate ideas and develop tangible outputs. This shift away from traditional instructional approaches toward more interactive and collaborative learning environments has been shown to support the development of critical thinking, problem-solving, and team cooperation (Rehman *et al.*, 2023). Studies examining students' preferences for group work further indicate that group-based instructional practices function as a form of practical teaching, although their effectiveness may vary across individuals, underscoring the nuanced role of teaching design in shaping collaborative learning outcomes (Gajderowicz *et al.*, 2023). In addition, research on experiential entrepreneurship education has identified a positive relationship between teamwork competencies and team performance, highlighting the importance of practical, real-life team tasks in fostering effective collaboration (Pazos *et al.*, 2022).

From the perspective of experiential learning theory, hands-on and real-world experiences are regarded as central to the development of professional skills and disciplinary knowledge (Billett, 2020). Such approaches support the integration of theoretical understanding with practical application, enabling students to engage not only cognitively but also functionally with professional practices (Rolston & Cox, 2015). Studies on practical teaching illustrate how instruction embedded in real-world contexts creates learning environments in which students can acquire and apply academic knowledge, thereby supporting the development of professional judgment and field expertise (Zhuang & Tao, 2024). Furthermore, research on authentic learning—characterized by tasks that reflect professional practice—indicates positive associations with student engagement and learning outcomes, contributing to the cultivation of professional competencies (Herrington & Parker, 2013). Together, these studies underscore the role of practical teaching contexts in supporting the development of field expertise and preparing students for the complexity of professional work.

As such, our first research hypothesis is as follows. H1: Practical teaching positively influences students' innovation (H1a), team cooperation (H1b), and field expertise (H1c).

### ***The contribution of off-campus practical education to students' employability cultivation***

Internships, an important constituent of off-campus practical education, have been shown to contribute significantly to the development of students' team spirit, a competency that is increasingly valued in collaborative work environments (Renganathan *et al.*, 2012). Through participation in internships, students are typically required to work alongside individuals with diverse levels of expertise and from varied professional and cultural backgrounds. Such experiences expose students to multiple perspectives and professional norms, thereby supporting the development of communication, listening, and coordination skills essential for effective team cooperation. At the same time, internships provide opportunities for students to contribute their own ideas and competencies within team-based settings, which may foster a sense of professional belonging and shared responsibility (Holdsworth *et al.*, 2009).

Beyond team cooperation, internships are also associated with the development of students' innovation abilities by facilitating the application of academic knowledge in real-world contexts (Galván, 2014). Engagement in professional tasks and problem-solving activities allows students to translate theoretical concepts into practice and to adapt their knowledge to context-specific challenges. Exposure to workplace dynamics and authentic constraints may

encourage students to adopt more critical and innovative approaches to problem-solving, contributing to the development of an entrepreneurial mindset (Kayyali, 2023).

In addition, internships play an important role in strengthening students' field expertise. Immersion in professional environments enables students to engage directly with industry-specific practices, technologies, and standards, thereby extending their disciplinary knowledge beyond classroom-based learning (Rose, 2013). Through hands-on tasks and project participation, students gain insights into professional expectations and workflows, often through interaction with experienced practitioners. Such experiences not only support the development of technical competence but also contribute to broader employability skills, including communication, time management, and adaptability, which are widely recognized as relevant for graduate employability and labor-market competitiveness (Franco *et al.*, 2019).

Given the reported associations between internship experiences and multiple dimensions of employability skills, the second set of hypotheses in this study is formulated as follows. H2: Internships positively influence students' innovation (H2a), team cooperation (H2b), and field expertise (H2c).

Furthermore, as discussed above, transformed AHEIs in China are structurally positioned to place greater emphasis on the development of students' applied competencies than their non-transformed counterparts (Du, 2020; Zhang, 2018). Through the systematic integration of practical teaching and internships, these institutions offer learning environments in which theoretical instruction is more closely aligned with practical application. Engagement with real-world contexts and hands-on experiences enables students in these institutions to develop a more contextualized understanding of their fields and to acquire skills relevant to professional practice. The focus on industry relevance supports students' ability to translate theoretical knowledge into practice and to respond to workplace demands, particularly in contexts requiring applied problem-solving and technical competence. From an assessment perspective, these institutional characteristics suggest that transformed AHEIs may provide more favorable conditions for the cultivation of employability-related outcomes.

By contrast, non-transformed institutions, which continue to operate largely within traditional academic models, may face greater challenges in fostering employability skills through their curricula and pedagogical approaches (Akalu, 2016; Green, 2023). An emphasis on theoretical instruction,

often delivered through lecture-based formats, may limit opportunities for students to engage with authentic tasks and applied learning experiences (Yin *et al.*, 2017; Yin *et al.*, 2014). As a result, while students in such contexts may develop strong conceptual understanding, they may have fewer opportunities to practice applying knowledge in complex, real-world situations. Such misalignment between academic preparation and professional practice has been noted as a constraint on employability development, particularly in labor markets that increasingly value applied skills, adaptability, and innovation (Zhuang & Tao, 2024). Consequently, differences in institutional orientation and pedagogical design are likely to shape variations in students' employability skill outcomes across transformed and non-transformed universities.

As such, our third and fourth sets of hypotheses are established as follows. H3: There is a significant difference between transformed AHEIs and non-transformed institutions in terms of the impact of practical teaching on students' innovation (H3a), team cooperation (H3b), and field expertise (H3c). H4: There is a significant difference between transformed AHEIs and non-transformed institutions in terms of the impact of internships on students' innovation (H4a), team cooperation (H4b), and field expertise (H4c).

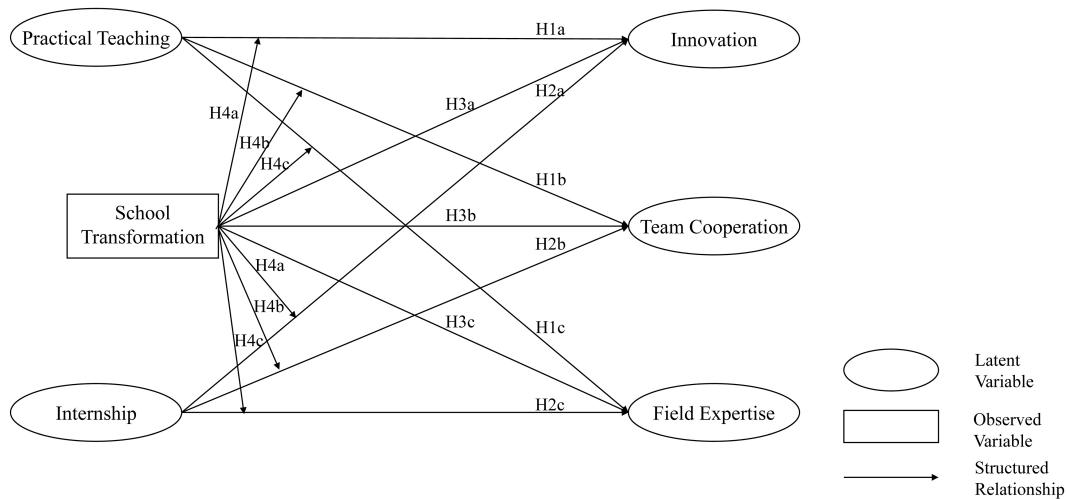
The complete hypothesis model for the study is visualized in Figure 1.

## METHODOLOGY

### *Data collection*

The data utilized in this study originated from a field survey conducted by researchers working on the Survey on Talent Cultivation and Employment in Local Undergraduate Colleges and Universities in China. This research team surveyed senior graduates from 41 local undergraduate colleges and universities across various regions of China at the end of June 2017. The 41 institutions included 17 in eastern China, 14 in central China, and 10 in western China. The sample comprised 27 transformation-pilot universities and 14 non-transformation-pilot universities. Under the current policy framework, these universities are best understood as belonging mainly to the application-oriented segment of local undergraduate education.

The study sample was obtained through cluster sampling within each institution. Prior to the survey, a pre-survey was conducted among more than 300 senior graduates, who completed all the items related to the constructs in the survey. Some items were revised appropriately based on the analysis of the pre-survey data. A total of 10,235 valid



**Figure 1.** Established hypothesis model, controlling for students' background information (SES, gender, and minority status). SES, socioeconomic status.

questionnaires were collected, comprising 4559 female students (44.5%) and 5676 male students (55.5%). The item nonresponse rate in the students' questionnaires was less than 1.1%.

Despite being collected in 2017, this dataset remains analytically valuable for understanding the relationship between praxis education and employability skills. The timing of data collection captures a critical transitional period in Chinese higher education, when the transformation of local universities toward application-oriented models was actively underway but had not yet been fully institutionalized under the current policy framework. Critically, institutional transformation, once implemented, represented a substantive and enduring shift in institutional orientation, with lasting effects on curriculum design, pedagogical practices, and talent cultivation models that continue to shape these universities a decade later. The transformation status assigned to each institution in 2017 reflects a real and consequential policy commitment that does not diminish over time, making it a stable and reliable attribute for examining the moderating effects on the relationships between praxis education and employability outcomes. Moreover, because the core pedagogical practices of practical teaching and internships have remained central to application-oriented talent cultivation, the observed associations between these praxis education components and employability skills are likely to reflect enduring educational mechanisms rather than transient policy effects. Thus, the 2017 dataset provides a large-scale, multi-institutional evidence base that captures meaningful variation in transformation status at a formative stage, offering insights into the structural relationships among key variables that remain pertinent for institutions currently navigating or consoli-

dating similar transitions.

**Measurement**

*Practical teaching*

Practical teaching was measured using a scale of practical teaching (Bao, 2014; Guo & Wu, 2017) that consisted of 11 items on students' perceptions of the internship and practicum classes offered by their institution (e.g., "There are many opportunities for entrepreneurship, innovation, or practice related to the major on campus"). All items were retrospective responses to students' learning experiences throughout their undergraduate studies. Each item was rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Factor loadings for this scale ranged from 0.725 to 0.758, Cronbach's  $\alpha$  was 0.934, and McDonald's  $\omega$  was 0.934.

*Internship*

Internship was assessed using a scale of internship (Bao, 2014; Guo & Wu, 2017) that consisted of 9 items capturing students' perceptions about their internship experiences (e.g., "Internship organization instructors are highly skilled and effective in supervising internships"). Similar to practical teaching, all internship items referred to retrospective measurements of students' internship experiences throughout their undergraduate years. Each item was rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Factor loadings for this scale ranged from 0.697 to 0.771, Cronbach's  $\alpha$  was 0.915, and McDonald's  $\omega$  was 0.915.

*General competence*

In this study, we assessed general competence, including subscales for innovation, team cooperation, and field

expertise, all of which came from the Competency Scale for High School Graduates (Bao & Liu, 2016; Guo & Wu, 2017). Cronbach's  $\alpha$  for general competence was 0.914, and McDonald's  $\omega$  was 0.914 in this study.

### *Innovation*

Innovation consisted of four items measuring students' evaluations of their creative abilities in the learning process (e.g., "I am always able to come up with new and useful solutions to problems or tasks"). Each item was rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Factor loadings for this scale ranged from 0.665 to 0.761, Cronbach's  $\alpha$  was 0.799, and McDonald's  $\omega$  was 0.800.

### *Team cooperation*

Team cooperation was measured using three items assessing students' self-assessment of teamwork skills (e.g., "I can work effectively with a team and have strong teamwork skills"). Each item was rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Factor loadings for this scale ranged from 0.646 to 0.801, Cronbach's  $\alpha$  was 0.744, and McDonald's  $\omega$  was 0.747.

### *Field expertise*

Field expertise was assessed using four items measuring students' self-assessment of professional knowledge and competence (e.g., "My field technical and practical skills can meet the needs of the workplace"). Each item was rated on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Factor loadings for this scale ranged from 0.714 to 0.770, Cronbach's  $\alpha$  was 0.833, and McDonald's  $\omega$  was 0.833.

### *Background information*

Students' gender was collected via student questionnaires, coded as 0 for female and 1 for male. Parents' educational background, occupation, and family income were synthesized into students' socioeconomic status (SES), which had a mean of 0 and a standard deviation of 3. Minority status indicated whether the student was an ethnic minority, coded as 0 for non-minority (Han) and 1 for minority. Transformation indicated whether the institution was a transformed institution, coded as 0 for non-transformed institutions and 1 for transformed AHEIs.

## **FINDINGS**

### *Data analysis*

To explore relationships among practical teaching, internship, innovation, team cooperation, and field expertise, several structural equation models (SEMs) were estimated. In Model 1, students' background variables (SES,

gender, and minority status) and institutional transformation were controlled. To compare whether relationships differed between transformed AHEIs and non-transformed institutions, latent moderated structural equation (LMS) modeling was conducted. In Model 2, two interaction variables (practical teaching  $\times$  transformation, internship  $\times$  transformation) were constructed based on practical teaching (latent variable), internship (latent variable), and transformation. Six moderated paths were tested in this model. All continuous variables were standardized to ensure comparability across scales in both Model 1 and Model 2. The results of Model 1 are presented in Figure 2 and Table 1, and the results of Model 2 are shown in Figure 3 and Table 1.

Models were estimated using Mplus 8.3, based on the maximum likelihood (ML) estimation method of analysis. Model 1 was deemed to have adequate fit when the comparative fit index (CFI) and Tucker–Lewis index (TLI) exceeded 0.90, and the root mean square error of approximation (RMSEA) was less than 0.06. The specific fit indices of the models are reported alongside the model coefficients in the Findings section. Model 2 was evaluated using a likelihood test to compare Models 1 and 2, using the indicator  $D = -2$  (log-likelihood of Model 1 – log-likelihood of Model 2), which follows a  $\chi^2$  distribution with the corresponding degrees of freedom. The significance of  $D$  indicated whether the model fit of Model 2 was better than that of Model 1. The effect size indicator  $f^2$  (Cohen, 1988) compared the proportion of variance explained for each dependent variable across models to indicate whether the independent variables included in the models helped explain the dependent variables. An  $f^2$  value greater than 0.02 represents a small effect, 0.15 a medium effect, and 0.35 a large effect.

### *Common method bias test*

According to MacKenzie and Podsakoff (2012), common method bias may be a concern when a single factor accounts for more than 40.00% of the total variance. In the present study, the results of the test indicated that the first unrotated factor accounted for 14.91% of the total variance, which is well below the recommended threshold. This suggests that common method bias is unlikely to pose a serious threat to the validity of the findings.

### *Preliminary results*

Descriptive statistics for all variables are presented in Table 2. Practical teaching, internship, innovation, team cooperation, and field expertise were positively correlated with each other.

Preliminary differences in practical teaching, internship, innovation, team cooperation, and field expertise between

**Table 1: Results of structural equation model and latent moderated structural equation model**

Item	Model 1						Model 2					
	Innovation		Team cooperation		Field expertise		Innovation		Team cooperation		Field expertise	
	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE	$\beta$	SE
SES	0.033**	0.012	0.037**	0.013	0.031**	0.011	0.033**	0.012	0.036**	0.013	0.030**	0.011
Gender	0.002	0.009	0.007	0.009	0.002	0.009	0.001	0.009	0.013	0.027	0.001	0.009
Minority	-0.001	0.012	-0.005	0.013	0.013	0.011	-0.002	0.012	-0.005	0.013	0.013	0.011
Transformation	0.001	0.009	0.010	0.009	0.026**	0.009	0.001	0.009	0.011	0.009	0.026**	0.009
Practical teaching	0.355***	0.016	0.342***	0.017	0.345**	0.015	0.321***	0.027	0.310***	0.029	0.260***	0.026
Internship	0.399***	0.016	0.408***	0.017	0.405**	0.015	0.406***	0.027	0.400***	0.029	0.469***	0.027
Practical teaching × transformation	-	-	-	-	-	-	0.025	0.016	0.024	0.017	0.062***	0.015
Internship × transformation	-	-	-	-	-	-	-0.005	0.016	0.006	0.017	-0.046*	0.016
$R^2$	0.503		0.498		0.500		0.506		0.501		0.504	
Effect size ( $f^2$ )	0.998		0.978		0.980		0.006		0.006		0.008	
Log-likelihood (df)	-343,976.062 (121)						-343,969.663 (115)					

SES, socioeconomic status; SE, standard error. \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ ; all coefficients were standardized.

**Table 2: Descriptive statistics of variables**

Construct	M	SD	1	2	3	4	5	6	7	8	9
Practical teaching	3.041	0.593	-	-	-	-	-	-	-	-	-
Internship	3.032	0.605	0.707**	-	-	-	-	-	-	-	-
Innovation	3.109	0.572	0.567**	0.573**	-	-	-	-	-	-	-
Team cooperation	3.102	0.598	0.541**	0.552**	0.727**	-	-	-	-	-	-
Field expertise	3.064	0.608	0.577**	0.585**	0.725**	0.716**	-	-	-	-	-
Transformation	0.660	0.474	0.039**	0.037**	0.025*	0.035**	0.049**	-	-	-	-
SES	0.009	3.00	0.054**	0.043**	0.060**	0.060**	0.068**	-0.039**	-	-	-
Gender	0.550	0.497	-0.005	0.030**	0.009	0.010	0.008	-0.056**	-0.056**	-	-
Minority	0.190	0.393	0.065	0.056**	0.057**	0.058**	0.074**	0.007	0.659**	-0.046**	-

\* $P < 0.05$ , \*\* $P < 0.01$ . SES, socioeconomic status; M, mean; SD, standard deviation.

transformed AHEIs and non-transformed institutions were compared via *t*-tests, which showed that the average scores of non-transformed institutions on all five variables were lower than those of transformed institutions (Table 3). Because Cohen's *d* indicators of the differences between students from transformed and non-transformed institutions were all below the threshold of 0.2 (Cohen *et al.*, 2002), the differences were all negligible. Thus, the significant *t* values may be attributable to the large sample size, indicating no meaningful differences between transformed and non-transformed institutions across all variables.

***The direct effects of practical teaching and internship on employability***

Controlling for SES, gender, minority status, and institutional transformation as control variables, the results of Model 1 are shown in Table 1 and Figure 2, indicating that the model had a good fit, with CFI = 0.944, TLI = 0.938, and RMSEA = 0.043. Practical teaching was positively

associated with innovation ( $\beta = 0.355$ ,  $P < 0.001$ ), team cooperation ( $\beta = 0.342$ ,  $P < 0.001$ ), and field expertise ( $\beta = 0.345$ ,  $P < 0.001$ ). Internship was positively associated with innovation ( $\beta = 0.399$ ,  $P < 0.001$ ), team cooperation ( $\beta = 0.408$ ,  $P < 0.001$ ), and field expertise ( $\beta = 0.405$ ,  $P < 0.001$ ). Interestingly, SES was positively associated with innovation ( $\beta = 0.033$ ,  $P < 0.01$ ), team cooperation ( $\beta = 0.037$ ,  $P < 0.01$ ), and field expertise ( $\beta = 0.031$ ,  $P < 0.01$ ) at a significant level. Institutional transformation was positively correlated with field expertise ( $\beta = 0.026$ ,  $P < 0.01$ ) at a significant level but was not associated with innovation ( $\beta = 0.001$ ,  $P > 0.05$ ) and team cooperation ( $\beta = 0.010$ ,  $P > 0.05$ ).

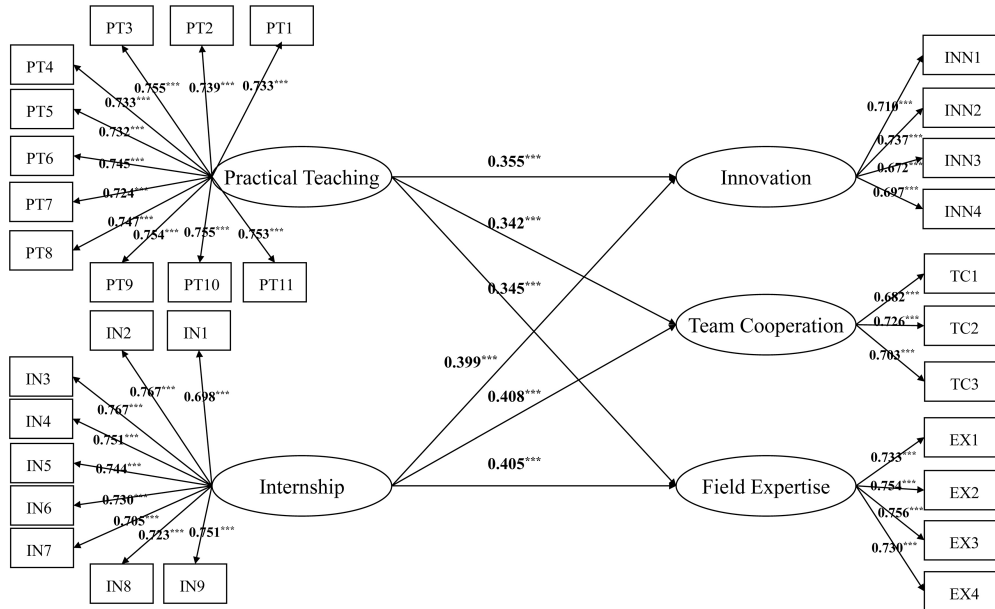
***Moderating effect of transformation type***

To compare whether relationships differ in transformed and non-transformed institutions, an LMS model (Model 2) was conducted with two interaction variables (practical teaching × transformation, internship × transformation). The model is

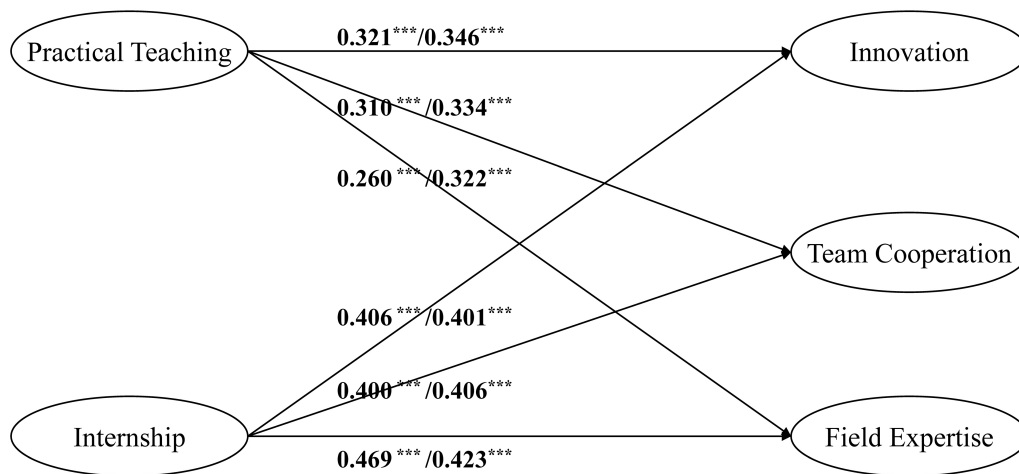
**Table 3: t-test results between transformed and non-transformed institutions**

Item	Transformed (n = 6748)		Non-transformed (n = 3487)		t	Cohen's d
	M	SD	M	SD		
Practical teaching	3.058	0.597	3.009	0.583	4.027***	0.083
Internship	3.048	0.612	3.001	0.590	3.745***	0.078
Innovation	3.120	0.581	3.089	0.554	2.599**	0.055
Team cooperation	3.118	0.603	3.073	0.587	3.595***	0.076
Field expertise	3.086	0.611	3.022	0.601	5.010***	0.106

\*\*P < 0.01, \*\*\*P < 0.001; M, mean; SD, standard deviation.



**Figure 2.** Structural equation modeling for Model 1. All coefficients standardized; \*\*P < 0.01, \*\*\*P < 0.001.



**Figure 3.** Latent moderated structural equation model (Model 2) coefficients for non-transformed/transformed institutions. \*\*\*P < 0.001.

shown in Table 1 and Figure 3. The likelihood ratio test indicated Model 2 had a better fit than Model 1 ( $D = 12.798$ ,  $\Delta df = 6$ ,  $P < 0.05$ ). Institutional transformation significantly moderated the relationship between practical teaching and field expertise ( $\beta = 0.062$ ,  $P < 0.001$ ). In transformed institutions, practical teaching had a stronger impact on field expertise ( $\beta = 0.322$ ,  $P < 0.001$ ) than in non-transformed institutions ( $\beta = 0.260$ ,  $P < 0.001$ ). Additionally, institutional transformation significantly moderated the relationship between internship and field expertise ( $\beta = -0.046$ ,  $P < 0.001$ ). In transformed institutions, internship had a weaker impact on field expertise ( $\beta = 0.423$ ,  $P < 0.001$ ) than in non-transformed institutions ( $\beta = 0.469$ ,  $P < 0.001$ ). However, institutional transformation did not moderate the relationships between practical teaching and innovation ( $\beta = 0.025$ ,  $P > 0.05$ ), practical teaching and team cooperation ( $\beta = 0.024$ ,  $P > 0.05$ ), internship and innovation ( $\beta = -0.005$ ,  $P > 0.05$ ), or internship and team cooperation ( $\beta = 0.006$ ,  $P > 0.05$ ).

## DISCUSSION

### *Impact of on-campus praxis teaching on university students' employability skills*

The SEM results of this study confirm that on-campus practical teaching plays a significant role in enhancing university students' employability skills, including innovation, team cooperation, and field expertise. These findings provide strong empirical support for experiential learning theory (Kolb, 2014), which posits that skill formation occurs through concrete experience, reflective observation, abstract conceptualization, and active experimentation. In this study, praxis education is clearly defined as a two-dimensional construct consisting of on-campus practical teaching and off-campus internships, which together form a systematic experiential learning system for employability development. These findings support the proposition that structured, curriculum-embedded praxis education constitutes an effective mechanism for the development of employability-related learning outcomes (Borah *et al.*, 2021; Fortenberry, 2011). However, the study reveals that as a core component of praxis education, internships complement but cannot replace on-campus practical teaching, differing from previous studies that found that on-campus practical teaching is not as important (Quick & Sieborger, 2005). In particular, the positive associations between practical teaching and innovation suggest that learning environments characterized by experimentation, problem-based activities, and applied tasks enable students to engage more actively in creative problem-solving and knowledge application.

This finding is consistent with previous research

highlighting the value of applied and experiential pedagogies in fostering innovation-related competencies (Chell & Athayde, 2017). Studies have shown that practice-oriented teaching approaches facilitate the integration of theoretical knowledge with real-world problem contexts, thereby supporting students' capacity for innovation and entrepreneurial thinking (Chell & Athayde, 2017; Fortenberry, 2011). By embedding such experiences within the formal curriculum, practical teaching also ensures more systematic exposure to innovation-enhancing activities than ad hoc or externally organized learning opportunities.

In addition, the significant relationship between practical teaching and team cooperation aligns with prior evidence indicating that project-based and laboratory-based instructional designs promote collaborative learning and interpersonal skill development (Pazos *et al.*, 2022). From the perspective of social learning theory, structured group tasks in practical teaching create repeated opportunities for peer interaction, role-taking, and collective responsibility, which are essential for building stable teamwork competencies (Martin, 2004). Through structured group tasks and supervised collaboration, students are afforded repeated opportunities to develop coordination, communication, and shared responsibility, which are central to effective teamwork. Compared with less structured learning contexts, curriculum-based practical teaching offers greater consistency in the assessment and development of team cooperation as a learning outcome.

The particularly strong effect of practical teaching on field expertise further underscores the importance of on-campus praxis education. This result is consistent with situated learning theory, which emphasizes that professional competence is best developed in authentic, contextually embedded learning environments rather than decontextualized lectures (Lave & Wenger, 1991). By situating disciplinary knowledge within applied learning contexts, practical teaching supports the development of professional judgment and technical competence. This finding corroborates earlier research suggesting that authentic, practice-oriented instruction enhances students' ability to contextualize and apply theoretical knowledge, thereby strengthening field-specific expertise (Rose, 2013; Zhuang & Tao, 2024). Notably, the stronger influence observed in transformed AHEIs reflects their institutional emphasis on application-oriented curricula and reinforces arguments that curriculum design plays a critical role in shaping employability outcomes (Zhuang, 2023).

### *Impact of off-campus internships on university students' employability skills*

The analysis also confirms that off-campus internships are

significantly associated with the development of students' innovation, team cooperation, and field expertise. The findings highlight internships as an important component of praxis education, particularly in providing exposure to authentic workplace environments. Internships support innovation by allowing students to confront real-world challenges that require adaptive problem-solving and creative application of academic knowledge. Specifically, in terms of team cooperation, internships demonstrate a meaningful contribution to students' collaborative skill development. Workplace settings require students to interact with colleagues from diverse backgrounds and to participate in team-based tasks under real organizational constraints. This finding echoes earlier research indicating that internships foster communication, coordination, and interpersonal competencies that are difficult to replicate fully in classroom settings (Holdsworth *et al.*, 2009; Renganathan, 2012). Compared with on-campus practical teaching, internships may offer more varied and context-dependent teamwork experiences, although these experiences are often less structured and less systematically assessed.

Internships also contribute significantly to the development of field expertise by immersing students in industry-specific practices, technologies, and professional norms. This supports existing evidence that workplace learning enables students to deepen their understanding of disciplinary knowledge and to acquire practical skills aligned with labor-market expectations (Acker & Webber, 2020; Billett, 2020). However, the findings further suggest that in non-transformed institutions, internships play a compensatory role, offsetting the relatively weaker integration of practical teaching within the curriculum. This reliance on internships echoes concerns raised in the literature regarding the uneven quality and accessibility of internship experiences and the challenges associated with ensuring consistent learning outcomes across placements (Zlatkin-Troitschanskaia *et al.*, 2017).

### ***Comparative analysis of transformed and non-transformed institutions of higher education***

A central contribution of this study lies in its comparative examination of how praxis education functions differently across transformed AHEIs and non-transformed institutions, revealing nuanced institutional dynamics that shape employability skill development. Although descriptive statistics indicated that transformed institutions exhibited marginally higher mean scores across all five variables—practical teaching, internship, innovation, team cooperation, and field expertise—the effect sizes (Cohen's *d*) were consistently below 0.2, suggesting that the raw differences in student outcomes between the two institutional types

were negligible when considered in isolation. However, LMS modeling unveiled more complex patterns of moderation that challenge simplistic assumptions about institutional superiority.

Notably, institutional transformation significantly moderated the relationship between practical teaching and field expertise ( $\beta = 0.062$ ,  $P < 0.001$ ), such that in transformed AHEIs, the positive effect of on-campus practical teaching on students' field expertise was considerably stronger ( $\beta = 0.322$ ) than in non-transformed institutions ( $\beta = 0.260$ ). This finding aligns with the structural positioning of transformed AHEIs, which systematically embed applied learning, industry-aligned curricula, and hands-on pedagogical approaches into their academic frameworks, thereby amplifying the developmental potential of practical teaching for professional competence.

Conversely, a countervailing pattern emerged for internships: Transformation significantly moderated the internship–field expertise relationship ( $\beta = -0.046$ ,  $P < 0.001$ ), with internships exerting a stronger influence on field expertise in non-transformed institutions ( $\beta = 0.469$ ) than in their transformed counterparts ( $\beta = 0.423$ ). This finding suggests that in non-transformed institutions, where on-campus practical teaching may be less integrated or less practice-oriented, internships serve a compensatory function, acting as the primary mechanism through which students acquire applied professional knowledge and workplace-relevant expertise. In contrast, transformed institutions, with their more robust on-campus praxis infrastructure, may distribute the development of field expertise more evenly across both curricular and extracurricular learning experiences, thereby reducing their relative dependence on internships as a singular pathway to employability.

Interestingly, transformation did not significantly moderate the relationships involving innovation or team cooperation, indicating that the differential institutional effects are domain-specific rather than uniform across all employability dimensions. These findings collectively underscore that institutional transformation does not simply produce uniformly better outcomes but rather reshapes the configuration of praxis education, reconfiguring how practical teaching and internships contribute to employability skills. From a policy and institutional development perspective, this analysis suggests that while transformed AHEIs offer a more integrated and pedagogically coherent environment for developing field expertise through on-campus mechanisms, non-transformed institutions may leverage high-quality internships as a strategic lever to bridge the

theory–practice divide. Ultimately, the comparative analysis highlights that institutional context fundamentally conditions the efficacy of praxis education and that efforts to enhance graduate employability must attend not only to the presence of experiential learning opportunities but also to how these opportunities are structured, sequenced, and integrated within distinct institutional logics.

### ***Limitations and future research***

Several data-related limitations should be acknowledged. First, the data were collected in 2017, a period marking an important transitional stage in the transformation of local undergraduate institutions in China. Importantly, the survey was conducted before the current policy framework explicitly differentiated among research-oriented, application-oriented, and skills-oriented institutional missions. Given the local undergraduate nature of the sample and prior work using the same database—which indicates cluster sampling within relatively application-oriented majors—the sample is best understood as belonging primarily to the application-oriented segment, or the transition zone toward application-oriented development, within China's local undergraduate sector. Moreover, formal institutional labels and the depth of implemented practice-oriented reform may not fully coincide, which underscores why examining the concrete roles of practical teaching and internships remains important. Consequently, the findings are most directly relevant to local universities pursuing or consolidating application-oriented transformation, whereas caution is needed when generalizing them to research-intensive universities or explicitly skills-oriented institutions. Second, the key constructs—practical teaching, internship, and employability skills—were measured using students' retrospective self-reports, which may be subject to recall bias, social desirability, and common method variance, although post hoc diagnostics suggested that the latter did not pose a serious threat. Third, the cross-sectional design precludes definitive causal inference; the observed associations should be interpreted as correlational rather than causal. Future research should employ more recent, multi-source data (e.g., combining student, employer, and administrative data) and longitudinal or quasi-experimental designs to strengthen causal claims, track institutional transformation dynamics over time, and capture the evolving landscape of praxis education in Chinese higher education.

## **THEORETICAL AND PRACTICAL IMPLICATIONS**

### ***Extending experiential learning theory through a differentiated model of praxis education***

Although experiential learning theory (Kolb, 2014) has long

emphasized the role of concrete experience in skill formation, existing studies have often treated practical learning as a relatively undifferentiated construct, failing to distinguish between the distinct mechanisms through which on-campus and off-campus experiences shape employability outcomes. This paper makes a theoretical contribution by disaggregating praxis education into two complementary yet functionally distinct components—on-campus practical teaching and off-campus internships—and demonstrating that each operates through different developmental pathways. Practical teaching, embedded within structured curricular frameworks, provides supervised, iterative opportunities for experimentation and collaborative problem-solving, thereby fostering innovation and team cooperation through controlled, risk-managed learning environments. In contrast, internships expose students to authentic workplace constraints, uncertain problem contexts, and diverse professional norms, cultivating employability skills through situated, unscripted engagement with real-world demands. By theorizing and empirically validating this differentiated model, the paper advances experiential learning theory beyond a monolithic conception of "hands-on experience" toward a more nuanced understanding of how the locus, structure, and sequencing of practice-based learning shape specific employability dimensions.

### ***Reconceptualizing institutional context as a moderator of employability formation***

Another theoretical contribution concerns the role of institutional context in shaping the efficacy of experiential learning. Prior research on graduate employability has largely focused on individual-level determinants—such as students' prior work experience, motivation, or socioeconomic background—or on the presence or absence of specific employability initiatives, with comparatively less attention paid to how institutional logics and structural orientations moderate the relationship between pedagogical practices and skill outcomes. This paper introduces and empirically tests a contextual moderation framework, demonstrating that the same praxis education component can exert differential effects depending on whether an institution has undergone an application-oriented transformation. Specifically, the finding that practical teaching has a stronger effect on field expertise in transformed AHEIs, whereas internships play a compensatory role in non-transformed institutions, challenges the implicit assumption that employability-enhancing practices operate uniformly across institutional types. Instead, the paper theorizes that institutional transformation reshapes the entire configuration of skill development, redistributing the relative weight of curricular versus extracurricular learning experiences. This institutional contingency perspective contributes to employability theory by moving beyond a one-size-fits-all

prescription toward a more context-sensitive understanding of how higher education systems can design praxis education in alignment with their structural positions and developmental trajectories.

### ***Rethinking curriculum design: Integrating praxis as a core pedagogical principle***

This study's findings offer actionable insights for policymakers, university leaders, and educators. Policymakers should prioritize funding and policy frameworks that embed praxis education into curricula, especially as global trends push universities toward applied models (Hayhoe & Zha, 2010).

The finding that on-campus practical teaching significantly enhances innovation, team cooperation, and field expertise suggests that praxis should be treated as a core pedagogical principle rather than a peripheral add-on to the academic curriculum. Curriculum development should move toward vertically integrating practical teaching across year levels, scaffolding skills from foundational team-based activities in the early years to complex, interdisciplinary projects in the upper years. Assessment practices should also evolve to reward experimentation, creative problem-solving, and iterative learning, thereby fostering innovation capabilities that are essential for professional contexts.

### ***Balancing on-campus and off-campus praxis education***

Given that both on-campus practical teaching and off-campus internships independently and substantially contribute to employability, institutions should adopt a balanced approach that strategically leverages the unique strengths of each modality. Rather than relying on internships as the primary mechanism for skill development, curricula should intentionally sequence and integrate the two—using practical teaching to build foundational competencies prior to placements and bringing workplace experiences back into the classroom for reflection and deeper learning. Such integration maximizes the developmental potential of both forms of praxis education.

### ***Context-sensitive approaches to institutional reform***

The moderation findings reveal that transformed AHEIs and non-transformed institutions exhibit distinct configurations of how practical teaching and internships shape employability, underscoring that effective praxis education is context-dependent. For transformed institutions, the stronger effect of practical teaching on field expertise suggests a need to consolidate on-campus praxis quality through faculty development and authentic assessment while maintaining internships as integrated, high-quality experi-

ences. For non-transformed institutions, where internships play a compensatory role, priorities should include expanding access to meaningful placements and strengthening on-campus practical teaching to build a more balanced skill development ecosystem.

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### ***Author contributions***

Zhuang TT: Writing—Original draft preparation, Conceptualization, Writing-Review and Editing. Hou XY: Writing—Original draft preparation, Data Curation, Formal Analysis. Liu YB: Methodology, Conceptualization, Project administration, Supervision. All authors have read and approved the final version.

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Not required.

### ***Informed consent***

The authors explained the detailed purpose and contents of the research in the survey and informed participants that they should begin answering the questions after agreeing to participate in the study. All participants gave their consent.

### ***Declaration of conflicting interests***

The authors have no conflicts of interest to declare.

### ***Generative AI use declaration***

None.

### ***Data availability statement***

Data used to support the findings of this study are available from the corresponding author upon request.

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