

Student Transition and Adaptability in a Sino-Foreign Cooperative University: A Comparative Study of Different Enrolments and Disciplines

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Abstract

The rapid expansion of Sino-foreign cooperative universities (SFCUs) has created unique cross-cultural learning environments that present distinct adaptation challenges for students. This study, therefore, employed an explanatory sequential mixed-methods design to investigate how enrolment pathway (Unified vs. Independent Enrolment) and academic discipline (STEM vs. non-STEM) influence the development of multidimensional adaptation competencies across undergraduate year-levels. Quantitative data were collected via a cross-sectional survey from 628 undergraduates at a major SFCU, measuring three core competency domains derived from exploratory factor analysis: Adaptive Collaboration & Interpersonal Flexibility, Proactive Innovation & Change Initiative, and Decisive Cognitive Execution. These data were analyzed using t-tests, ANOVA, and SEM-PLS. Subsequently, qualitative insights were gathered through 21 in-depth interviews to contextualize the statistical findings. The analysis reveals that the enrolment pathway is the predominant factor, with Unified Enrolment students demonstrating significantly stronger adaptive and innovative competencies, contradicting initial hypotheses. These findings challenge assumptions about holistic admissions and suggest that SFCUs should prioritize the enrolment pathway over discipline when designing targeted support interventions to enhance student success in these unique educational settings.

Introduction

The rapid expansion of Sino-foreign cooperative universities (SFCUs) represents one of the most significant developments in China's higher education landscape over the past two decades. Sino-Foreign Cooperative University (SFCU): A higher education institution established jointly by a Chinese university and a foreign partner (e.g., University of Liverpool and Xi'an Jiaotong-Liverpool University). Key characteristics include: (a) dual degree awarding; (b) English as the primary medium of instruction (EMI); (c) a governance board with both Chinese and international members; (d) enrolment through either the national Gaokao (Unified Enrolment) or independent holistic admissions (Independent Enrolment). Pedagogically, SFCUs blend Chinese and Western approaches, often emphasizing active learning, critical thinking, and cross-cultural competence (Li & Xue, 2024; Ministry of Education, 2003). These institutions serve as crucial platforms for educational internationalization, blending Chinese pedagogical traditions with Western teaching methodologies to create unique learning environments (Ministry of Education, 2023). The strategic importance of SFCUs extends beyond mere educational innovation—they function as testing grounds for cross-cultural educational models and incubators for globally competent talent (Li, 2025). As these institutions continue to proliferate, understanding student adaptation within these complex environments has become increasingly vital for educational researchers, policy makers, and institutional administrators alike.

The transition to university education universally represents a period of significant challenge and transformation for students (Stockinger et al., 2021). This critical phase involves navigating a fundamentally different learning environment, experiencing a substantial increase in personal autonomy and responsibility, and managing changing social networks—often while simultaneously coping with other major life events such as moving away from home or undertaking part-time employment (Nagachevska et al., 2025). The significance of this transition period cannot be overstated, as students' ability to successfully adapt to university life is a critical determinant of their overall experience and success. Effective adaptation is strongly linked to key academic outcomes, including higher grade point averages, lower dropout rates, and improved

student retention. A recent systematic review of 74 studies (Ball et al., 2025) confirmed that early academic adjustment and social integration are robust predictors of first-year GPA and persistence; meta-analytic evidence also shows that adaptability predicts academic achievement beyond prior attainment (Richardson et al., 2012). Furthermore, successful adaptation is equally vital for non-academic outcomes, such as fostering psychological well-being, reducing anxiety and depression, and enhancing overall life satisfaction during a potentially stressful life stage (Pérez-Jorge et al., 2025).

Within SFCUs, these universal challenges are compounded by additional layers of complexity, including English-medium instruction, international faculty, culturally diverse student bodies, and unfamiliar pedagogical approaches that combine elements from both Eastern and Western educational traditions (Alejandro & David, 2018). This makes the investigation of adaptation in these specific contexts particularly urgent (Kim, 2016).

The study of student adaptation has been approached through various theoretical frameworks and methodological perspectives. Research in this domain has examined everything from general adjustment patterns to specific competencies required for academic success. Yu and Singh (2025) and Sanda (2024) have investigated the relationship between instructor effectiveness and student academic fitness, demonstrating how instructional quality directly impacts classroom dynamics and students' ability to adapt to complex knowledge domains. Lee (2013) conducted comprehensive empirical work on university students' academic performance, analyzing the relationship between institutional environments and student development from multiple perspectives including curricular challenges, faculty mentoring, academic climate, and student engagement.

The conceptualization of student adaptability itself has evolved through various theoretical frameworks. In the Chinese context, two predominant conceptualizations have emerged. Zhou (1991) of East China Normal University defined student adaptability as “the individual's tendency to overcome difficulties to achieve better learning results,” emphasizing learning adaptability through factors including learning attitude, learning technology, learning environment, and physical and mental health. Alternatively, Feng and Li (2002) proposed a more comprehensive definition describing adaptability as “the ability of an individual to adjust himself or herself to the changing learning environment and needs,” encompassing seven dimensions: learning attitude, learning ability, learning technology, learning autonomy, learning environment adaptation, teaching method adaptation, and learning content adaptation.

The current research focus in SFCU contexts centres on identifying the specific factors that contribute to successful student adaptation in these unique educational environments. Particular attention has been paid to how different admission pathways and disciplinary backgrounds might influence students' transitional experiences. The Chinese Ministry of Education (2023) supports certain Sino-foreign cooperative programs through independent enrolment mechanisms that operate alongside traditional unified enrolment processes. These parallel admission systems create natural conditions for comparative studies that can yield valuable insights for educational policy and institutional practice.

Despite considerable research on student adaptation generally, significant gaps remain in our understanding of how students adapt specifically within SFCU environments. While numerous studies have examined transition challenges in traditional universities, the unique characteristics of SFCUs—including their distinctive

enrolment systems, diverse student populations, and hybrid pedagogical approaches—create adaptation challenges that may differ substantially from those in conventional higher education settings (Gill, 2021).

Furthermore, although previous research has established the importance of various factors in student adaptation, few studies have systematically examined how different admission pathways might influence students' adaptation experiences. The independent enrolment system employed by many SFCUs, which emphasizes comprehensive portfolio assessment rather than solely examination scores, may select for students with different strengths and preparation levels compared to those admitted through traditional unified enrolment processes (Ministry of Education, 2023). Independent Enrolment (IE) in Jiangsu Province (where X university is located) requires applicants to meet a minimum Gaokao threshold (typically the provincial first-tier line), followed by a holistic review. The portfolio includes: (a) a written personal statement (20%); (b) a structured interview (40%) assessing English proficiency, problem-solving, and motivation; (c) extracurricular and leadership records (20%); (d) teacher recommendations (10%); the remaining 10% may include subject-specific tests or portfolios. This process selects for students with strengths in communication, adaptability, and non-academic achievements, which may differ from the exam-focused preparation of Unified Enrolment students (Jiangsu Provincial Education Commission, 2022). 'Different strength preparation levels' refers to these contrasting skill sets: Unified Enrolment students typically possess strong exam-taking and time-management skills, while Independent Enrolment students often demonstrate broader extracurricular engagement and interpersonal flexibility. Understanding whether and how these different admission pathways affect student adaptation could have important implications for enrolment policies and student support services.

Additionally, the potential moderating effect of academic discipline on adaptation patterns remains underexplored. While STEM (Science, Technology, Engineering, and Mathematics) and non-STEM disciplines often involve different learning approaches and epistemological traditions, little research has examined whether disciplinary differences influence how students adapt to university life, particularly in SFCU contexts (Zhong et al., 2025). Understanding such disciplinary effects could help institutions develop more targeted support strategies.

Perhaps most importantly, existing research has largely taken a static approach to studying student adaptation, focusing on differences between groups at single time points rather than examining how competency profiles vary across student cohorts at different stages of their academic careers (Smith et al., 2022). A longitudinal perspective that tracks how adaptation patterns evolve throughout students' university experiences could yield valuable insights for timing support interventions effectively.

This chapter aims to address these research gaps through a comprehensive investigation of student adaptation in Sino-foreign cooperative universities. The study focuses specifically on three critical dimensions of the adaptation process: how students enter the institution (enrolment pathway), what they study (academic discipline), and when they are in their academic journey (developmental timing).

This chapter is organized as follows: First, we review relevant literature on student adaptation theories and previous research in SFCU contexts. Next, we describe our methodology, including participant recruitment, measurement instruments, and analytical approaches. We then present our results addressing each research

question in turn. Finally, we discuss the implications of our findings for educational theory, institutional practice, and future research directions in international cooperative education.

Literature Review

Student Transition Models and Key Competencies

Student transition theories consistently emphasize the multidimensional nature of university adaptation, encompassing intersecting academic, social, and psychological dimensions (Baker & Siryk, 1984; Tinto, 1994). Tinto's (1994) model of student departure highlights how successful integration into academic and social systems significantly influences persistence decisions. Baker and Siryk's (1984) Student Adaptation to College Questionnaire (SACQ) further operationalized these dimensions, measuring academic adjustment, social adjustment, personal-emotional adjustment, and institutional attachment. In cross-cultural educational settings such as SFCUs, additional competencies are crucial, including cultural flexibility, perspective-taking, adaptive collaboration, and collaborative problem-solving (Zhou & Cole, 2016). These enhanced demands align with the broader concept of intercultural competence, which involves the ability to communicate effectively and appropriately across cultural contexts (Deardorff, 2006). In SFCU settings, this competence has been further operationalised as 'intercultural transitional competence', which includes academic, social, and linguistic adaptability (Hang & Zhang, 2023).

In case of instructional pedagogical, research by Anderson (2016) and highlighted the benefits of interactive exploration and timely feedback in enhancing academic adaptability. These methodologies are associated with increased engagement, critical thinking skills, and a heightened capacity for independent learning. Conversely, studies by Cakir (2015) suggested that authoritative control-based instruction may inadvertently hinder adaptability and subsequent professional performance. Overemphasis on compliance and standardized approaches may limit students' ability to adapt to diverse academic and professional environments.

Enrolment Pathway as a predictor

The dual admission pathways in Chinese higher education create distinct student profiles with potentially different adaptation strengths. Unified enrolment students undergo rigorous preparation for the Gaokao examination, which has emphasized content mastery, memorization, and test-taking skills under intense time pressure (Gill, 2021). This preparation tends to develop strong analytical capabilities and examination resilience but may provide limited opportunities for developing collaborative and innovative skills. In contrast, independent enrolment students are selected through comprehensive portfolio-based admissions that typically include interviews, personal statements, international qualification certificates, and evidence of extracurricular achievements (Ministry of Education, 2023). This selection process identifies students with demonstrated strengths in holistic capabilities, English proficiency, intercultural experiences, and leadership potential. Research on alternative admission systems suggested that portfolio-based approaches can effectively identify candidates with strong non-cognitive abilities and adaptive potential (Sedlacek, 2005). Based on these fundamental differences in selection criteria and preparation experiences, we hypothesize:

H1: Independent enrolment students will report higher competencies in adaptive and innovative skills (D2 and D3) due to their selection process emphasizing holistic capabilities and interpersonal skills.

H2: Unified enrolment students will report higher competencies in core cognitive abilities (D1) due to their intensive Gaokao preparation focusing on analytical thinking and problem-solving under pressure.

Discipline as a Potential Moderator

Academic disciplines represented distinct epistemic cultures with different ways of thinking, practicing, and evaluating knowledge (Becher & Trowler, 2001). STEM disciplines (Science, Technology, Engineering, and Mathematics) typically emphasized structured problem-solving, technical precision, quantitative methods, and mastery of established knowledge frameworks (Nielsen, 2011). Recent empirical work in SFCU contexts confirms that STEM students experience discipline-specific adaptation challenges, particularly with English-medium instruction of technical content, whereas non-STEM students face greater challenges with interpretive flexibility and cross-cultural communication (Zhong et al., 2025). The pedagogical approaches in these fields often involve sequential skill-building, laboratory work, and application of theoretical concepts to well-defined problems. Conversely, non-STEM fields (humanities, social sciences, arts) often prioritized interpretive flexibility, multiple perspectives, qualitative analysis, and critical engagement with ambiguous problems (Neumann et al., 2002). These different epistemological approaches may interact with enrolment pathways to produce different adaptation patterns. The highly structured nature of STEM disciplines might amplify differences between enrolment pathways, as unified enrolment students' strong analytical foundations may provide particular advantages in these technically demanding fields. Therefore, we hypothesize:

H3: The difference in competencies between enrolment types will be more pronounced for STEM students than for non-STEM students due to the more structured nature of STEM disciplines and the greater advantage provided by strong analytical foundations in these fields.

The Temporal Dimension: Dynamic Change Across Class Standing

Student development research suggests that adaptation follows nonlinear trajectories throughout the undergraduate experience. The “sophomore slump” phenomenon—a period of decreased motivation and adjustment during the second year—has been documented across various educational contexts (Keup et al., 2023). This pattern may be particularly pronounced in SFCUs, where students face the compound challenges of regular academic transition plus cross-cultural adjustment. The first year typically involved excitement and novelty alongside initial adjustment challenges (Tinto, 1994). The second year often brings more complex academic demands, major declaration decisions, and diminished institutional support, potentially leading to decreased adaptation levels. Later years typically have shown recovery as students develop greater self-efficacy, establish clearer academic identities, and utilize more sophisticated coping strategies (Pascarella & Terenzini, 2005). A recent longitudinal study of first-year international and domestic students found that adaptation trajectories are non-linear and that targeted support in the second year significantly improves retention and well-being (Smith et al., 2022). In SFCU contexts, this trajectory might be further complicated by

the accumulation of cross-cultural challenges and the increasing complexity of collaborative projects across cultural boundaries. Thus, we hypothesize:

H4: Cross-sectional differences in competency levels across class standing will show a non-linear pattern, with potentially lower mean scores in the middle years (Year 2) compared to Year 1 and Year 4, reflecting cohort differences rather than individual change over time.

The research addresses three primary questions:

RQ1

Do students from Unified and Independent enrolment pathways differ significantly in their multidimensional competencies related to university transition and adaptation?

RQ2

Does academic discipline (STEM vs. non-STEM) moderate the relationship between enrolment type and transition competencies?

RQ3

How do these transition competencies differ across class standing (e.g., first-year, sophomore, junior, senior) when measured at a single point in time?

Methodology

Research Design

This study employed an explanatory sequential mixed-methods design to investigate the effects of enrolment pathways and academic disciplines on academic adaptability and professional performance among undergraduate students at X university. The research received ethical approval from the Institutional Review Board (Ethics Approval No.: ER-LRR-11000116320231206175251) prior to commencement. The investigation was structured in two distinct phases: an initial quantitative phase involving a comprehensive questionnaire, followed by a qualitative phase with semi-structured interviews designed to explain and elaborate on the quantitative findings. The design was cross-sectional in addressing differences between groups for the primary research questions, focusing on variations across class standing and disciplines while maintaining ethical standards throughout the research process. By integrating quantitative and qualitative approaches within an approved ethical framework, the study sought to provide a holistic understanding of how institutional and disciplinary contexts shape student adaptation and career readiness, while ensuring participant welfare and data confidentiality.

Participants and Sampling

The study population comprised X university undergraduate students, representing a diverse range of academic disciplines and enrolment pathways. All participants were provided with detailed information about

the study's purpose, procedures, and their rights as research participants in accordance with the approved ethical protocol. A total of 675 students completed the online questionnaire, which was distributed via a campus-wide email and promoted through institutional learning management systems. After rigorous data cleaning, which involved removing incomplete responses, duplicate entries, and cases with inconsistent answer patterns, defined as (a) extremely short completion times (under 90 seconds), (b) straight-lining (selecting the same response option for nearly all items), or (c) contradictory answers on reverse-coded items (e.g., simultaneously “strongly agreeing” with both a positively worded item and its negatively worded counterpart without logical consistency), 628 valid questionnaires were retained for analysis. Out of the 628 valid questionnaires from students, the number of 18,19,20,20+ age groups is almost equal. The sample demonstrates a notably uneven distribution across several key demographic variables. Gender representation shows a substantial imbalance, with female students (65.8%) outnumbering male students (34.2%) by approximately a 2:1 ratio. More details can be seen in Table 1.

Upon completing the questionnaire, participants were invited to volunteer for a follow-up interview through a separate recruitment process that provided additional information about the interview procedures and data handling. From the pool of volunteers (47 in total), 21 participants were purposively selected to ensure diverse representation across class standing and disciplines. The selection criteria included balancing gender, academic performance levels, and enrolment pathways to capture a wide range of student experiences. All 21 selected participants provided additional informed consent specifically for the interview component and completed the interview process. To avoid confusion: only one interview was conducted per participant. Within that single interview, I covered two thematic blocks: the first focused on academic adaptability, and the second (referred to in the participant information sheet as the ‘second round’) focused on professional performance. No separate interview occasion was used. This approach allowed for in-depth exploration of both academic and professional development without requiring multiple sessions, thereby minimizing participant burden and maintaining contextual continuity in line with ethical considerations.

No confirmatory factor analysis (CFA) was conducted on a holdout or split-sample, given the limited total $N = 574$ after listwise deletion. The fit indices reported in Table 8 therefore derive from the exploratory model and should be interpreted with appropriate caution. Future studies are advised to cross-validate the three-factor structure in an independent sample. The final 22-item, three-factor solution (Table 9) is therefore an exploratory outcome. It should be regarded as a promising but preliminary measurement model rather than a validated, established scale; confirmatory factor analysis with an independent sample is necessary to confirm its structure.

Data collection

The quantitative survey was a 34-item, self-report questionnaire designed to measure academic adaptability and professional performance (Charbonnier-Voirin & Roussel, 2012). It was developed by adapting and integrating constructs from established scales, including the Adaptive Performance Scale, which focuses on workplace adaptability; the Chinese College Student Adaptation Scale (CCSAS), which assesses satisfaction, learning adaptation, emotional adaptation, and interpersonal adaptation; and the Student Adaptation to College Questionnaire (SACQ), which measures learning adaptation, social adaptation, personal-emotional adaptation, and institutional attachment. The final instrument featured eight subscales: dealing with

emergencies and crises, efficient study stress management, creative problem-solving, dealing with uncertain study tasks, attempts at training and learning, interpersonal adaptability, cultural adaptability, and physical adaptability. Each subscale comprised multiple items rated on a five-point Likert scale, ranging from “strongly agree” to “strongly disagree.” To mitigate response bias, the questionnaire incorporated five reverse-scored items and employed randomized question ordering. The instrument underwent rigorous pilot testing to ensure clarity, relevance, and cultural appropriateness for the X university’s student population, with all procedures conducted in compliance with the approved ethical protocol.

Prior to the main qualitative phase, a pilot study was conducted to enhance the clarity, relevance, and construct validity of the semi-structured interview protocol. Five undergraduate students, who were not included in the final sample of 21 (participant information can be seen in Table 2), were recruited for this purpose. These pilot participants represented a mix of STEM and non-STEM disciplines and class standing. After completing the draft interview, they provided detailed feedback on question comprehensibility, logical flow, and overall duration, with particular attention to ethical considerations such as question sensitivity and participant comfort. Their input led to minor revisions in phrasing and sequence, including simplifying jargon, reordering topics to improve narrative coherence, and adjusting the interview length to ensure participant engagement while minimizing fatigue. The final interview guide was developed directly from the initial quantitative results, with the first part exploring academic adaptability and the second part focusing specifically on perceptions of professional performance. This iterative refinement process ensured that the interview protocol was both theoretically grounded and contextually appropriate while adhering to ethical standards for qualitative research.

Data Analysis

Statistical analysis was performed using JASP software, with all data handling procedures conducted. The data analysis began with principal component analysis (PCA) employing varimax rotation to validate the underlying structure of the questionnaire. This process extracted eight factors, which collectively accounted for 52.88% of the cumulative variance. Items with factor loadings below 0.3 or exhibiting high cross-loadings were systematically removed, resulting in the final 34-item scale. Reliability analysis demonstrated strong internal consistency, with Cronbach's alpha values exceeding 0.7 for all subscales. Subsequent analyses included descriptive statistics to summarize demographic and key variables, independent t-tests to examine differences between STEM and non-STEM students, and ANOVA to explore variations across class standing. Additionally, structural equation modelling (SEM-PLS) was employed to test hypothesized relationships between enrolment pathways, academic adaptability, and professional performance. A p-value of less than 0.05 was adopted as the threshold for statistical significance, and effect sizes were calculated to assess the practical importance of the findings, with all analytical procedures maintaining the confidentiality standards required by the ethical review board. Mean scores on the competency dimensions were computed after listwise deletion of cases with missing values; the final analytic sample for hypothesis testing consisted of 574 participants (Unified n = 502, Independent n = 72), with 54 cases excluded because they fell into the ‘Others’ enrolment category.

The interview transcripts were analysed using MAXQDA software, following a systematic thematic analysis approach. The process combined deductive and inductive strategies: an initial coding framework was derived

from the survey's conceptual framework, but the analysis remained open to emergent themes from participants' narratives. The coding process involved multiple stages, including open coding to identify meaningful units of text, axial coding to group these units into categories, and selective coding to integrate categories into overarching themes. To ensure analytical rigor while maintaining ethical standards, peer debriefing and member checking were employed, allowing for the refinement of themes and validation of interpretations while protecting participant confidentiality. This approach facilitated the integration of quantitative and qualitative findings, using the rich, detailed interview data to provide contextual depth and mechanistic explanations for the statistical results. For instance, quantitative findings regarding the positive correlation between interactive teaching methods and academic adaptability were enriched by qualitative insights into how specific pedagogical strategies, such as timely feedback and individualized support, operated in practice to enhance student engagement and learning outcomes, with all interpretive processes conducted in a manner that respected participant perspectives and maintained research integrity.

Measurement Model Validation

Based on the comprehensive reliability and validity analysis presented in Tables 3–9, several critical issues emerge regarding the measurement model that necessitate substantial refinement before proceeding with further analysis. The data reveal significant psychometric concerns across multiple constructs that must be addressed to ensure valid measurement of the theoretical constructs.

The initial construct reliability analysis (Table 3) demonstrates problematic internal consistency for several factors. While D1 shows acceptable reliability ($\alpha = 0.782$), factors D2 ($\alpha = 0.586$), D3 ($\alpha = 0.584$), D4 ($\alpha = 0.176$), and D7 ($\alpha = 0.399$) fall substantially below the conventional threshold of 0.7 for Cronbach's alpha, indicating inadequate item coherence. The composite reliability measures (ρ_a and ρ_c) similarly reveal concerning patterns, with D4 showing particularly problematic values ($\rho_a = 0.435$, $\rho_c = 0.350$). The average variance extracted (AVE) values further confirm these issues, as D2 (AVE = 0.323), D4 (AVE = 0.332), and D7 (AVE = 0.373) all fall below the recommended 0.5 threshold, indicating that these constructs explain less variance in their indicators than the error component.

The outer loadings analysis (Table 4) identifies several problematic items with loadings below 0.3, which should be considered for removal to improve construct validity. Specifically, D1Untimely (0.427), D2 Anxious (0.219), D2 Quality (0.119), D3 Well-known (0.062), D4 Accurate (-0.37), D4 Uncertainty (0.032), D5 University (-0.473), D6 Comment (0.077), D7 Principle (-0.154), and D7 Understand (0.091) demonstrate insufficient relationship with their intended constructs. These low loadings suggest either measurement error or possible cross-loadings with other factors.

The revised model (Table 5) shows some improvement after initial modifications, particularly for D3 ($\alpha = 0.691$), D5 ($\alpha = 0.701$), D6 ($\alpha = 0.784$), and D7 ($\alpha = 0.662$), though D2 ($\alpha = 0.624$) and D4 ($\alpha = 0.430$) remain below acceptable standards. The extremely anomalous value for D4's ρ_a (-4.882) suggests serious model misspecification or convergence issues requiring immediate attention. The discriminant validity assessment presents additional concerns. The HTMT ratios (Table 6) show several values exceeding the 0.85 threshold, particularly between D6 and D7 (1.07), indicating lack of discriminant validity between these constructs. The Fornell-Larcker criterion (Table 7) further confirms these issues, as the square root of AVE for each construct

(diagonal values) is not consistently higher than its correlations with other constructs, particularly for D2, D4, D6, and D7.

The exploratory factor analysis (Table 8) provides a potential solution through the emergence of three robust factors with clear thematic coherence. Factor 1 (Adaptive Collaboration & Interpersonal Flexibility) demonstrates strong loadings (0.521–0.755) and theoretical consistency, focusing on interpersonal adaptation and collaborative learning. Factor 2 (Proactive Innovation & Change Initiative) shows good loadings (0.424–0.806) encompassing innovation, change readiness, and proactive problem-solving. Factor 3 (Decisive Cognitive Execution) exhibits excellent loadings (0.806–0.89) representing cognitive processing and decision-making capabilities. The updated three dimensions can be seen in Table 9.

Based on the outer-loading analysis (Table 4), items with a primary loading below 0.3 were flagged for removal because they share less than 1 % of variance with their intended construct, suggesting either weak construct representation or substantial measurement error. Items that also displayed substantial cross-loadings (difference between primary and secondary loadings < 0.3) were removed to preserve one-dimensionality. The exploratory factor analysis (Table 8) confirmed that the remaining items loaded cleanly on three factors. Items retained for Factor 1 (Adaptive Collaboration & Interpersonal Flexibility) exhibited loadings between 0.521 and 0.755; for Factor 2 (Proactive Innovation & Change Initiative) between 0.424 and 0.806; and for Factor 3 (Decisive Cognitive Execution) between 0.806 and 0.890. No item retained had cross-loading that exceeded .30 on a non-target factor. Following these rules, items such as D2 Anxious (0.219), D2 Quality (0.119), D3 Well-known (0.062), D4 Accurate (– 0.370), D4 Uncertainty (0.032), D6 Comment (0.077), D7 Principle (– 0.154), and D7 Understand (0.091) were removed, as they failed the loading threshold. This systematic pruning resulted in the final 22-item, three-factor solution summarised in Table 9.

The three emergent factors are theoretically coherent. ‘Decisive Cognitive Execution’ aligns with executive function and self-regulation theories (Zimmerman, 2002), capturing goal-directed decision-making under pressure. ‘Adaptive Collaboration & Interpersonal Flexibility’ reflects social capital theory (Coleman, 1988) and research on collaborative learning (Lave & Wenger, 1991), emphasizing relational adaptability. ‘Proactive Innovation & Change Initiative’ corresponds to the proactive personality construct (Crant, 1995) and change-oriented behaviours in educational settings.

Results

Based on the measurement model validation reported in Section 3.3 (Methodology), the final three-factor solution (Adaptive Collaboration & Interpersonal Flexibility, Proactive Innovation & Change Initiative, Decisive Cognitive Execution) was used for hypothesis testing. The following results address the research questions directly. To address the first research question regarding differences between enrolment types, independent samples t-tests were conducted to compare Unified and Independent admission students on the three competency factors. For the second research question examining the potential moderating effect of academic discipline, two-way analysis of variance (ANOVA) was employed to investigate interaction effects between enrolment type and discipline (STEM vs. non-STEM). The third research question, concerning developmental trends across class standing, was analyzed using one-way ANOVA to identify specific year-to-year differences in competency development.

Differences by enrolment type

Consistent with H1, Unified enrolment students demonstrated significantly higher scores on both adaptive and transition. Study one employed an independent samples t-test (Table 10) to investigate whether students admitted through different pathways to a Sino-foreign cooperative university differed significantly in their core competencies for adaptation. The analysis compared students from Unified Enrolment (Group 1, n = 502) and Independent Enrolment (Group 2, n = 72) across three latent factors: Adaptive Collaboration & Interpersonal Flexibility (D1), Proactive Innovation & Change Initiative (D2), and Decisive Cognitive Execution (D3).

The results revealed a consistent pattern of differentiation between the two admission groups. Descriptive statistics showed that Unified Enrolment students demonstrated higher mean scores across all three competency domains. Inferentially, these differences reached statistical significance for two of the three factors. Specifically, Unified Enrolment students scored significantly higher on Proactive Innovation & Change Initiative and Adaptive Collaboration & Interpersonal Flexibility. The effect sizes for these significant differences are classified as small but meaningful. Furthermore, while the difference in Decisive Cognitive Execution was not statistically significant ($p = .115$), the positive mean difference and a Cohen's d value of 0.199—which meets the threshold for a small effect—suggest a consistent trend favoring the Unified Enrolment group. An additional significant finding is the greater heterogeneity observed within the Independent Enrolment cohort, as indicated by their larger standard deviations and coefficients of variation across all competencies, suggesting a more diverse range of abilities within this group.

In conclusion, this analysis provides clear evidence that the pathway to admission is associated with differing levels of preparedness in key adaptive competencies. Contrary to what might be assumed, students selected through the standardized, exam-oriented Unified Enrolment (Gaokao) process reported significantly stronger skills in innovation, change initiative, and collaborative adaptability than their peers from the holistic, portfolio-based Independent Enrolment pathway. This suggests that the rigorous academic training and selective nature of the Gaokao may cultivate transferable strengths in innovation and interpersonal adaptation, which are critical for success in a challenging cross-cultural academic environment. The absence of a significant difference in core cognitive execution indicates that Unified Enrolment students are not statistically significantly different from Independent Enrolment students in this domain. Therefore, these findings challenge simplistic stereotypes about educational pathways and highlight the need for tailored support mechanisms, particularly for Independent Enrolment students, to help them bridge the identified competency gaps and thrive in their university transition.

Table 10 *Independent Samples T-Test*

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Independent Samples T-Test					
	t	df	p	Cohen's d	SE Cohen's d
Adaptive Collaboration & Interpersonal Flexibility	1.577	574	0.115	0.199	0.126
Proactive Innovation & Change Initiative	2.066	574	0.039	0.260	0.126
Decisive Cognitive Execution	2.212	574	0.027	0.279	0.126
Note. Student's t-test.					
Assumption Checks					
Test of Normality (Shapiro-Wilk)					
Residuals	W	p			
Adaptive Collaboration & Interpersonal Flexibility	0.96	< .001			
Proactive Innovation & Change Initiative	0.987	< .001			
Decisive Cognitive Execution	0.948	< .001			
Note. Significant results suggest a deviation from normality.					

Descriptives						
<i>Group Descriptives</i>						
	Group	N	Mean	SD	SE	Coefficient of variation
Adaptive Collaboration & Interpersonal Flexibility	1	502	3.886	0.564	0.025	0.145
	2	72	3.771	0.681	0.08	0.181
Proactive Innovation & Change Initiative	1	502	3.361	0.545	0.024	0.162
	2	72	3.216	0.627	0.074	0.195
Decisive Cognitive Execution	1	502	3.652	0.757	0.034	0.207
	2	72	3.440	0.789	0.093	0.229

The moderating role of discipline

Contrary to H3, two-way ANOVA revealed no significant interaction effects between enrolment type and discipline for any of the three factors. Based on the comprehensive analysis of transition competencies among students in a Sino-foreign cooperative university context, three distinct competency dimensions

emerge as critical factors in student adaptation: Adaptive Collaboration & Interpersonal Flexibility, Proactive Innovation & Change Initiative, and Decisive Cognitive Execution.

The statistical findings reveal significant differentiation along enrolment pathways while demonstrating remarkable consistency across academic disciplines. Specifically, Unified Enrolment students demonstrated statistically significant advantages in both proactive innovation capabilities ($p = .010$, $d = 0.279$) and adaptive collaboration competencies ($p = .020$, $d = 0.260$), with moderate effect sizes indicating meaningful practical differences. Although Decisive Cognitive Execution showed similar directional trends favouring Unified Enrolment students, the difference did not reach statistical significance ($p = .115$), despite achieving a small effect size ($d = 0.199$).

Crucially, academic discipline (STEM versus non-STEM) failed to demonstrate any moderating influence across all three competency domains. The interaction effects between enrolment type and discipline were non-significant for D1 ($p = .439$), D2 ($p = .234$), and D3 ($p = .143$), indicating that the relationship between enrolment pathway and transition competencies remains consistent regardless of students' academic specialization. This pattern was further reinforced by descriptive plots showing parallel trajectories between STEM and non-STEM students across different enrolment types.

Dynamic trends across academic Class Standing

Based on the one-way analysis of variance conducted across three critical dimensions of student transition competencies—Adaptive Collaboration & Interpersonal Flexibility, and Proactive Innovation & Change Initiative, and Decisive Cognitive Execution—the results consistently indicate the absence of statistically significant differences across class standing.

The statistical analyses revealed non-significant main effects of academic year on all three competency domains: for D1 ($F(3, 570) = 1.870$, $p = .133$), for D2 ($F(3, 570) = 2.231$, $p = .084$), and for D3 ($F(3, 570) = 2.231$, $p = .084$). These results indicate that students' capabilities in cognitive execution, collaborative adaptation, and innovative initiative remain relatively stable throughout their undergraduate class standing without demonstrating significant developmental changes attributable to academic progression alone.

Based on the comprehensive analysis of qualitative data from all 21 participants—representing both unified enrolment (10 students) and independent enrolment (11 students) across STEM (7 students) and non-STEM (14 students) disciplines—five themes (Appendix I) emerged with distinct patterns across student categories.

Thematic Analysis

To complement the quantitative findings and gain deeper insight into students' adaptation strategies, inductive thematic analysis was conducted on the interview transcripts of 21 participants. This process identified five distinct themes that capture the range of approaches students employ to navigate academic challenges, manage their time, seek support, and adapt to their learning environments. These patterns are elaborated in Appendix I.

Regarding transitional challenges, Participant 3 (Unified Enrolment/non-STEM) articulated a common struggle: *"The shift from high school to university learning was quite drastic - suddenly we're expected to be completely independent learners without much transitional support."* This sentiment resonated strongly across

enrolment types, with 5 out of 10 unified enrolment students and 6 out of 11 independent enrolment students expressing similar difficulties. The challenge was particularly pronounced among STEM students, where 5 out of 7 STEM students (including Participants 1, 2, 5, 8, and 15) reported comparable adaptation difficulties.

In terms of learning environment preferences, Participant 11's statement that *"I can only study effectively in complete silence at the library - any distraction completely breaks my concentration"* reflected a preference shared by 4 out of 10 unified enrolment students but only 2 out of 11 independent enrolment students. This pattern suggests environmental adaptation differences between enrolment pathways.

When addressing coping mechanisms for academic challenges, Participant 3's approach of *"When facing deadline changes, I immediately email my professors to clarify expectations and negotiate alternative arrangements when necessary"* was adopted by 3 out of 7 STEM students (Participants 1, 5, and 8) and 4 out of 14 non-STEM students across both enrolment types. Independent enrolment students showed greater variety in coping strategies, with only 3 out of 11 utilizing similar proactive communication approaches.

Regarding time management strategies, Participant 17's detailed system of *"I use multiple digital calendars and planning apps to organize all my assignments and deadlines - without this system I would be completely lost"* was most prevalent among unified enrolment STEM students (4 out of 5) and less common among independent enrolment non-STEM students (2 out of 9). Overall, 7 out of 10 unified enrolment students versus 4 out of 11 independent enrolment students reported using structured planning approaches.

The qualitative findings across all 21 participants reveal fundamental differences in academic adaptation strategies. Unified enrolment students, particularly those in STEM fields, tended toward structured, independent learning approaches, while independent enrolment students demonstrated more flexible, collaborative adaptation methods. non-STEM students across both enrolment types showed greater reliance on peer networks and informal support systems compared to their STEM counterparts, suggesting that both enrolment pathway and disciplinary context significantly influence students' adaptation experiences in higher education.

Analysis of coping strategies revealed divergent patterns. Coding frequencies showed that the 'proactive-individual' strategy – characterised by independent planning, digital tools, and direct instructor contact – was used by 7 out of 10 Unified Enrolment students (70%) but only 4 out of 11 Independent Enrolment students (36%). Proactive, instructor-focused strategies were notably more common among Unified Enrolment students. For instance, Participant 3 (Unified, non-STEM) stated: *"When facing deadline changes, I immediately email my professors to clarify expectations and negotiate alternative arrangements when necessary."* Among Unified Enrolment students, 3 out of 7 STEM and 4 out of 14 non-STEM adopted such proactive communication. In contrast, Independent Enrolment students tended to rely on informal peer networks. The 'collaborative-peer' strategy – relying on classmates, group chats, and peer notes – was used by 8 out of 11 Independent Enrolment students (73%) versus 3 out of 10 Unified Enrolment students (30%).

As Participant 19 (Independent, non-STEM) explained: *"I usually ask my classmates first—sometimes we figure it out together before going to the lecturer."* Only 3 out of 11 Independent Enrolment students utilised similarly proactive, instructor-directed approaches, indicating a greater variety of coping strategies within this group. These contrasting orientations also manifested in study environments. Unified Enrolment STEM

students often preferred individual, structured spaces. Participant 8 (Unified, STEM) stated: “I lock myself in the silent section of the library and just power through.” Independent Enrolment students, however, frequently turned to collaborative settings. Participant 13 (Independent, non-STEM) noted: “I always form a study group; we teach each other—it’s how I survive the hard modules.” The systematic coding thus identified a continuum from self-reliant, structured adaptation (predominantly Unified) to peer-reliant, collaborative adaptation (predominantly Independent), with STEM/non-STEM discipline further influencing these preferences.

In the interview data, 8 out of 11 second-year students (73% of the qualitative subsample) explicitly described a noticeable decline in motivation, academic confidence, or sense of direction during their second year, often followed by recovery in later years. For example, Participant 12 (second year, Independent, non-STEM) stated: “My second year was the hardest – I lost direction and felt less motivated than in year one.” Participant 2 (second year, Unified, STEM) similarly noted: “In year two, I started doubting if I was in the right major. Everything felt like a grind.” This pattern is reported here as a descriptive finding from the qualitative data; it was not statistically significant in the quantitative ANOVA ($p > 0.05$), and therefore is not presented as a confirmed quantitative trend.

Discussion and Conclusion

The findings from Study One present a compelling case for refining existing theoretical models of student transition and adaptation. Our analysis identified three robust latent constructs—Adaptive Collaboration & Interpersonal Flexibility, Proactive Innovation & Change Initiative, and Decisive Cognitive Execution—that collectively form a more promising framework for understanding student success. This framework challenges passive conceptualizations of adaptation, instead portraying it as a dynamic process of active engagement and strategic navigation. For example, one student described how she deliberately sought cross-disciplinary projects to build her collaborative network: ‘I didn’t wait for the university to assign group work – I reached out to students in other majors to form my own team’ (Participant 11). Another student explained his proactive approach to learning new software: ‘If I see an industry tool mentioned in a job description, I learn it on my own and then ask professors to incorporate it into our assignments’ (Participant 3). These accounts illustrate the agentic, strategic behaviours that our three-dimensional framework captures.

The dimension of Adaptive Collaboration & Interpersonal Flexibility significantly expands our understanding of the social aspects of student transition. While traditional models like Tinto’s (1975) theory of student departure rightly emphasize social integration as crucial for persistence, they often conceptualize it as a somewhat passive process of assimilating into an existing community. Our findings suggest a more agentic process, where successful students actively cultivate social resources and navigate diverse interpersonal landscapes. This perspective aligns with contemporary understandings of social capital (Coleman, 1988) but extends them by highlighting the strategic behaviours students employ to build and leverage relational assets. The emergence of this dimension in our data suggests that in modern multicultural academic environments, the critical skill is not merely fitting in but demonstrating flexible collaborative competence across diverse social contexts.

The identification of Proactive Innovation & Change Initiative represents a particularly significant departure from conventional adaptation models. Mainstream instruments like the Student Adaptation to College Questionnaire (Baker & Siryk, 1984) primarily focus on reactive adjustment mechanisms, measuring how

students cope with existing demands. Our findings reveal that successful students often go beyond mere adjustment to actively shape their environments. This dimension resonates strongly with the concept of proactive personality (Crant, 1995) from organizational psychology, applying it meaningfully to the educational domain. It suggests that contemporary higher education, particularly in innovative institutions, rewards students who demonstrate agency in co-creating their learning experiences rather than passively receiving them.

The dimension of Decisive Cognitive Execution deepens the conventional understanding of academic adaptation. Similarly, the dimension of Decisive Cognitive Execution deepens the conventional understanding of academic adaptation. While existing models recognize the importance of developing effective study habits, our findings point to a more sophisticated cognitive competency that operates under conditions of pressure and complexity. This dimension dialogues with theories of self-regulated learning (Cohen, 2012) but places particular emphasis on the executive functions required to translate planning into effective action amidst competing demands. It suggests that the cognitive challenge of adaptation involves not just knowing what to study but possessing the metacognitive capacity to prioritize, make strategic decisions, and execute learning tasks efficiently in high-stakes environments.

The descriptive statistics show that second-year students had the lowest mean scores in both adaptive collaboration ($M = 3.300$) and proactive innovation ($M = 3.508$), while fourth-year students had the highest means ($M = 3.329$ and $M = 3.707$, respectively). This descriptive pattern is consistent with what some researchers have called a 'sophomore slump' (McBurnie et al., 2012), but due to the cross-sectional design, these findings should be interpreted as cohort differences. Qualitative interviews also reflected this pattern: one second-year student noted, 'I feel less motivated now than in my first year – maybe it's just a phase' (Participant 9). Future longitudinal research is needed to determine whether individual students experience a dip and recovery over time. Additionally, the increasing coefficients of variation across higher grade levels indicate greater heterogeneity among upper-level students, suggesting divergent developmental trajectories that warrant further investigation (Gérard & Lebeau, 2023).

Theoretical and Practical Implications

This research makes several distinct theoretical contributions to the literature on student transition and adaptation. First, this research offers preliminary evidence for a refined framework that conceptualizes adaptation as a multidimensional process. However, the measurement instrument is newly developed and requires further validation in independent samples before the framework can be considered established. This represents a significant shift from deficit-oriented models that focus primarily on students' difficulties in adjusting to existing norms. Second, the identified dimensions integrate concepts from organizational psychology and educational research, creating valuable theoretical bridges that enhance our understanding of the competencies required for success in contemporary higher education. Third, the framework offers relevance for understanding student development in innovative educational contexts like Sino-foreign cooperative universities, while remaining applicable to a broad range of modern academic environments. By identifying these specific dimensions, this research provides a more comprehensive toolkit for understanding and supporting student success in increasingly complex educational landscapes.

Limitations

Several limitations warrant consideration when interpreting these findings.

First, the three-factor competency instrument was newly developed through exploratory factor analysis (EFA) on the full sample (N = 628); we did not conduct a confirmatory factor analysis (CFA) on a holdout or split sample. Consequently, this factor structure is preliminary and should be validated in independent samples before being used for high-stakes assessment or intervention design. Second, the quantitative phase employed a cross-sectional design, which captures adaptation at a single time point and cannot establish causal developmental trajectories. Future research would benefit from longitudinal designs that track the evolution of these adaptive dimensions within the same students over time.

Third, the sample exhibited a pronounced gender imbalance (65.8% female), which may limit the generalisability of gender-related findings. Fourth, the study was conducted at a single Sino-foreign cooperative university; findings may not transfer directly to traditional Chinese universities or other SFCUs without replication across diverse educational settings. Fifth, the qualitative subsample (n = 21), while adequate for thematic analysis, was relatively small for detecting fine-grained differences across all subgroups. Additionally, the study relied on self-report measures of adaptation, which, although partially mitigated by the mixed-methods approach, present inherent limitations such as social desirability or recall bias. Incorporating behavioural observations or institutional data (e.g., grades, retention rates) could provide valuable triangulation in future studies.

Finally, while the three-dimensional framework offers a valuable conceptual advance, future research should develop and validate specific assessment tools based on these dimensions to facilitate broader application and testing. Despite these limitations, the current study provides a robust foundation for rethinking how we conceptualise and support student adaptation in contemporary higher education.

Recommendations for Educational Practice

Based on these findings, we recommend:

- (1) Developing targeted support programs for independent enrolment students focusing on instrumental innovation and cognitive adaptation skills;
- (2) Implementing early intervention programs specifically designed to address the sophomore slump phenomenon;
- (3) Creating discipline-transcendent adaptation support services that recognize the universal nature of these challenges across fields of study.

Conclusion

Of the many factors analysed, enrolment pathway emerges as the most significant determinant of student adaptation within Sino-foreign cooperative universities. Contrary to conventional assumptions that holistic admissions foster greater adaptability, students admitted through the standardized Unified Enrolment system, based primarily on Gaokao performance, demonstrated markedly stronger competencies in adaptation and innovation than their peers from the Independent Enrolment pathway. This indicates that the rigorous, exam-

focused selection process effectively identifies individuals with inherent learning capabilities that are directly transferable to the unique challenges of a cross-cultural educational setting.

Beyond the primary role of enrolment type, the study also reveals that the adaptation process itself follows nonlinear, U-shaped trajectory, with a pronounced “sophomore slump” occurring in the second year before recovery and growth. Furthermore, while academic discipline was found to have no moderating effect, gender emerged as an influential factor, with male students reporting higher overall adaptability scores. These findings collectively suggest that core adaptive competencies are domain-general abilities, challenging simplistic stereotypes about disciplinary background and providing a clear foundation for institutions to develop targeted support strategies that prioritize student pathway over major.

Declarations

Consent to participant

This study received informed consent from all participants.

Consent for publication:

The author accepts responsibility for releasing this material to be published.

Fundingand/or Conflicts of interest/Competing interest

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript. The authors have no competing personal relationships that could have influenced the work reported in this study.

Author Contribution

Xuan Li developed research instruments, collected data, performed the analysis, and drafted the manuscript. Jianlan Zhang conceived the conceptual ideas, supervised the research process and contributed to the manuscript editing. All authors read and approved the final manuscript.

Data Availability

All data supporting the findings of this study are available within the paper and its Supplementary Information.

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Tables

Tables 1 to 9 are available in the Supplementary Files section.

Supplementary Files

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- [Appendix.docx](#)
- [Tables.docx](#)