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A Study on German Language Curriculum and Student Satisfaction in Sino-German Cooperative Education Programs

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ABSTRACT
This study investigates student satisfaction with the German language curriculum in a Sino-German cooperative program using a five-dimensional framework that includes course objectives, performance, support, assessment and real-scenario training. A validated questionnaire was employed to capture students' experiences and core needs at a Sino-German college in eastern China. Exploratory factor analysis confirmed a stable five-factor structure and high construct validity; hierarchical regression demonstrated that course performance, course support and real-scenario training are significant predictors of overall satisfaction, whereas course objectives and course assessment exerted minimal influence. There are notable differences across academic years and majors, underscoring the necessity of stage- and discipline-specific pedagogies. The results present an empirically supported road map for continuous enhancement of quality in Sino-German cooperative education and emphasize the importance of practice-oriented, technologically advanced, and culturally embedded approaches in German language curriculum.

KEYWORDS
Sino-German cooperative education; German language curriculum; Student satisfaction; Curriculum enhancement

1 Introduction

International educational cooperation is a significant trend in higher education. Sino-German cooperative education programs seek to integrate Germany's advanced educational methodologies with its professional strengths to cultivate talent with an international perspective, cross-cultural communication abilities and professional skills. This not only conforms to the development trend of international cooperation, but also has the potential to meet the demand for technical talent. In recent years, Sino-German cooperative education programs have rapidly developed in Chinese universities, covering diverse disciplines such as mechanics, electrical engineering, engineering, economics and management. As the key language in such programs, German is not only an important tool to acquire professional knowledge but also an important bridge for cross-cultural communication. The quality of German teaching directly affects students' comprehension and application of professional knowledge in German, thus affecting the overall success of the study programs.

According to data from the official website of the Chinese Ministry of Education (as of July 2025), 42 universities in China participate in undergraduate-level cooperative education with Germany, including 12 Sino-German cooperative education institutions and 42 cooperative education programs. These Sino-German cooperative education institutions and programs, covering 18 provinces and cities in China, are extensively implemented in economically and educationally advanced regions, including Beijing, Shanghai, Jiangsu, Shandong and Zhejiang. Among the 77 majors offered, 53 are in science and engineering, accounting for 69%; 13 are in management and humanities; and 9 are in the arts.

As an important carrier of the internationalization of higher education, Sino-foreign cooperative education institutions have a direct impact on talent quality. An analysis of the objectives across 12 Sino-German cooperative education institutions at the undergraduate level indicates considerable homogeneity in their goals. First of all, "internationalization" and "application-oriented" are the two most common terms. Almost all institutions emphasize the cultivation of high-quality application-oriented talent with global vision and cross-cultural communication abilities. Secondly, most institutions mention terms such as "engineering practice ability", "innovation ability" and "professional skills", which reflect the high importance of practical ability and comprehensive quality. The phrases "German/English teaching," "bilingual ability," and "language advantage" are also common, which shows that language competence development is a key part of the target system. Further analysis revealed the prevalence of value-oriented terms such as "national identity", "social responsibility" and "value guidance". Finally, expressions such as "integration of industry and education", "university-industry collaboration" and "serving regional development" appear many times, indicating that the projects generally emphasize the connection with industrial needs. In summary, Sino-German cooperative education institutions show the common characteristics of international vision, application-oriented ability, language advantage, value guidance and integration.

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2 Literature review

2.1 German curriculum design

As a medium for professional study and a tool for cross-cultural communication, German directly affects students' language ability development and professional learning outcomes through its curriculum design and teaching models. Comprehensive existing research shows that scholars have conducted studies on dimensions such as curriculum design, teaching model innovation and cross-cultural ability cultivation, forming a rich set of theoretical results and practical experiences.

German courses in Sino-German cooperative education programs usually adopt a phased strengthening model to balance the dual goals of achieving language proficiency and professional studies. The Sino-German International College of the University of Shanghai for Science and Technology divides German teaching into three stages: language learning stage, language strengthening stage and professional German learning stage, so as to improve the practicality of German teaching in professional learning (Zheng 2015). Wang (2024) proposes a "three-stage embedded model": the foundational stage solidifies groundwork through specialized vocabulary paired with phonetics; the intermediate stage strengthens academic text processing skills via syntactic analysis; and the advanced stage cultivates academic writing and critical thinking by engaging with cutting-edge literature.

2.2 German teaching reform

The German teaching in Sino-German cooperative education programs breaks through the traditional language training model and constructs a three-dimensional system of practical orientation, cultural integration and technological support. Through the following multifaceted reforms and innovations, it achieves specialized language service major study.

The teaching method is task-driven and project-based. Zhejiang University of Science and Technology took the lead in proposing the concept of German teaching "oriented to action", established a "project German learning file" through situational and task-based classrooms and strengthened the autonomous management of learning through process evaluation (Weng, 2015). The Sino-German Engineering College of Qingdao University of Science and Technology takes real cases, interdisciplinary projects and on-site practice as the main line, so that students can complete the construction of German meaning in solving practical problems (Cheng, 2023).

Blended teaching and flipped classrooms are implemented. With the development of educational technology, blended learning has become mainstream. Li (2020) adopted a hybrid model of 50% online + 50% offline and ran formative and summative evaluation thru the entire teaching process. In order to effectively address the imbalance of traditional classroom niches, Huang (2021) proposed an O2O smart teaching system from an ecological perspective, highlighting the dynamic equilibrium of the "Information–Human–Resource–Environment" framework. Xu (2024) established an "online micro-lecture + offline task" model, achieving a closed-loop system of pre-class preparation, in-class interaction and post-class assessment and improving learning efficiency and classroom participation.

The system integrates the cultivation of cross-cultural critical thinking. Weng (2015) relied on the cultural lectures of German professors and the "Deutsche Stammtisch" to form a cultural immersion mechanism that linked inside and outside the classroom. Chen and Li (2021) implemented at Shandong Agricultural University a three-stage teaching method: cultural theme, critical task and project presentation, promoting the coordinated development of language proficiency, cultural cognition and value judgment. Sichuan University has built a systematic intercultural education framework around four dimensions: language communication, intercultural practice, academic innovation and local culture education (Yan et al., 2024).

New technological trends drive teaching reform. Qilu University of Technology has built its own German corpus of mechanical engineering, guiding students to carry out word meaning discrimination and micro-context exploration based on data mining, so as to realize the precision and personalization of vocabulary acquisition (Sun, 2020).

2.3 Research on student satisfaction

Since the 1980s, student satisfaction has become an important indicator in the quality assessment of higher education. The research on foreign language learning satisfaction has multiple perspectives and rich models. Wu and Liu (2013) discussed the satisfaction of EFL blended learning and found out, learning climate, perceived enjoyment, perceived usefulness, system functionality, social interaction, content feature and performance expectation are significantly related to students' satisfaction. Tasgin and Korucuk (2018) constructed a college students' foreign language course satisfaction scale including three dimensions of curriculum, teachers and physical conditions, and suggested that colleges and universities should continue to optimize the course content and teaching environment. Dou (2022) examined foreign language majors in Jiangsu Province and discovered that English majors' satisfaction was noticeably lower than that of Japanese and other languages. The main reasons were the unreasonable curriculum system, the traditional teaching methods and the weak practical links. He called on English majors to reconstruct the curriculum system, strengthen

practical teaching and carry out teaching reform with "students as the center". In order to enhance the online foreign language teaching experience, Du and Yang (2025) developed a four-dimensional scale that measures the teaching platform's functionality, the curriculum's rationality, its usefulness, its teaching effect and the willingness to promote it. They also recommended optimizing the platform's functionality and curriculum design. In conclusion, research on the satisfaction of learning a foreign language typically identifies curriculum design, instructional strategies, platform support and personal experience as the main determinants. In the future, we should focus on the student-centered teaching reform, strengthen practical links and technical support.

The research on student satisfaction with Sino-foreign cooperative education has also been gradually enriched. Zhong et al. (2012) conducted a study based on the SERVQUAL service quality model, from the three dimensions of school conditions, service management and emotional investment, emphasizing that emotional care and teaching resource construction should be strengthened. Liu et al. (2016) added the dimension of "introduction of high-quality resources" on the basis of referring to the SSI/NSS of the United States and the United Kingdom, forming a five-dimensional framework of classroom teaching, evaluation feedback, academic support, personal development and resource introduction, which has become the most widely cited paradigm in subsequent research on cooperative education. Ge (2017) started from nine dimensions including learning objectives, curriculum setting, teaching quality and foreign teachers, and found that curriculum setting and teacher teaching had a significant impact on satisfaction. It was proposed that the construction of teachers and curriculum management should be strengthened to enhance students' professional identity and sense of purpose. Mai and Liang (2020) analyzed from six dimensions of organizational management, teacher teaching, assessment, academic support, learning resources and personal development, and found that they all had a significant impact on overall satisfaction, and suggested optimizing teaching management and resource allocation. From the standpoint of education for sustainable development, Huang et al. (2023) developed a four-dimensional model of resource input, teacher environment, teaching process and teaching results. They also recommended bolstering academic support and teacher training to encourage the ongoing enhancement of Sino-foreign cooperative education quality.

Existing studies have three shortcomings: First, most studies focus on English or general language courses and lack empirical data on German courses in Sino-German cooperative education programs. Second, they insufficiently consider German's unique functional role as a "professional bridge language." Third, domestic research often relies on qualitative interviews or policy analysis, with insufficient quantitative empirical evidence.

3 Research design

This study used a structured questionnaire to systematically evaluate whether the German language courses in Sino-German cooperative programs are suitable for students' academic development and career needs, and whether their content is in line with relevant professional competitiveness frameworks. The goal is to provide empirical evidence to help improve the curriculum design and the teaching effectiveness.

Grounded in established frameworks for university student satisfaction and teaching-quality evaluation within Sino–foreign collaborative programs, and aligned with the talent-development objectives of Sino-German cooperative education, this survey focuses on students' learning experiences and core needs in German-language courses. The questionnaire is structured around five research dimensions: course performance, course objectives, course assessment, course support and real-scenario training. The scale adopts a five-point Likert scale (scoring rules: 1 = strongly disagree, 5 = strongly agree). The questionnaire comprises 21 scale items, with each dimension containing 4 items. They examine critical factors such as student satisfaction with course structure, the relevance of learning objectives to career development, variety of assessment methods, sufficiency of learning resources, efficacy of faculty assistance and the applicability of language skills to practical and professional environments.

The questionnaire survey was conducted at Sino-German College of Shanghai University of Science and Technology, one of 12 Sino-German cooperative institutions at the undergraduate level.

4 Research results and analysis

4.1 Descriptive statistics

This study collected a total of 206 valid questionnaires. For grade distribution, first-year, second-year and third-year students contributed 36.9%, 40.8% and 22.3%, respectively. Fourth-year students did not participate in the survey since they had no longer German courses. The majority of students (71.0%) were engineering majors, while 29.0% were economics majors. 72.33% of students stated that they were "satisfied" or "very satisfied" with the existing German courses. Overall course satisfaction is relatively high.

4.2 Reliability and validity test results

This study used Corrected Item-Total Correlation (CTC) and Cronbach's α coefficient to measure the reliability of the

questionnaire. The Cronbach's α coefficient was 0.976, with all dimension coefficients exceeding 0.9, indicating high internal consistency. The Course objectives dimension (α = 0.927) and the Course assessment dimension (α = 0.941) had the highest reliability and showed a significant homogeneity among their components. The CTC values for all items were between 0.767 and 0.877, which is far higher than the recommended level of 0.5. This suggests that each item demonstrates a strong overall correlation and representativeness within its assigned dimension.

Table 1 Corrected item-total correlation

Dimension	Item	CTC	Cronbach's α
Course performance	P1	0.789	0.917
	P2	0.834	
	P3	0.851	
	P4	0.767	
Course objectives	O1	0.793	0.927
	O2	0.857	
	O3	0.812	
	O4	0.857	
Course assessment	A1	0.856	0.941
	A2	0.877	
	A3	0.859	
	A4	0.844	
Course support	S1	0.767	0.919
	S2	0.799	
	S3	0.811	
	S4	0.875	
Real-scenario training	R1	0.809	0.923
	R2	0.872	
	R3	0.78	
	R4	0.819	

This research employed exploratory factor analysis (EFA) to assess concept validity. The findings indicated a KMO value of 0.954 and a significant Bartlett's sphericity test, validating the data's appropriateness for factor analysis. Principal component analysis found five common components, which explained 83.392% of the total variation. There are no cross-loads, and all projects have factor loads above 0.5 in their assigned dimensions. This suggests that the scale has a unique structure and confirms its strong constructive validity.

Table 2 KMO- and bartlett's test

KMO Value		.954
Bartlett's test for sphericity	Approx. chi-square	4515.217
	Degrees of freedom	190
	Significance	.000

Table 3 Total variance explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	Variance%	Cumulative%	Total	Variance%	Cumulative%	Total	Variance%	Cumulative%
1	13.536	67.681	67.681	13.536	67.681	67.681	4.676	23.382	23.382
2	1.262	6.310	73.991	1.262	6.310	73.991	3.678	18.391	41.773
3	0.805	4.025	78.016	0.805	4.025	78.016	3.121	15.604	57.376
4	0.623	3.115	81.131	0.623	3.115	81.131	2.807	14.036	71.413
5	0.452	2.261	83.392	0.452	2.261	83.392	2.396	11.979	83.392
6	0.370	1.851	85.243						
7	0.356	1.781	87.023						
8	0.344	1.721	88.744						
9	0.321	1.605	90.350						
10	0.312	1.558	91.908						
11	0.246	1.228	93.136						
12	0.236	1.182	94.318						
13	0.217	1.087	95.405						
14	0.171	0.854	96.260						
15	0.163	0.815	97.074						
16	0.152	0.762	97.837						
17	0.144	0.720	98.557						
18	0.109	0.545	99.102						
19	0.100	0.500	99.602						
20	0.080	0.398	100.000						

4.3 Factor analysis and scale structure

Factor 1 is connected to course support (items 18, 19, 20, 21) and the factor loadings for these items are all over 0.60,

Table 4 Rotated component matrix a

Component					
	1	2	3	4	5
S4_21	0.797				
S2_19	0.762				
S3_20	0.734				
S1_18	0.674				
RLT1_22	0.573				
P2_5		0.799			
P1_4		0.797			
P3_6		0.719			
P4_7		0.578			
O2_9			0.750		
O4_11			0.681		
O3_10			0.648		
O1_8			0.568		
A4_16	0.404				
A2_14	0.484				
A1_13	0.504				
A3_15	0.465				
RLT3_24					0.839
RLT4_25					0.588
RLT2_23					0.554

which shows that they have significance to this factor. Factor 2 is related to course performance, including learning progress and feedback mechanisms (items 4, 5, 6, 7), and it also has high factor loadings. Course objectives are the primary focus of Factor 3 (items 8, 9, 10, 11), whereas the variety of course assessment techniques and practical training are the focus of Factors 4 and 5 (items 13, 14, 15, 16, and items 23, 24, 25).

However, item 22 had significant cross-loadings and could not be clearly attributed to any dimension, which may weaken the structural validity of the scale. We did factor analysis again after removing this item to improve the model. The findings indicated that the KMO value remained excellent (0.951) and Bartlett's test of sphericity continued to be highly significant ($p < 0.001$). The five factors explained 83.668% of the total variance, and all of the items that were kept had factor loadings above 0.58 (range: 0.582–0.891) on their expected dimensions with no cross-loadings. The validity of the scale was significantly improved.

Table 5 Rotated component matrix a (without item 22)

Component					
	1	2	3	4	5
S4_21	0.792				
S2_19	0.759				
S3_20	0.729				
S1_18	0.667				
P2_5		0.797			
P1_4		0.797			
P3_6		0.720			
P4_7		0.577			
O2_9			0.753		
O4_11			0.685		
O3_10			0.654		
O1_8			0.570		
A4_16	0.717				
A2_14	0.645				
A1_13	0.617				
A3_15	0.611				
RLT3_24					0.843
RLT4_25					0.597
RLT2_23					0.539

The analysis results indicate that the current German courses are reasonably designed in terms of learning progress, course assessment methods and curriculum content, effectively supporting students' learning needs. The KMO value and Bartlett's test results prove that the data are appropriate for factor analysis and enhance therefore the reliability of the research findings. Factor analysis also explains the relationships between different items and helps us understand

students' perceptions of the course. "Personalized teaching support" and "varied assessment methods" are two important factors that have a big impact on learning outcomes and provide important proof for improving the curriculum.

4.4 regression analysis

Table 6 Regression Analysis of Five Course assessment Dimensions on Overall Course Satisfaction

Dimension	Standardized Coefficient (Beta)	t-value	p-value	Significance	VIF
Course performance	0.330	4.853	0.000	Significant	3.677
Course support	0.366	4.913	0.000	Significant	4.396
Real-scenario training	0.314	4.812	0.000	Significant	3.371
Course assessment	0.067	0.859	0.392	Not Significant	4.900
Course objectives	-0.131	-1.703	0.090	Not Significant	4.685

Multiple regression analysis results indicate that course performance ($\beta = 0.330$, $p < 0.001$), course support ($\beta = 0.366$, $p < 0.001$) and real-scenario training ($\beta = 0.314$, $p < 0.001$) exert significant positive predictive effects on satisfaction, representing the three fundamental elements influencing student experience. Course assessment ($\beta = 0.121$, $p = 0.078$) and course objectives ($\beta = -0.131$, $p = 0.090$) failed to meet the conventional significance threshold ($p > 0.05$), with effect sizes below 0.15, signifying their minimal independent contributions to satisfaction.

The variance inflation factors (VIF) for all variables ranged from 3.371 to 4.900, which is below the critical limit of 5. It indicates that the model does not have a serious multicollinearity problem. Although the VIF values for course support (4.396) and course assessment (4.900) were close to the critical value, they were still within the acceptable range and did not affect the stability of the regression results.

Table 7 Hierarchical regression analysis results

Model	New Variables	R^2 (Cumulative)	ΔR^2 (Added)	Cumulative Explained Variance	Significance (p)
1	Course performance	0.567	0.567	56.70%	0.000
2	+Course objectives	0.587	0.021	58.70%	0.002
3	+Real-scenario training	0.692	0.105	69.20%	0.000
4	+Course assessment	0.718	0.026	71.80%	0.000
5	+Course support	0.748	0.030	74.80%	0.000

Hierarchical regression analysis showed that the five dimensions together explained 74.8% of the variance in overall satisfaction ($R^2 = 0.748$), indicating that the model has excellent predictive power. When only "course performance" was included in the baseline model, it could already explain 56.7% of the variance ($\Delta R^2 = 0.567$, $p < 0.001$). This shows that course performance is the most important factor in satisfaction. The introduction of "real-scenario training" brought the largest incremental explanatory power ($\Delta R^2 = 0.105$, $p < 0.001$), with the cumulative explanation rate reaching 69.2%, confirming that practice-oriented teaching is a key breakthrough for enhancing satisfaction. Course assessment ($\Delta R^2 = 0.026$, $p < 0.001$) and course support ($\Delta R^2 = 0.030$, $p < 0.001$) also made independent contributions, but they were minor. However, the addition of course objectives only increased the explanation by 2.1% ($\Delta R^2 = 0.021$, $p = 0.002$). The negative coefficient and little contribution of this dimension together suggest that there may be measurement redundancy or conceptual ambiguity in this dimension.

The research results present a clear priority for teaching improvements: course performance is a foundational factor and should maintain its current level. Real-scenario training, due to its significant incremental contribution (10.5%), deserves additional resources for further development and expansion. Although the incremental contribution of the course support system is moderate (3.0%), it still has unique value as a final optimization element. In comparison, the optimization needs of course objectives and the course assessment system are relatively secondary. These findings provide empirical evidence for building a hierarchical curriculum optimization system.

4.5 Group difference test

We first conducted normality tests on the satisfaction data for each grade, in order to examine the differences in German course satisfaction among different groups, The results of the Kolmogorov-Smirnov test and the Shapiro-Wilk test were both significant ($p < 0.05$), so that the data did not follow a normal distribution. Therefore, non-parametric methods were used for analysis.

The Kruskal-Wallis H test showed that there were statistically significant differences in overall satisfaction with German course settings among students of different grades ($\chi^2 = 15.23$, $df = 2$, $p = 0.001$). Further pairwise comparisons were made using the Mann-Whitney U test, and the results showed that first-year students ($M = 1.74$) had significantly lower satisfaction than second-year ($M = 2.12$) and third-year students ($M = 2.43$). However, there was no significant difference between second- and third-year students.

In addition, there were significant differences in course satisfaction among students of different majors ($U = 5536$, $Z =$

3.14, p = 0.002). Students majoring in engineering (M = 2.36) had significantly higher satisfaction than those majoring in economics and management (M = 2.01).

Student grade and academic background are important grouping variables affecting German course satisfaction: satisfaction increases with grade level, and engineering students have higher overall ratings, reflecting that curriculum design needs to take into account both the adaptability of the learning stage and the characteristics of major connections.

5 Discussion and implications

The study found that students' overall satisfaction with German courses is at a medium to high level, indicating that the current curriculum system has achieved certain results in meeting basic language teaching needs. However, development in all aspects is still uneven and requires systematic optimization.

Course performance is the core driver of student satisfaction. Curriculum reform should focus on improving classroom practicality and comprehensively implementing task-based and project-based teaching methods. These methods integrate language acquisition more deeply into professional contexts such as engineering and business management to improve classroom engagement and augment the practicality and contextual relevance of language application.

Although real-scenario training received below-average scores, it showed the strongest incremental explanatory power in hierarchical regression analysis. This shows that students' expectations on how to use language in real-world and cross-cultural environments have not been met, indicating the need for substantial enhancement in this dimension. Suggested options include working with German universities and businesses to promote project-based learning, simulated international or transnational case studies to seamlessly connect language skills and professional experience.

Course support serves as a critical mechanism that connects teaching with each student's needs and has an independent role that can't be replaced. There should be a tiered personalized support system in place. For example, first-year students should get language tutoring, students in the upper years should get workshops on academic writing and professional development, and e-learning-platforms should make sure that resources are delivered exactly when they are needed.

Course objectives and assessment are not statistically significant, yet open-ended feedback strongly indicates underlying problems: vague objectives, monolithic assessment methods and overreliance on summative written examinations. Rebuilding the objective framework with incremental routes for each academic year is highly crucial. Courses in the first year should concentrate on basic language skills and cross-cultural communication. In the second year, courses should enhance specialized language learning and academic expression. Senior students should align their coursework with overseas exchange opportunities and international certifications (such as Goethe-Zertifikat and TestDaF). Simultaneously, the assessment structure should be reformed to establish a diverse evaluation loop emphasizing both process and outcomes, thereby enhancing students' self-efficacy.

Course satisfaction is greatly affected by a student's grade and academic background. To reduce learning anxiety, it is advised to offer a "German Learning Guide Course" for first-year students. To make the curriculum more coherent, an integrated module combining Business German and Cross-Cultural Management is also recommended for business and management students.

6 Conclusion

This research uses the Sino-German College of University of Shanghai for Science and Technology as a case study and systematically analyzes the current state of German curriculum design, student satisfaction and influencing factors. Since the samples come from a single institution, the findings need to be tested again to see if they apply to other institutional contexts. Cross-sectional data cannot show how students' satisfaction changes over time during the learning process. The research variables mostly rely on student self-assessments, excluding objective indicators such as course scores, language certifications, or employment outcomes. Future studies could examine cross-institutional comparisons, longitudinal tracking and the incorporation of additional objective measurement dimensions to comprehensively clarify the teaching efficacy and development of German language courses within Sino-German cooperative education programs.

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