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RESEARCH ARTICLE

The relationship among General English Proficiency, Academic Self-efficacy, school-related information and Perceived English for Academic Purposes Competence

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ABSTRACT

This study examined the relationship among general English proficiency, academic self-efficacy, school-related information and perceived English for academic purposes (EAP) competence. In a questionnaire survey conducted with a sample of 543 Chinese undergraduate students who had participated in EAP courses or related activities, participants reported their CET-4 scores, as well as self-rated levels of academic self-efficacy and perceived competence in English for Academic Purposes, using a five-point Likert scale. Perceived EAP competence was positively associated with both general English proficiency and academic self-efficacy. Furthermore, academic self-efficacy mediated the relationship between general English proficiency and perceived EAP competence. Although school location did not moderate the relationship between general English proficiency and perceived EAP competence, school type emerged as a significant moderating variable. These results of the study offer practical implications for the effective design of EAP courses and activities, both within and across institutions, aimed at promoting the sustainable development of perceived EAP competence among undergraduate students.

Keywords: Perceived English for academic purposes competence; general English proficiency; academic self-efficacy; school type; undergraduate

1. Introduction

British Association of Lectures in English for Academic Purposes (BALEAP) [1] emphasizes that it is crucial to cultivate college students' English for academic purposes (EAP) competence. This competence is not only the essential academic ability for contemporary university students to pursue their professional studies, but also an indispensable professional competency in the context of globalization [2]. The excellence of undergraduate students' EAP competence could facilitate their further education after graduation as well as serve as a passport to obtaining decent employment [3]. In addition, strengthening the cultivation of undergraduate students' EAP competence is of significant importance for helping young generation for better participation in the international exchanges. However, college English teaching in China continues to be predominantly focused on English for general purposes, with EAP instruction at the undergraduate level

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remaining underdeveloped [4]. Consequently, existing research on students' English language development has primarily concentrated on the listening, speaking, reading, and writing skills associated with general English [5-8]. Even the College English Test Band 4 (CET-4), which is widely administered across the China, primarily assesses basic English skills without the reflection of the communicative demands inherent in academic and professional contexts. Nevertheless, there is a pressing need for EAP competence development at the undergraduate level. Many students, despite possessing a strong command of vocabulary and grammar and achieving high scores on general English examinations, still struggle to use English effectively in authentic academic contexts. In fact, undergraduates reported that they perceived many challenges in EAP activities, such as the slow and ineffective reading of English textbooks or professional English literature, difficulty in making summaries in research articles [9], lack confidence in participating in English International academic activities etc [2](p. 537). Unfortunately, there has been a lack of research exploring how to effectively promote the development of EAP competence through the optimization of general English teaching.

Self-efficacy, an important concept not only in the field of psychology but also widely used in the field of education, has been found to be a crucial motivational factor connected to students' language achievement. This study aims to explore the relationship among self-efficacy, general English proficiency and perceived EAP competence through quantitative research, so as to address the above research gap. The results of the questionnaire will be analyzed in detail to help us gain a deeper understanding of the psychology of students' EAP learning, and also provide enlightenment for future more effective cultivation of undergraduates' EAP competence in real actual use.

2. Literature review

2.1. Terminology

2.1.1. General English proficiency

Broadly, general English proficiency demonstrated the mastery of specific language skills such as vocabulary and grammar, and your ability to use them appropriately and pragmatically in ordinary situation [5]. It refers to the learner's basic language ability to use English comprehensively to understand, express and communicate in cross-cultural social interactions in non-specialized areas. So general English proficiency in this study focuses on listening, speaking, reading, and writing skills in everyday life, general texts, and non-professional communication scenarios, and explicitly excludes the disciplinary language cognition operations required for EAP.

2.1.2. Academic Self-efficacy

Educators defined academic self-efficacy as an individual's belief in his or her ability to accomplish given academic tasks successfully at a certain stage [10]. A learner with high self-efficacy will be motivated to put in more effort and persist longer so he is more likely to overcome difficulties and complete a given task [11]. Students with low self-efficacy, on the other hand, dwell on their deficiencies in school and rarely strive to achieve set goals [12]. People's self-efficacy controlled their motivation by affecting their decisions when confronted with obstacles and novel tasks, their degree of effort, their anxiety levels, and their resilience [13].

2.1.3. Perceived EAP competence

English for Academic Purposes (EAP) is defined as a register of English, which has specific linguistic characteristics appropriate for academic settings and is used in professional texts [14]. EAP competence, in turn, represents the applied manifestation of such knowledge, encompassing the capability to comprehend

and interpret cutting-edge developments within related disciplines in English; write and publish academic papers in accordance with internationally accepted conventions; deliver effective presentations of research findings at international academic conferences; and participate actively in international research collaboration programs while communicating effectively across linguistic and cultural boundaries [15]. Perceived EAP competence refers to an individual's self-assessment of their own ability to perform such EAP-related tasks. This subjective perception is significant because it influences motivation, engagement, and persistence in academic communication contexts. Self-evaluation of EAP competence instead of objective EAP test scores can captures learners' confidence and faced challenges in their practical EAP activities, which are not directly reflected in formal EAP proficiency tests.

2.2. The relationship between general English proficiency and the perceived EAP competence

With this increasing use of English in education, many researchers have make a distinction between the general English for daily communication and English for specific purposes, such as occupation, academe and so on. There are many researches reporting general English proficiency as a strong predictor of English achievement in specific domains. For example, high language proficiency, and authentic English language input are instrumental to students' English listening and speaking performance [16]. There is also a positive relationship between students' English proficiency and their perceived competence in online academic learning activities in EAP courses [17] . Such kind of effects of English language proficiency on EAP/ ESP achievement are not only direct but also indirect through motivational intensity and self-efficacy. These results are to some extent consistent with the findings of a comparative study between home and international students in UK. It has been concluded that international students in many anglophone countries generally achieved lower academic performance because of English language proficiency and they was reported to have more academic language difficulties which can be viewed as an aspect of their perceived EAP competence [18]. However, the contradictory results also exist that general English proficiency is replaced by academic success in Native Medium of Instruction (TMI) programmes to be a significant predictor of academic success in EMI programmes,which can be regarded as in English for Specific Purposes in academic context (ESAP) [19]. Furthermore, Cai [20] implicitly highlighted the distinctions in teaching objectives, faculty composition, and institutional capabilities across different types of higher education institutions while examining the necessity and challenges associated with the transition from general English to academic English in English language instruction within Chinese universities. This indicates that school-related information needs to be considered as a possible moderating variable in the relationship between general English and EAP.

The differentiate results among previous researches may be resulted from the measurement. According to the concept of general English proficiency, the present measurement of general English proficiency is primarily focused on the scores of tests, including self-developed test [21] and standardized national/international tests such as College English Test-Band 4 (CET-4) [22-13], TOEIC [24-25], LexTALE test [18].

2.3. The relationship between academic self-efficacy and the perceived EAP competence

As learners' awareness of their capabilities to perform designated tasks [27], academic self-efficacy is also identified as an influential prerequisite for academic achievement of English language learners [26]. The higher the level of English self-efficacy in EFL students, the higher their level of academic achievement [27]. An array of empirical studies have further contributed to an exploration of specific aspects of language learner' self-efficacy in relation to second or foreign language learning, such as listening [28-30], speaking [31-33], reading [34-35], writing [6, 36-37] and vocabulary learning [38]. For SLA or EFL learners, the cultivation of

EAP competence is actually a kind of improvement of English language learning skills as well, just specialized for the contexts of academic study and scholarly exchange itself. Therefore, there is definitely a certain effect of academic self-efficacy on EAP learning performance. Students were reluctant to participate in EAP activities due to language anxiety and lack of self-confidence, thus affecting their EAP learning outcomes. This perceived lack of confidence is a reflection of the students' under-assessed confidence in successfully performing the required behaviours in a given EAP situation, that is, an indication of a weak sense of self-efficacy [39] . English self-efficacy affects the beliefs and perceived competence of students in language learning [40]. However, some international students asserted that there is little problem with their academic performance even if their self-efficacy in English is low [41]. Whether there is a statistic effect of academic self-efficacy on students' self-perceived EAP competence need to be further investigated.

There are different approaches proposed to measure self-efficacy, some focusing on specific tasks, domains, and others focusing on broader domains [42-43]. The General Self-Efficacy Scale (GSES), created by German psychologist Schwartzer in 1981, is one of the widely utilized measurement of self-efficacy in various nations [44]. Besides, Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich et al. [45], a renowned tool with high reliability and validity, which have successfully been adapted for various research purposes [46]. The subscale of MSLQ for assessing learners' self-efficacy beliefs in learning and performance, consisting of total eight items. According to social cognitive theory, measures of self-efficacy should concentrate on specific domains or tasks and be reflective of judgements about one's own competence [47]. Therefore, many researchers adjusted the wording of the items in self-efficacy scale of MSLQ to evaluate learners' specific academic self-efficacy in different learning context [48-49], some of which are especially for EFL learners [21].

3. Methodology

3.1. Research model and hypotheses

Based on the literature, a hypothesized research model (see Figure 1) was proposed to illustrate the relationships between Chinese undergraduates' general English proficiency and their perceived EAP achievement. The following hypotheses were proposed:

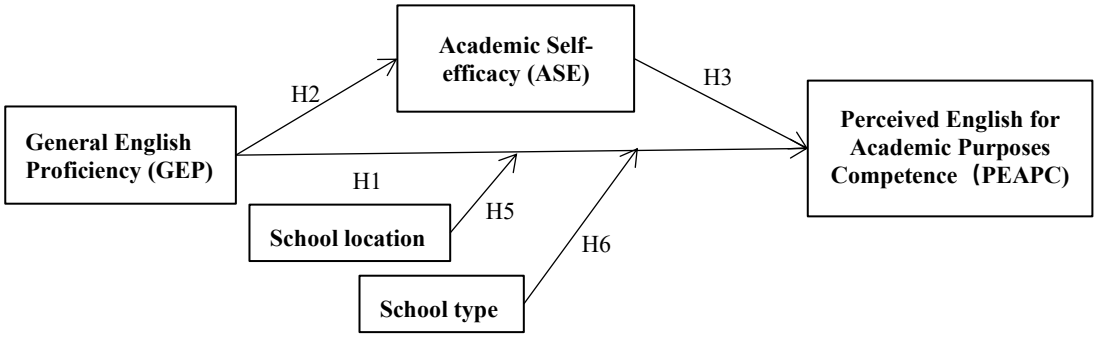

Figure 1. The hypothesized research model.

Hypothesis 1 (H1): General English proficiency is positively related to students' perceived English for academic purposes competence.

Hypothesis 2 (H2): General English proficiency is positively related to academic self-efficacy.

Hypothesis 3 (H3): Academic self-efficacy is positively related to perceived English for academic purposes competence.

Hypothesis 4 (H4): Academic self-efficacy significantly mediates the relationship between general English proficiency and perceived English for academic purposes competence.

Hypothesis 5 (H5): School location significantly moderates the relationship between general English proficiency and perceived English for academic purposes competence.

Hypothesis 6 (H6): School type significantly moderates the relationship between general English proficiency and perceived English for academic purposes competence.

3.2. Participants and setting

An anonymous questionnaire survey was conducted online in July 2024 at the target population, who are the undergraduates in Jiangsu Province China, and share the characteristic that they had studied at least one EAP course or participated in EAP activities. A total number of 640 undergraduates' voluntary questionnaire were received. For the accuracy of the study, after partial exclusion of the questionnaires. Three types of anomalous data were excluded as a result of extreme cases such as too short time to complete the questionnaires, too high repetition of responses to the questions, and discrepancies in the location of the school and the its charge. Therefore, 543 valid sample data were acquired with the recovery rate of 73.38%. The sample consist of 31 (5.7%) freshmen, 79 (14.5%) sophomores, 217 (40.0%) juniors and 216 (39.8%) seniors. The number of junior and senior students together totaled close to 80%, precisely captures the characteristics of the curriculum of the undergraduate education in China represented by this sample. The female sub-sample accounted for 53.8% of the full sample.

3.3. Instruments

The questionnaire was composed of three sets of scales to measure undergraduates' general language proficiency, academic self-efficacy and perceived English for academic purposes competence. All the items were scored on a 5-point Likert scale except the general language proficiency(1 = totally disagree, 5 = totally agree).

General language proficiency was measured by College English Test Band 4 (CET-4). Specifically, its listening section incorporates materials such as everyday conversations and radio news to directly evaluate the ability to process and interpret spoken information in real time. The reading component focuses on general texts related to social culture and scientific topics, requiring test-takers to understand main ideas and infer intentions in non-academic settings, thus reflecting their capacity to interpret public information. Writing and translation tasks involve composing basic argumentative essays, letters, and English-Chinese translations in everyday scenarios, which necessitate the activation of essential pragmatic output skills [50].

The students' academic self-efficacy (shown in Appendix) was adapted from five-item Questionnaire for Measuring EFL Learners' Academic Self-Efficacy [21].

Twenty items reflecting students perceived English for academic purposes competence were selected from the EAP competency scale for non-English major academics [51]. This streamlined version of the EAP competency scale is more closely aligned with the objectives of the EAP instruction at the undergraduate level in China, spanning the four aspects of EAP competencies, that is EAP listening, speaking, reading, and writing.

3.4. Data analysis

Two-stage approach were used for the verification of data by SPSS 27. The first stage was to assess the construct reliability and validity of two scales and their inter-correlations. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to examine the factor structure. Pearson's

correlations were calculated between all of the factors. Afterwards, the researchers proceeded to evaluate the structural model in line with the steps developed by Hair et al. [52]. The direct effect were evaluated based on the path coefficients of main structural model and the mediating and moderating effects are assessed by Bootstrapping.

4. Results

4.1. Validity and Reliability

The factor analysis of the 25 items measuring the academic self-efficacy and perceived English for academic purposes competence was first conducted using EFA with principal axis factoring method followed by varimax rotation through the Kaiser Normalization procedure. The values of Kaiser-Mayer-Olkin measure (sometimes referred to as KMO) and Bartlett's Spherical Test for the total sample of this study provide strong evidence about the structure of the data and the applicability of factor analysis, which are demonstrated in the following **Table 1**.

Table 1. KMO and Bartlett's Test

Kaiser-Mayer-Olkin Measure of Sampling Adequacy		.979
Bartlett Spherical Test	**Approx. Chi-Square**	9655.040
	df	300
	Sig.	.000

The KMO measure of sampling adequacy (KMO = 0.979) and the Bartlett's test of sphericity ($\chi 2(543) = 9655.040$, df = 300, $p < 0.001$) collectively pointed to the suitability of the current dataset for exploratory factor analysis.

Table 2. Four Dimensions of Perceived EAP Competence from EFA (N = 543)

	1	**2**	**3**	**4**	**5**	**6**
PEAPC8	0.784					
PEAPC6	0.771					
PEAPC10	0.767					
PEAPC7	0.757					
PEAPC9	0.744					
PEAPC11	0.739					
PEAPC15		0.763				
PEAPC14		0.761				
PEAPC12		0.758				
PEAPC17		0.753				
PEAPC16		0.741				
PEAPC13		0.737				
ASE4			0.775			
ASE3			0.77			
ASE5			0.708			
ASE2			0.704			
PEAPC2				0.771		

	1	2	3	4	5	6
PEAPC4				0.765		
PEAPC3				0.762		
PEAPC5				0.741		
PEAPC19					0.781	
PEAPC18					0.778	
PEAPC20					0.753	
ASE1						0.788
PEAPC1						0.744

Extraction Method：Principle Component Analysis.

Rotation Method：Varimax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

Table 2 exhibits the four dimensions of perceived EAP competence with factor loading. Although all items had a factor loading higher than 0.50 on their own scales, it was noticed upon closer inspection that two items, ASE1 and PEAPC1, emerged as implausible principal components after rotation, suggesting that they had failed to be correctly categorized during the rotation process. Therefore, these two items were deleted in the subsequent data processing to ensure the accuracy and reliability of the analysis. Finally, the perceived EAP competence is defined by 19 items with the subdimensions of reading (PEAPC6, 7, 8, 9, 10, 11), writing (PEAPC12, 13, 14, 15, 16, 17), speaking (PEAPC2, 3, 4, 5), and listening (PEAPC18, 19, 20). Academic self-efficacy scale is consisted of four items (ASE2, 3, 4, 5).

Table 3. Reliability, Convergent Validity and Discriminant Validity

Variables	Reliability	Convergent Validity	Discriminant Validity		
	Cronbach's Alpha	AVE	General English Proficiency	Academic Self-efficacy	Perceived EAP Competence
General English Proficiency	1	1	1		
Academic Self-efficacy	0.847	0.581	.340**	0.762	
Perceived EAP Competence	0.970	0.633	.522**	.473**	0.796

***. Correlation is significant at the 0.01 level (2-tailed).*

The bold diagonals are the open root values of the AVE, and the lower triangles are the Pearson correlations of the variables.

Separately, academe Self-Efficacy was assessed through 4 items which achieved a KMO value of 0.817 and a Cronbach's Alpha of 0.847, showcasing good internal consistency regardless of the small number of items. Perceived EAP competence, on the other hand, was measured in detail through 19 items and gained a KMO value as high as 0.986 and a Cronbach's Alpha of 0.970 (shown in **Table 3**), which not only reflects the high reliability of the scale, but also demonstrates that it has a high degree of precision.

The construct validity of the remaining 23 items was then examined using CFA. The fit indices of academic self-efficacy were acceptable ($\chi 2/df = 2.909$, RMSEA = 0.059, CFI = 0.996, TLI = 0.987) with factor loadings ranging from 0.652 to 0.719. The construct validity of perceived English for academic purposes competence was also test with the acceptable model fit indices ($\chi 2/df = 1.605$, RMSEA = 0.033, CFI = 0.989, TLI = 0.988). Specially, the general English proficiency, as a unidimensional construct, had an

AVE value of 1.000 (standardized measurement characteristic). In addition, the results have revealed a statistically significant two-tailed positive correlation ($p<0.01$) between all the variables. The square root values of the AVEs (General English Proficiency=1.000, Academic Self-efficacy=0.762, Perceived EAP Competence=0.796) were all significantly greater than the absolute values of the correlation coefficients of the corresponding ranks, which indicates that there is good discriminate validity of this model.

4.2. Descriptive statistics and correlations

Table 4. Descriptive statistics, correlations, and reliability (N = 543).

	1	2	3	4	5
1.School location	1				
2.School type	0.057	1			
3.General English proficiency	-0.045	-.100*	1		
4.Academic self-efficacy	0.024	-.151**	.340**	1	
5.Perceived English for academic purposes competence	0.037	-.086*	.522**	.473**	1
Mean	5.49	2.98	549.75	3.50	3.29
Standard Deviation	4.048	1.052	69.268	0.970	0.987

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the descriptive results and correlations. The mean scores of the academic self-efficacy and perceived English for academic purposes competence were higher than the median value (3), indicating a relatively higher level of evaluation, between which academic self-efficacy won the higher evaluation. The general English proficiency stating the respondents' CET-4 scores can very between 0 and 750, actually the lowest score in this group was 403 and the highest one was 707, which lie within the acceptable range of values. On average, students achieved 549.75 score and the standard deviation of scores is 69.268, indicating that the data points are relatively concentrated but still somewhat discrete, which is correlated with the large range of values in the actual measurements. School location and School type are two demographic information containing thirteen and five items respectively.

The Pearson's correlations between each two factors are displayed in Table 4 large ($r = 0.522$) and positive correlations were found between general English proficiency and perceived EAP competence. There are also a moderate positive correlation between general English proficiency and academic self-efficacy ($r = 0.330$) together with academic self-efficacy and perceived EAP competence ($r = 0.451$). However, the correlation between school type and English proficiency, academic self-efficacy, or perceived EAP competence is negative.

4.3. Regression analysis

Table 5. Multiple Linear Regression Analysis

DV	IV	B	SE	t	Sig.	Lower	Upper	VIF	R2	Durbin-Watson
Zscore(PEAPC)	(constant)	-1.01E-15	0.034	-.000	1.000	-0.067	0.067		0.369	1.861
	Zscore(GEP	0.408	0.036	11.251	<.001	0.337	0.48	1.131		
	Zscore(ASE)	0.334	0.036	9.214	<.001	0.263	0.406	1.131		

As the value of general English proficiency is not measured by the same criteria as perceived EAP competence and academic self-efficacy, all the values of them are standardized to eliminate dimensional

differences for the further study. Shown in **Table 5**, the VIF values of both general English proficiency and academic self-efficacy are 1.131, implying that there is no significant multicollinearity issue among the independent variables. The value of the Durbin-Watson is 1.861, which is close to the theoretical ideal value of 2, stating the independence of the residuals of the model, which meets the criteria of the error of linear regression without autocorrelation. The coefficient of determination, R^2 in the above **Table 5** was 0.369, indicating that the two independent variables, general English proficiency and academic self-efficacy, jointly explained 36.9% of the variance in students perceived EAP competence. Regression coefficient analysis illustrated that all the predictors reached the statistically significant level ($p<.001$). On a more specific note, the standardized regression coefficient for general English proficiency was 0.408 (SE=0.036), with its 95% confidence interval [0.337,0.48] not crossing the null, indicating that each one standardized increase in general English proficiency predicted a 0.408 standardized increase in perceived EAP competence when controlling for other variables. The standardized coefficient for academic self-efficacy was 0.334 (SE=0.036), with confidence interval at [0.263,0.406], similarly revealing a positive predictive effect. It was found that the general English proficiency explained perceived EAP competence somewhat to greater extent (β=0.408) than the academic self-efficacy (β=0.334) when comparing the standardized coefficients. However, the coefficient of constant term was a negative value. Although it reflects the mathematical extrapolation properties of the model at the extremes of the independent variables (general English proficiency = 0, academic self-efficacy = 0), actually, general English proficiency is measured by the examination of CET-4, whose minimum score for normal participation cannot be zero and for academic self-efficacy, it has a non-zero lower bound (academic self-efficacy = [1-5]). Hence, the theoretical negative value of the intercept term does not affect the explanatory validity of the model over the range of observed data.

4.4. Mediation analysis

The mediating effect test was performed by using SPSS 27.0 and the Process plug-in (Model 4) developed by Hayes in the current study. Process compensates for the limitations of the traditional stepwise regression method by the Bootstrap sampling method (5000 repetitions), which allows for a more robust estimation of confidence intervals for the indirect effects. The results are shown in the following **Table 6**.

Table 6. Mediating Effect Test by Process Distribution Regression Method

Process	DV	IV	R	R-sq	F	β	t
Step 1	Zscore(PEAPC)	Zscore(GEP)	0.522	0.2725	202.681***	0.522	14.237***
Step 2	Zscore(ASE)	Zscore(GEP)	0.340	0.1159	70.893***	0.340	8.420***
Step 3	Zscore(PEAPC)	Zscore(GEP)	0.6094	0.371	159.502***	0.408	11.251***
		Zscore(ASE)				0.334	9.214***

****=p<0.001*

In **Table 6**, the results of the mediating effect test based on process stepwise regression are presented. It can be found that there was a significant relationship of general English proficiency on perceived EAP competence ($\beta = 0.522$, $t = 14.237$, $p < 0.001$) in the first step (total effects test). This model was significant ($F = 202.681$, $p < 0.001$), explaining 27.25% of the variance ($R^2 = 0.2725$), suggesting that the total effect held. In the second step (mediating path test), the regression model was also significant ($F = 70.893$, $p < 0.001$) with general English proficiency as the independent variable and academic self-efficacy as the dependent variable, explaining 11.59% of the variance ($R^2 = 0.1159$). The predictive effect of general English proficiency on academic self-efficacy was significant ($\beta = 0.340$, $t = 8.420$, $p < 0.001$). Meanwhile, general English proficiency and academic self-efficacy were simultaneously included in the regression model in the third step (direct and mediated effects test) , which lead to the explanatory power of the model

increased to 37.1% ($R^2 = 0.371$) and it was significant overall ($F = 159.502$, $p < 0.001$). There was not only a significant effect of general English proficiency on perceived EAP competence ($\beta = 0.4083$, $t = 11.251$ $p < 0.001$), but also a significant effect of academic self-efficacy on perceived EAP competence ($\beta = 0.334$, $t = 9.214$, $p < 0.001$), thereby demonstrating a valid and partial mediating role of academic self-efficacy in the model.

Table 7. Bootstrap Mediation Effect Test Outcome

Effects	Values	LLCI	ULCI	Ratio
Total	0.5221	0.45	0.5941	
Direct	0.4083	0.337	0.4795	78%
Indirect	0.1138	0.0821	0.1489	22%

The mediating role of academic self-efficacy in the model is tested by Bootstrap technique. According to data in **Table 7**, it can be seen that the value of the indirect effect is 0.1138 and the 95% confidence interval [0.0821,0.1489] does not contain 0, so it means that the indirect effect is established, and therefore academic self-efficacy plays a significant mediating role in the model. At the same time, the confidence interval of the direct effect test neither contains 0, pointing out that the direct effect is established. It can be predicted that academic self-efficacy has partial mediating effect between general English proficiency and perceived EAP competence On the basis of the calculation of the effect share, there is a 22% impact of academic self-efficacy.

4.5. Moderation analysis

Using Process Model 1, 5,000 bootstrap samples were generated, and the moderating effects of school location and school type were examined through a 95% confidence interval based on standardized data.

Table 8. Moderating Effect Test Outcome of School Location

Variable	B	SE	t	p	LLCI	ULCI
General English Proficiency	0.522	0.037	14.208	0.000	0.450	0.594
School location	0.037	0.037	1.006	0.315	-0.035	0.109
Int-1	0.026	0.037	0.706	0.480	-0.046	0.099

According to **Table 8**, the main effect of the independent variable general English proficiency on perceived EAP competence was statistically significant and positive ($\beta = 0.522$, $t = 14.208$, $p < 0.001$; 95% CI [0.450, 0.594]), indicating that higher scores of general English proficiency were associated with significantly higher perceived EAP competence. The main effect of the moderator variable school location was not statistically significant ($\beta = 0.037$, $t = 1.006$, $p = 0.315$; 95% CI [-0.035, 0.109]), suggesting that there was no significant difference in mean perceived EAP competence levels across geographically distinct school locations after controlling for general English proficiency. Importantly, the interaction term representing the moderating effect (General English Proficiency × School location) was not statistically significant at the 0.05 level, indicating no significant moderating influence of school location between general English proficiency and perceived EAP competence.

Table 9. Moderating Effect Test Outcome of School Type

Variable	B	SE	t	p	$\triangle R^2$	F	LLCI	ULCI
General English Proficiency	0.516	0.037	14.067	0.000	0.273	202.681***	0.444	0.588
School type	-0.032	0.037	-0.867	0.386	0.001	101.723***	-0.104	0.040
Int-1	-0.093	0.035	-2.650	0.008	0.009	70.914***	-0.161	-0.024

Table 9 presents the results of the moderation effect analysis for school type. The findings indicate that although the main effect of school type on perceived EAP competence is not statistically significant (B = -0.032, t = -0.867, p = 0.386, 95% CI [-0.104, 0.040]), the interaction term (General English Proficiency × School type) is statistically significant (B = -0.093, t = -2.650, p = 0.008, 95% CI [-0.161, -0.024]). This significant interaction effect accounted for an additional 0.9% of the variance in the outcome variable (ΔR^2 = 0.009), beyond the substantial main effect of general English proficiency (ΔR^2 = 0.273, B = 0.516, p < 0.001). The overall model was significant (F = 70.914, p < 0.001). Therefore, it can be concluded that school type moderates the positive predictive relationship between general English proficiency and perceived EAP competence (B = 0.516, p < 0.001).

Table 10. Conditional Effects of General English Proficiency on Perceived EAP Competence Across the School Type Level

School type	Effect	SE	t	p	LLCI	ULCI
Mean-SD	0.609	0.050	12.189	0.000	0.510	0.707
Mean	0.516	0.037	14.067	0.000	0.444	0.588
Mean+SD	0.423	0.051	8.238	0.000	0.322	0.524

Table 10 indicates that general English proficiency exerts a statistically significant and positive predictive effect on perceived EAP competence across different school types. However, the magnitude of this effect systematically decreases as the representative value of the school type increases. Specifically, for low-representative school types, the effect size of general English proficiency on perceived EAP competence is 0.609 (t = 12.189, p < 0.001) with confidence interval at [0.510,0.707], indicating a significant relationship. For medium-representative school types, the effect size is 0.516 (t = 14.067, p < 0.001), which remains statistically significant. For high-representative school types, the effect size further decreases to 0.423 (p < 0.05). These results suggest that the moderating variable, school type, significantly attenuates the influence of general English proficiency on perceived EAP competence. On average, the positive effect of general English proficiency on perceived EAP competence diminishes by approximately 30% as the school type value increases from the lowest to the highest level as the conditional effect decreasing from 0.609 to 0.423.

5. Discussion and conclusion

This study adds literature to EFL learners' EAP competence development research by verifying the effects of general English proficiency and academic self-efficacy on it.

5.1. Relationships between general English proficiency and perceived EAP competence

General English proficiency was the main predictor of perceived EAP competence with a stronger effect than academic self-efficacy regarding standardized coefficients. It is notable when general English proficiency increased by one standardized unit, perceived EAP competence will positively changed by 0.408 units in the present research context. It means that the undergradutes' general English proficiency positively affect their confidence and actual performance in participating in and completing academic tasks. The results are consistent with the claim that there is a positive relationship between English language proficiency and

their EAP/ESP achievements [17]. And such effect was verified not only in the virtual online learning environment, but also in the real-life campus environment. Compared with the influence on students' English listening and speaking performance [16], it hints that general English proficiency is an important predictor of the comprehensive self-assessment of English skills, especially in academic context. However, the opposite result in Curle et al. [19] may be due to its unique model structure including both general English proficiency and TMI as the independent variables. Besides, its research context is EMI programmes which belongs to ESAP which narrow our focus to the key issue.

This result of the study extend our though of the arrangement of EAP courses or activities. The cultivation of students' EAP competence at the undergraduate level should root in a solid foundation of general English proficiency. For the university administrators, the quality and effectiveness of undergraduate-level general English instruction (e.g., comprehensive English, college English) must be acknowledged and prioritized,when planning EAP courses. It is unrealistic to expect that students' academic English competence can be rapidly improved through mere 'academic skills' training when their foundational English proficiency is weak. It is essential to ensure that students possess sufficient general English language foundations before they engage in more specialized academic English learning, even if only in learning English for general academic purposes. Therefore, it is recommended to explore a level-based English teaching model, conducting diagnostic assessments of undergraduate students' general English proficiency at the time of admission or at the end of each semester. Based on the results, undergraduate students can be streamed into different academic English course pathways with varying starting points and focuses (e.g., EGAP or ESAP). In addition, since general English proficiency has a significant positive impact on perceived EAP competence and is more influential than academic self-efficacy, which reveals that the improvement of perceived EAP competence largely depends on the transfer and application of language fundamentals. For the teachers, EAP course or activity design should emphasize continuity and integration with basic English, however, no more advanced EAP reading or writing tasks for students with low English language proficiency.

5.2. The effect of academic self-efficacy on perceived EAP competence

The results of the research confirm that academic self-efficacy not only serves as a direct predictor of perceived English for Academic Purposes Competence ($\beta = 0.334$), but also functions as a significant mediating variable in transmitting the influence of general English proficiency. This represents a departure from the traditional perspective that emphasizes solely the development of language proficiency. Academic self-efficacy exhibited either a direct and an indirect positive relationship with perceived EAP competence. For the direct effect, perceived EAP competence will significantly increase by 0.334 units when academic self-efficacy raise up by one standardized unit in the current research context. Although its direct impact is not as strong as that of general English proficiency, academic self-efficacy is also an important influencing factor on perceived EAP competence. This is consistent with the previously widely held view in academia that academic self-efficacy is an important prerequisite for the academic achievement of English learners [26]. Higher levels of academic self-efficacy are associated with greater academic achievement, not only in EFL teaching [27] but also in EAP teaching and activities designed to cultivate undergraduates' academic English competence. Academic self-efficacy, that is students' confidence in their ability to successfully complete academic tasks, remains important, but its establishment requires a certain level of general English proficiency and successful experiences. It confirms to the findings of Lee et al. [39] and further validates that not only international students but also EFL learners in native learning environment may be reluctant to participate in EAP activities due to lack of confidence and anxiety in their language proficiency, which directly affects their learning achievements.

Beside the direct effect, the indirect effect of academic self-efficacy between general English proficiency and perceived EAP competence has also been statistically significant, accounting for 22% of the variance. Students' improvements in general English proficiency may be accompanied by an increase in their self-efficacy in EAP. This mediating effect of self-efficacy is also reflected in online language learning environments, emphasizing the mediating role of self-efficacy for the sustainable development of learning [49] . Academic self-efficacy was significantly predicted by general English proficiency ($\beta = 0.340$), with the model explaining 11.59% of the variance in academic self-efficacy, which indicate it is not an immutable trait, but rather a malleable psychological state that can be influenced through targeted interventions.

Therefore, educators should be fully cognizant of the fact that academic self-efficacy should be gradually built up and enhanced in EAP courses and activities by designing systematical and reasonable tasks that students can successfully accomplish through dedicated effort. Such success-oriented experiences, particularly those involving the use of general English proficiency to complete academic tasks, are crucial for enhancing students' academic self-efficacy. In turn, heightened self-efficacy can foster more active and sustained engagement in learning. On the one hand, with regard to the development of perceived EAP competence, the improvement of academic self-efficacy must be accompanied by substantial progress in language proficiency. On the other hand, in conjunction with establishing a robust foundation in general English proficiency, it is imperative to systematically integrate strategies aimed at developing academic self-efficacy. Failure to cultivate a strong sense of self-efficacy may lead to a loss of approximately 22% of its potential contribution.

5.3. Moderation of school-related information in the relationships general English proficiency and perceived EAP competence

The research results demonstrate that school location does not exert a statistically significant moderating effect on the relationship between general English proficiency and perceived EAP competence, whereas school type does have a statistically significant moderating effect on this relationship. Although the positive association between general English proficiency and perceived EAP competence remains consistent across all levels ($p < 0.001$), the strength of the effect of general English proficiency on perceived EAP competence is significantly influenced by school type.

In other words, regardless of a school's geographical location, the positive predictive effect of general English proficiency on perceived EAP competence with an estimated coefficient of approximately 0.522, remains relatively stable and does not exhibit statistically significant variation across regions. This suggests that the effect of general English proficiency is not moderated by geographical factors, potentially reflecting the relatively equitable distribution of higher education resources within Jiangsu Province. Core course offerings, particularly in general college English instruction, have been standardized across the province, and there are no notable regional disparities in essential educational resources such as faculty quality and teaching infrastructure. It is noteworthy that the efficiency with which student general English proficiency are converted into perceived English for academic competence remains consistent, regardless of whether students originate from southern or northern Jiangsu. This consistency may be attributed to Jiangsu Province's long-standing efforts to promote the integration of higher education. While geographical location does not appear to influence students' perceived EAP competence development, future research could further investigate whether general English proficiency itself is affected by urban-rural economic disparities.

Furthermore, the predictive ability of general English proficiency for perceived EAP competence varies in strength depending on the school type. Regarding school type, the coding sequence indicates that the smaller the number, the higher the administrative level of the higher education institution in China (1 =

universities charged by PRC Ministry of Education, 2 = universities charged by Provincial Ministry of Education, 3 = universities and colleges charged by Municipal Education Bureau, 4 = colleges charged by private Enterprises). Accordingly, the finding indicates that universities with higher administrative levels in Chinese higher education exhibit stronger conversion efficacy of general English proficiency into EAP application capabilities.

This outcome primarily results from the combined effects of unequal resource allocation and group dynamics. Both domestic and international studies have revealed significant disparities across different types of schools in terms of faculty strength, teaching facilities, funding allocation, and academic support systems [53-55]. Leading or resource-advantaged institutions are better equipped to provide enriched academic English input and support, such as academic writing centers, access to professional databases, and lectures by high-level foreign teachers, thereby facilitating students' transition from general language proficiency to academic application. This observation is consistent with the core findings of Lillis and Curry [56], which indicate that unequal access to resources and support leads to differences in academic output capabilities. In contrast, resource-constrained schools may focus predominantly on developing general English skills, lacking the essential infrastructure necessary to support this critical transition. Furthermore, in China, the type of school students can enroll in is often determined through selective admission mechanisms, resulting in relatively homogeneous student populations. An academic environment composed of outstanding peers, the so-called 'pond effect', can significantly enhance individual academic potential through peer interaction, role model learning, and a competitive atmosphere[57-58]. Consequently, in the universities directly affiliated with PRC Ministry of Education, owning concentrated high-quality student populations, students as a collective may demonstrate stronger 'academic conversion' capabilities and benefit from a more supportive academic development environment. These institutions are more advanced in terms of academic resource integration, such as research feeding back into teaching, professors engaging in undergraduate education and teaching, and interdisciplinary course design. In contrast, in schools with more diverse student populations, this effect is weakened due to the wide variation in individual backgrounds and the diminished influence of peer dynamics. Therefore, academic cooperation among universities and colleges within the province should be promoted to jointly carry out undergraduate academic activities. Leading universities should extend their high-performance models across the entire region, for example by opening up their premium course resource libraries, establishing cross-school teacher development centers, sharing tiered teaching designs and so on.

6. Limitation and suggestions for future research

Due to limitations in research design, this study is subject to two shortcomings. One is that the CET-4 score is not a perfect measurement tool. For example, it does not include impromptu everyday spoken English tests. Future studies could develop and use more comprehensive measurement of general English proficiency. The other is that this study focuses exclusively on undergraduate institutions in Jiangsu Province. Although Jiangsu is a major educational province and thus offers a certain degree of representativeness of China, the findings may not be directly generalizable to other regions. Higher education institutions across Chinese provinces differ in terms of academic atmosphere, resource availability, and historical background in English language instruction, and these contextual differences may influence the patterns and outcomes of the cultivation of undergraduates' EAP competence. To test the regional transferability of the research findings, subsequent research should aim to construct a multi-level spatial comparison framework and implement a gradient sampling method based on educational resource allocation. Chinese provinces can be categorized into high-, medium-, and low-support zones according to higher education English teaching investment indices, including student-to-teacher ratio, proportion of internationalized courses, and digital

resource coverage. Representative provinces from each zone can then be selected for stratified cluster sampling. Through such cross-regional comparative studies, commonalities and differences in the development of EAP competence among undergraduate students across provinces can be revealed, providing valuable insights for the formulation of regionally differentiated EAP teaching models.

Future research could also actively extend its scope to non-Chinese contexts and conduct systematic cross-national comparative studies, thereby testing the universality of this research within a broader global framework. Specifically, countries or regions that exhibit significant differences from China in terms of higher education system structure, cultural background, language policy environment, resource allocation levels, and societal attitudes toward English language acquisition, such as developing nations in Southeast Asia or developed non-English-speaking countries in Europe, should be selected as comparative cases. By employing rigorous comparative methodologies, including parallel case studies and in-depth interviews, the key drivers, core challenges, and similarities and differences in the effectiveness of undergraduate EAP competence development across different contexts should be explored. Such analyses would not only assess the theoretical generalizability of findings of this study and similar Chinese-context research, but also uncover the underlying contextual factors shaping the path of EAP learning. Cross-national comparisons can reveal both common patterns and context-specific variations in EAP education, offering essential empirical insights for the development of more culturally sensitive and contextually appropriate EAP teaching policies and practices across diverse regions. Ultimately, this approach would contribute to the establishment of a more inclusive global framework for EAP competence development.

Author contributions

Formal analysis, investigation, writing—original draft preparation, Xihui Chen; conceptualization, writing—review and editing, Xihui Chen and Ooi Boon Keat. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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Appendix

The following are the adapted Academic Self-efficacy Scale items used in this study.

1. I believe I will receive an excellent grade in English for academic purposes courses or activities.
2. I'm confident I can understand the most complex material presented by the instructor in English for academic purposes courses or activities.
3. I'm confident I can do an excellent job on the assignments and tests in English for academic purposes courses or activities.
4. I'm certain I can master the materials being taught in English for academic purposes courses or activities.
5. Considering the difficulty, the teacher, and my skills, I think I will do well in English for academic purposes courses or activities.