Factors Associated with the Scientific Research Competence of HUFLIT English Language Students in Project 1 and Project 2

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Abstract

This study examines factors associated with the self-assessed scientific research competence (SRC) of English Language students at Ho Chi Minh City University of Foreign Languages - Information Technology (HUFLIT) through Project 1 and Project 2. The study uses a convergent mixed-methods design, combining a quantitative survey of 500 students who had completed both courses with semi-structured interviews with 19 students. Quantitative data were processed with SPSS 26.0 and SmartPLS 4.0 using PLS-SEM, while qualitative data were analyzed thematically. The results show that the measurement model achieved satisfactory reliability, convergent validity, and discriminant validity (HTMT < 0.85). The structural model explained 52.7% of the variance in self-assessed SRC, 37.5% of the variance in overall course effectiveness (OE), and 46.0% of the variance in satisfaction (SAT). Of the 12 hypotheses, 11 were supported. Learning engagement (PE) was the strongest predictor of SRC ($\beta = 0.279$, $p < .001$), followed by assessment and feedback standardization (AS), course design quality and continuity (AL_CW), lecturer/system support (IS), and AI guidance linked with academic integrity (AI). Methodological and academic language barriers (MLB) showed a positive but statistically non-significant relationship with SRC ($\beta = 0.010$, $t = 0.342$, $p = .733$), contrary to the hypothesized negative direction. The interview data suggest that this result may reflect students' awareness of research difficulties and their use of coping strategies (such as AI or peer reliance), rather than only the actual obstructive level of those difficulties. Students still reported difficulties with literature review, SPSS-based data analysis, discussion writing, teamwork, and responsible AI use. The findings provide evidence for improving course design, standardizing rubrics, strengthening formative feedback, and developing clearer guidelines for AI use in academic work.

Keywords: self-assessed scientific research competence, English Language students, research methodology courses, PLS-SEM, assessment and feedback standardization, AI guidance, academic integrity

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1. Introduction

1.1. Rationale

In the context of modern higher education, scientific research competence is not only an academic requirement but also an essential skill that helps students develop critical thinking, problem-solving ability, and lifelong learning (Ciraso-Cali et al., 2022; Prosekov et al., 2020). For English Language students, doing scientific research has a more specific and complex nature. They face a "double burden": they must understand research methodology and also overcome barriers in academic language, data analysis, and culture (Ciraso-Cali et al., 2022; Le et al., 2023).

Recognizing this importance, Ho Chi Minh City University of Foreign Languages - Information Technology (HUFLIT) has included two core courses in the English Language program: Project 1 (Data Collection Skills) and Project 2 (Introduction to Scientific Research Methodology). The design of this course sequence shows the university's effort to move from content transmission to outcome-based education, creating constructive alignment in teaching (Biggs, 1996), together with a project-based learning model.

However, in practice, the implementation of research courses still has many challenges. Students often have difficulty identifying research problems, designing instruments, and especially meeting the strict standards of academic English. Moreover, the continuity between the two courses, teaching quality, supporting learning materials, and consistency in assessment through clear criteria are factors that directly are related to the success of developing students' research competence (Brookhart, 2018; Dawson, 2017; Reddy & Andrade, 2010).

Previous studies on students' research competence have mainly focused on describing competence or motivation to participate in research. They have not fully explained the combined roles of course design, lecturer support, assessment rubrics, AI/academic integrity guidance, and language/methodological barriers in the context of two connected Project courses. To address this gap, the topic "Factors Associated with the Scientific Research Competence of HUFLIT English Language Students in Project 1 and Project 2" was conducted.

1.2. Research Objectives

This study aims to identify and analyze the factors associated with the scientific research competence of English Language students at HUFLIT through Project 1 and Project 2. Specifically, the study examines the relationships of learning engagement, lecturer and system support, assessment and feedback standardization, AI use and academic integrity guidance, methodological/language barriers, and course design quality and continuity on students' SRC. Based on quantitative and qualitative findings, the study proposes implications for course improvement and directions for building an SRC framework suitable for English Language students.

1.3. Research Questions

To achieve these objectives, the study focuses on answering three questions:

- What factors are associated with the self-assessed scientific research competence of HUFLIT English Language students in Project 1 and Project 2?
- What is the strength of the relationships between learning engagement, lecturer/system support, assessment and feedback standardization, AI guidance, methodological/language barriers, course design quality, and students' SRC?
- How is students' SRC associated with overall course effectiveness and student satisfaction?

1.4. Significance of the Study

Theoretical significance:

This study enriches the academic literature on the scientific research competence of university students, especially in the context of English as a Foreign Language (EFL). The use of a multi-dimensional assessment model (survey and interview) provides a strong mixed-methods approach through triangulation in educational research (Creswell, 2009).

Practical significance:

- For students: The study helps students clearly identify difficulties in doing research, including both methodology and academic English, so that they can develop more effective self-regulated learning strategies (Panadero & Broadbent, 2018).
- For lecturers and the Faculty of Foreign Languages (HUFLIT): The study provides empirical evidence for reviewing and adjusting syllabi, standardizing assessment criteria (Brookhart & Chen, 2015; Dawson, 2017), and strengthening the continuity between Project 1 and Project 2.
- For administrators and curriculum developers: The study provides empirical evidence for the university to review and improve the training program, especially the continuity between Project 1 and Project 2, supporting learning materials, assessment rubrics, feedback mechanisms, and guidance on AI use in academic work. On this basis, the program can be adjusted to better match the learning outcomes of the English Language major and the need to develop students' scientific research competence.

2. Literature Review

2.1. Root Theories

To explain the development of SRC and the factors associated with it, this study is based on the following main theories:

2.1.1. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior, proposed by Ajzen (1991), is one of the classic theories used to predict individual intention and behavior. According to TPB, students' research behavior and SRC are affected by three factors: (1) attitude toward the behavior, (2) subjective norms, such as encouragement and support from lecturers and the university, and (3) perceived behavioral control, or students' confidence in overcoming barriers. This theory supports the argument that institutional scaffolding and language/methodological barriers are directly related to students' ability to conduct research.

2.1.2. Constructive Alignment and Outcome-Based Education (OBE)

Constructive Alignment, developed by Biggs (1996), is an important guide for higher education curriculum design. Biggs argues that learning is most effective when there is close alignment among learning objectives or outcomes, teaching methods, and assessment methods. For Project 1 and Project 2, this theory explains why students' SRC may depend strongly on the continuity of course design and the transparency of assessment criteria, or rubrics.

2.1.3. Self-Regulated Learning (SRL)

According to Panadero and Broadbent (2018), self-regulated learning is the process in which learners guide, monitor, and adjust their behavior and thinking to achieve academic goals. In project-based learning environments such as Project 1 and Project 2, active learning engagement and self-assessment are internal drivers that help students turn passive knowledge into real research competence.

2.2. Empirical Literature

2.2.1. Scientific Research Competence and the "Double Burden" in an EFL Context

SRC is a multi-dimensional system that includes the ability to identify problems, design methods, collect data, analyze data, and present findings (Ciraso-Cali et al., 2022). Compared with students in natural science fields, English Language students face a "double burden". First, they face methodological barriers when learning data analysis concepts (Ciraso-Cali et al., 2022; Davidson & Palermo, 2015). Second, they face academic language barriers. The gap between everyday communication and academic language creates major difficulties in reading academic sources and writing standard reports (Le et al., 2023).

2.2.2. The Role of Assessment for Learning (AfL), Feedback, and Rubrics

Assessment for Learning (AfL) shifts the focus from merely grading students to using assessment as a tool to enhance their learning process (Black & Wiliam, 1998). In complex tasks like scientific research, effective formative feedback provides students with the necessary scaffolding to identify their weaknesses and improve their work iteratively (Hattie & Timperley, 2007). Furthermore, the use of clear and well-designed rubrics is essential in higher education. Rubrics not only standardize assessment criteria among different lecturers but also help students understand academic expectations, thereby developing their evaluative judgement and self-regulation skills (Brookhart, 2018; Dawson, 2017; Reddy & Andrade, 2010).

2.2.3. Artificial Intelligence (AI) and Academic Integrity in Research

The growth of digital tools, open science, and AI is reshaping research practice. Requirements for transparency, open data, and research integrity are becoming more important (Le et al., 2025). Appropriate AI use can support students in data processing and academic writing. However, without clear guidance on academic integrity, AI may replace learners' critical thinking. Therefore, integrating AI guidance into the Project courses is an urgent need.

2.3. Hypothesis Development

Drawing on the theoretical and empirical review above, this study constructs a structural model centering on SRC as the outcome variable. It is predicted by six input factors and then linked to overall course effectiveness and student satisfaction. The 12 hypotheses below are organized in two groups.

Group 1: Factors Affecting Scientific Research Competence (SRC)

Self-Regulated Learning theory treats active learner agency as the primary catalyst for competence development (Panadero & Broadbent, 2018). Healey et al. (2014) further argue that scientific research is inherently participatory: students cannot acquire research skills through passive reception of lecture content alone; rather, they must engage with materials, interact with lecturers and peers, and monitor their own progress over time. Such engagement transforms declarative knowledge about research methods into procedural competence. In the context of Project 1 and Project 2, where students are expected to produce extended research outputs, high levels of engagement - including autonomous resource-seeking, deadline management, and iterative revision - should be associated with a stronger command of the research process.

H1 (+): Active learning engagement (PE) is positively associated with students' SRC.

Vygotsky's concept of the zone of proximal development implies that novice researchers benefit most when guided by knowledgeable others who provide timely scaffolding (Ciraso-Cali et al., 2022; Le et al., 2023). In the HUFLIT context, this scaffolding takes two distinct forms: institutional resources (e.g., Moodle repositories, research templates, handbooks) and supervisory guidance (e.g., formative feedback on draft chapters, consultations on methodology). When either form is insufficient or delayed, students may lose direction at critical stages such as instrument design or data interpretation, ultimately undermining SRC development.

H2 (+): System and lecturer support (IS) is positively associated with SRC.

The literature on assessment for learning establishes that well-designed rubrics serve a dual pedagogical function: they communicate academic expectations transparently and they provide a diagnostic lens through which students can evaluate - and subsequently improve - their own work (Black & Wiliam, 1998; Brookhart, 2018; Dawson, 2017; Hattie & Timperley, 2007). When rubric criteria are applied consistently across lecturers, students develop evaluative judgement - the capacity to discern quality and to close the gap between current and target performance. By contrast, ambiguous or inconsistent grading erodes trust in the assessment process and can discourage sustained effort.

H3 (+): Assessment and feedback standardization (AS) is positively associated with SRC.

The emergence of generative AI tools (e.g., ChatGPT, Gemini) has introduced a new dimension to research pedagogy. While AI can accelerate literature synthesis, grammar correction, and data exploration, it simultaneously raises concerns about intellectual autonomy and academic honesty (Le et al., 2025). Whether AI supports or undermines SRC depends largely on how students are instructed to use it. Clear guidelines that delineate acceptable assistance (e.g., brainstorming prompts, language polishing) from academic misconduct (e.g., submitting AI-generated analysis without understanding) enable students to leverage digital tools responsibly, thereby enhancing rather than substituting their research competence.

H4 (+): AI use and academic integrity guidance (AI) is positively associated with SRC.

English Language students confront a "double burden": limited statistical training and the formidable task of producing academic discourse that meets international publication standards (Ciraso-Cali et al., 2022; Le et al., 2023). Within the Theory of Planned Behavior, these barriers reduce perceived behavioral control -- i.e., the learner's belief that they can successfully execute the research task -- which in turn dampens motivation and may constrain final competence. Accordingly, students who perceive greater methodological and linguistic obstacles should, on average, report lower SRC.

H5 (-): Methodological and academic language barriers (MLB) are negatively associated with students' SRC.

Constructive Alignment (Biggs, 1996) stipulates that effective learning requires tight coherence among intended outcomes, instructional activities, and assessment tasks. When applied to a two-course sequence, this principle further demands vertical alignment: the competencies developed in Project 1 should serve as explicit prerequisites for the more demanding tasks of Project 2. A well-articulated progression -- coupled with manageable workload distribution -- enables students to consolidate foundational skills before tackling full-scale research, thereby strengthening SRC.

H6 (+): Course design quality and continuity (AL_CW) is positively associated with SRC.

Group 2: Effects on Satisfaction (SAT) and Overall Effectiveness (OE)

From an Outcome-Based Education perspective, course success is ultimately measured by the competencies that learners acquire. Students who perceive genuine growth in their research capabilities -- from formulating research questions through to interpreting findings and writing academic reports -- are more likely to judge the course as effective and to express satisfaction with their academic investment.

H7 (+): Students' SRC is positively associated with overall course effectiveness (OE).

H8 (+): Students' SRC is positively associated with satisfaction with the course (SAT).

Learner satisfaction is not determined solely by acquired competence; it is also shaped by the quality of the learning experience itself. A curriculum that is logically sequenced, offers appropriate workload, and maintains clear expectations contributes positively to both satisfaction and perceived effectiveness (Reddy & Andrade, 2010). Lecturer and system support create a responsive learning environment, while transparent assessment gives students a sense of procedural fairness and predictability. These institutional factors therefore merit separate paths to the outcome variables:

H9 (+): Course design quality and continuity (AL_CW) is positively associated with student satisfaction (SAT).

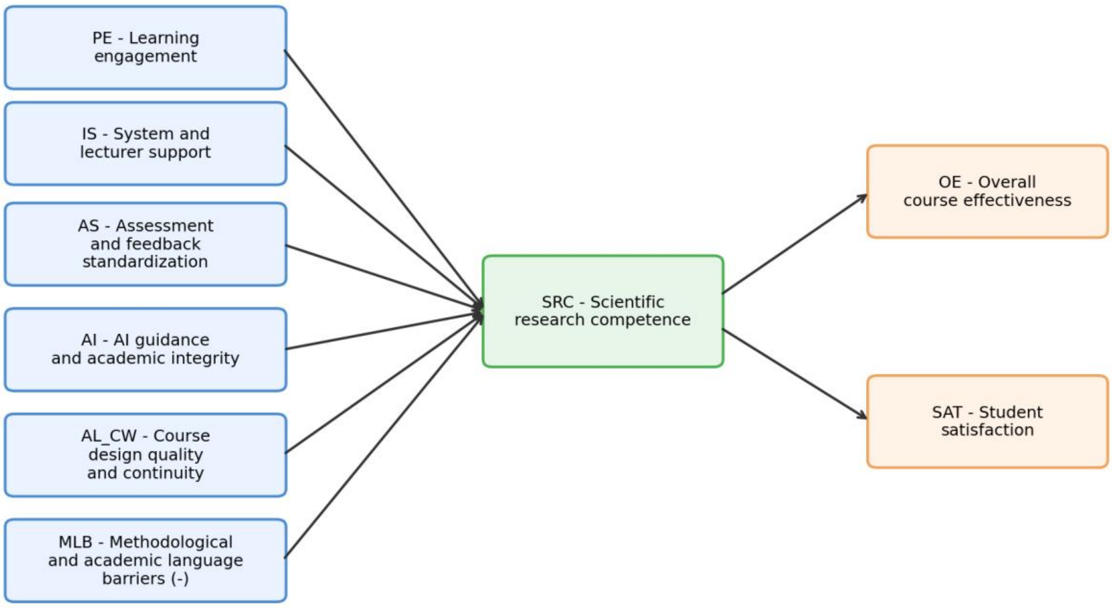
H10 (+): System/lecturer support (IS) is positively associated with student satisfaction (SAT).

H11 (+): Course design quality and continuity (AL_CW) is positively associated with overall course effectiveness (OE).

H12 (+): Assessment and feedback standardization (AS) is positively associated with student satisfaction (SAT).

Figure 1:

Research model of the proposed effects



3. Methodology

3.1. Research Model and Rationale for Factor Selection

A growing body of evidence suggests that students' SRC is a product not only of individual aptitude but also of the broader academic ecosystem -- including curriculum design, supervisory quality, resource availability, and assessment culture. In the Vietnamese higher-education context, Tran et al. (2020) identify research awareness, participation motivation, self-assessment capability, and the institutional support environment as key conditions shaping scientific research capacity. Complementary work on Vietnamese undergraduates further highlights the interplay of university-level encouragement, learning conditions, personal competence, and intrinsic motivation (Bui & Tran, 2022; Ha & Nong, 2019; Vo, 2023).

Building on these foundations, the present study constructs an integrated model situating students' self-assessed SRC at the center of a network of six predictor groups -- active learning engagement (PE), lecturer and system support (IS), assessment and feedback standardization (AS), AI use and academic integrity guidance (AI), methodological and academic language barriers (MLB), and course design quality and continuity (AL_CW) - together with two outcome variables: overall course effectiveness (OE) and student satisfaction (SAT). Direct paths from AL_CW, IS, and AS to SAT and OE are also specified. This design permits a simultaneous evaluation of the individual, pedagogical, and institutional factors that may support or constrain SRC development within the two-course Project sequence.

3.2. Research Design

The study employs a convergent mixed-methods design (Creswell, 2009). The quantitative strand relies on a structured questionnaire to test the theoretical model and examine hypothesized relationships among the nine latent variables. Concurrently, the qualitative strand draws on semi-structured interviews to elicit richer accounts of students' lived experiences, practical barriers, and perceived support needs across Project 1 and Project 2. Integrating both data sources serves two purposes: it mitigates the inherent limitation of exclusive reliance on self-report measures, and it produces a more complete understanding of the mechanisms through which SRC is developed.

3.3. Research Procedure

Five sequential stages structured the investigation. In the first stage, the researcher reviewed theoretical frameworks (TPB, SRL, Constructive Alignment) and empirical studies to identify the research gap, formulate the structural model, and derive the twelve hypotheses. The second stage involved instrument development: both the quantitative questionnaire and the semi-structured interview guide were drafted, subjected to a pilot survey, and refined to ensure contextual appropriateness for English Language students at HUFLIT. During the third stage, data were collected through a large-scale survey and in-depth interviews conducted simultaneously. In the fourth stage, quantitative data were analyzed in SPSS 26.0 (descriptive statistics, sample profiling) and SmartPLS 4.0 (PLS-SEM, bootstrapping, CTA-PLS), while qualitative transcripts were processed through open, axial, and selective coding in MAXQDA. The fifth and final stage synthesized both datasets, comparing quantitative path results with interview themes to generate conclusions, course-improvement implications, and recommendations for an SRC framework.

3.4. Research Sample and Sampling Method

The quantitative sample comprised 500 English Language students at HUFLIT who had completed both Project 1 and Project 2 - a criterion ensuring that all respondents possessed sufficient learning experience to evaluate course design, support structures, assessment practices, and their own SRC development. Sampling followed a two-stage procedure: convenience sampling was used to identify eligible cohorts, followed by random selection within Project classes to enhance representativeness and meet the requirements of PLS-SEM analysis. For the qualitative component, 19 students were purposively selected to maximize variation in learning outcomes, course experiences, and major orientations.

Regarding demographic composition, female students accounted for 55.2% and male students for 44.8%. Major orientations were distributed as follows: Office Administration (18.0%), Translation and Interpretation (17.6%), English for Logistics (17.6%), Business English (17.2%), English Language Teaching (15.4%), and English-Chinese Bilingual Studies (14.2%). All participants had taken both Project courses, confirming the suitability of the sample for the proposed model.

Table 1:
Demographic characteristics of the survey sample

Characteristic	Category	Frequency (n)	Percentage (%)
Gender (GI1)	Male	224	44.8
	Female	276	55.2
Major orientation (GI3)	Translation and Interpretation	88	17.6
	English Language Teaching	77	15.4

	Business English	86	17.2
	English-Chinese Bilingual Studies	71	14.2
	English for Logistics	88	17.6
	Office Administration	90	18.0
Self-assessment of learning outcomes (GI6)	Very good	83	16.6
	Good	103	20.6
	Average	114	22.8
	Somewhat difficult	111	22.2
	Great difficulty	89	17.8

3.5. Scale and Questionnaire Development

The quantitative questionnaire was designed based on the main theories and previous studies, and then adjusted to fit the context of English Language students at HUFLIT. The questionnaire included a demographic information section and a latent-variable scale section using a 5-point Likert scale. The variables in the model included learning engagement (PE), lecturer and system support (IS), assessment and feedback standardization (AS), AI use and academic integrity guidance (AI), methodological and academic language barriers (MLB), course design quality and continuity (AL_CW), self-assessed scientific research competence (SRC), overall course effectiveness (OE), and student satisfaction (SAT).

Self-assessed SRC was measured through core components that reflect the process of conducting an academic study in the English Language context. These components included identifying a research problem and research questions, reviewing the literature, designing the research method and instrument, collecting data, analyzing and interpreting data, writing a research report in academic English, presenting research findings, and cooperating during the project. This variable reflects how students evaluate their own competence after completing Project 1 and Project 2. Meanwhile, AI use and academic integrity guidance (AI) was treated as a separate independent variable to avoid conceptual overlap with SRC.

For qualitative data, the semi-structured interview guide was developed around key themes, including learning experiences, methodological/language barriers, the role of supervisors, the usefulness of rubrics, AI use in academic work, and suggestions for course improvement.

3.6. Data Collection Method

Quantitative data were collected through Google Forms and distributed directly in classes as well as through internal learning channels of English Language students. The survey was conducted after students had completed both Project courses to ensure that participants had enough experience to evaluate them. Qualitative data were collected through face-to-face or online interviews, with an average duration of 20 to 30 minutes for each student. The interviews were recorded with participants' consent and transcribed into text for analysis.

3.7. Data Analysis Method

Quantitative data were first processed using SPSS 26.0 for descriptive statistics of the survey sample. Then, SmartPLS 4.0 was used to analyze the partial least squares structural equation model (PLS-SEM). The measurement model was assessed through internal consistency reliability, convergent validity, and discriminant validity. Reliability was examined using Cronbach's alpha, rho_A, and Composite Reliability, with the accepted threshold above 0.70. Convergent validity was assessed using factor loading and Average Variance Extracted (AVE). In principle, factor loading should be about 0.70 or higher. Indicators close to 0.70 may be retained if Composite Reliability and AVE meet the required level. AVE should be 0.50 or higher.

Discriminant validity of the measurement model was assessed using the Fornell-Larcker and HTMT criteria. According to the Fornell-Larcker criterion, the square root of the AVE of each latent variable must be higher than its correlations with the other latent variables. In addition, the HTMT ratio (Heterotrait-Monotrait Ratio), following Henseler et al. (2015), was used to test the level of distinction among concepts in the model. An HTMT value below 0.85 is considered acceptable at a strict level, while the 0.90 threshold may be accepted for closely related concepts. Using both criteria helps ensure that the variables in the measurement model are conceptually different before the structural model is analyzed.

The structural model was assessed using the collinearity coefficient VIF, the coefficient of determination R-squared, the effect size f-squared, the predictive relevance Q-squared, and hypothesis testing with bootstrapping using 5,000 subsamples. A hypothesis was supported when the path coefficient was statistically significant with p-value < 0.05 and t-statistics > 1.96. Because the study used cross-sectional and self-reported data, the structural paths were interpreted as predictive relationships rather than definitive causal effects. Qualitative data were analyzed through thematic analysis with the support of MAXQDA. This included open coding, axial coding, and selective coding to identify themes corresponding to the variables in the model.

3.8. Research Ethics

The study followed ethical principles in educational research. All participants were informed about the purpose and scope of the study and their right to withdraw at any time without any effect on their learning results. The collected data were used only for academic purposes. Personal information was anonymized and coded. Citation, data processing, and result reporting were conducted honestly and followed the rules of academic integrity and intellectual property.

4. Results

4.1. Self-assessment of learning outcomes

Table 2 presents students' self-assessment of their learning outcomes after taking Project 1 and Project 2. The results show that the group rating themselves as Average had the highest proportion at 22.8%, followed by the Somewhat difficult group at 22.2%. Meanwhile, 20.6% of students rated their outcomes as Good, 16.6% as Very good, and 17.8% stated that they experienced Great difficulty. This distribution shows that the two Project courses set considerable academic demands for students, especially because they had to combine research skills, data processing, and academic English competence.

Table 2:
Self-assessment of learning outcomes

Self-assessment of learning outcomes	Frequency (n)	Percentage (%)
Very good	83	16.6
Good	103	20.6
Average	114	22.8
Somewhat difficult	111	22.2
Great difficulty	89	17.8
Total	500	100.0

4.2. Measurement Model Evaluation

The measurement model was assessed to ensure that the observed variables properly reflected the concepts being measured, or the latent variables. The assessment included reliability, convergent validity, and discriminant validity.

4.2.1. Construct Reliability and Convergent Validity

According to Hair et al. (2019), scale reliability is assessed through Cronbach's Alpha, rho_A, and Composite Reliability (CR), with an accepted threshold of > 0.70. Convergent validity is assessed through factor loading and Average Variance Extracted (AVE), in which AVE should be 0.50 or higher.

Table 3:
Results of construct reliability and convergent validity assessment

Latent variable	Cronbach's alpha	rho_a	rho_c	Average Variance Extracted (AVE)	Factor Loading
AI	0.859	0.863	0.905	0.704	.814 - .874
AL_CW	0.943	0.946	0.951	0.663	.758 - .877
AS	0.926	0.928	0.940	0.692	.791 - .881
IS	0.894	0.900	0.922	0.703	.784 - .864

MLB	0.959	0.967	0.964	0.689	.765 - .867
OE	0.901	0.905	0.927	0.718	.808 - .883
PE	0.913	0.915	0.932	0.697	.784 - .865
SAT	0.897	0.897	0.924	0.708	.820 - .865
SRC	0.978	0.978	0.979	0.652	.753 - .876

Based on Table 3, all scales achieved excellent reliability and convergent validity. Cronbach's alpha, rho_A, and rho_C values of all variables were well above the 0.70 threshold, indicating strong internal consistency among the items. Furthermore, the AVE values of all variables exceeded the 0.50 benchmark, ranging from 0.652 to 0.718. The factor loadings presented in the table demonstrate that the observed items effectively reflected their corresponding latent concepts. Therefore, the measurement model robustly met the requirements for further testing of discriminant validity and structural relationships.

4.2.2. Discriminant Validity

Discriminant validity was tested to ensure that the latent variables in the model were conceptually distinct from one another. The results based on the Fornell-Larcker and HTMT criteria are presented in Table 4 and Table 5.

Table 4:
Discriminant validity results based on the Fornell-Larcker criterion

	AI	AL_CW	AS	IS	MLB	OE	PE	SAT	SRC
AI	0.839								
AL_CW	0.501	0.814							
AS	0.494	0.508	0.832						
IS	0.448	0.448	0.480	0.838					
MLB	0.203	0.129	0.147	0.118	0.830				
OE	0.480	0.479	0.537	0.530	0.098	0.847			
PE	0.521	0.527	0.562	0.601	0.153	0.564	0.835		
SAT	0.478	0.479	0.552	0.549	0.108	0.535	0.616	0.842	
SRC	0.499	0.546	0.587	0.537	0.143	0.581	0.632	0.571	0.808

Table 5:
Discriminant validity results based on the HTMT ratio (Heterotrait-Monotrait Ratio)

	AI	**AL_CW**	**AS**	**IS**	**MLB**	**OE**	**PE**	**SAT**	**SRC**
AI									
AL_CW	0.554								
AS	0.554	0.542							
IS	0.509	0.486	0.523						
MLB	0.223	0.133	0.153	0.125					
OE	0.544	0.517	0.583	0.587	0.102				
PE	0.587	0.567	0.609	0.664	0.162	0.620			
SAT	0.542	0.519	0.605	0.609	0.116	0.593	0.680		
SRC	0.541	0.567	0.615	0.570	0.142	0.616	0.667	0.608	

The discriminant validity results demonstrate that the measurement model successfully met the requirements of both the Fornell-Larcker and HTMT criteria. Specifically, under the Fornell-Larcker criterion, the square root of the AVE of each latent variable (the diagonal values in Table 4) was strictly higher than its correlations with all other variables. More importantly, all HTMT values in Table 5 were well below the stringent 0.85 threshold, with the highest recorded value being just 0.680 (between PE and SAT). This indicates excellent discriminant validity, ensuring that the constructs within the model are empirically distinct and highly suitable for structural equation modeling.

4.2.3. Confirmatory Tetrad Analysis (CTA-PLS)

Traditionally, the decision to set scales as Reflective or Formative is often based only on theoretical arguments. However, to avoid measurement model misspecification, this study conducted Confirmatory Tetrad Analysis (CTA-PLS) to use empirical data to confirm whether the scales used in the study were reflective or formative (Hair et al., 2019).

CTA-PLS tests the statistical significance of tetrads, which are differences between products of covariances of pairs of observed variables. The evaluation criteria are based on the p-value and confidence interval from the bootstrapping procedure. If p-value > 0.05 or the 95% confidence interval includes 0, the study does not have enough evidence to reject the assumption that the scale is reflective. In contrast, if p-value < 0.05 and the confidence interval does not include 0, the scale should be reconsidered as formative.

The SmartPLS results show that, for latent variables with four or more observed variables in the model, the tetrads were generally not statistically significant and the adjusted confidence intervals (CI adjusted) all included 0. This result shows that the empirical data did not reject the reflective specification of the scales in the model.

This result supports the use of reflective scales in the study. It is consistent with the original theoretical basis from the Theory of Planned Behavior (TPB), Self-Regulated Learning (SRL), and the way the model concepts were measured.

4.3. Structural Model Evaluation and Hypothesis Testing

After the measurement model was confirmed, the structural model was analyzed to test the research hypotheses through the bootstrapping algorithm with 5,000 subsamples.

4.3.1. Collinearity Issues

Before testing the effects, the inner VIF was examined to ensure that there was no collinearity problem among the independent variables. Table 5 presents the VIF results.

Table 6
Collinearity test results (VIF)

Independent variable	**OE**	**SAT**	**SRC**
AI			1.638
AL_CW	1.426	1.586	1.641
AS		1.716	1.718
IS		1.532	1.697
MLB			1.048
PE			2.048
SRC	1.426	1.910	

As shown in Table 6, all inner VIF values across the structural model ranged from 1.048 to 2.048. These values are consistently well below the conservative threshold of 3.0 (and far below the maximum acceptable limit of 5.0 set by Hair et al., 2019). This confirms that multi-collinearity was not a problem and did not bias the estimation of the path coefficients.

4.3.2. Explanatory Power (R^2) and Effect Size (f^2)

- R^2 coefficient: This shows the level of variance in the dependent variables (OE, SAT, SRC) explained by the independent variables.
- f^2 coefficient: This evaluates the contribution level, large, medium, or small, of each independent variable to the dependent variable.

Table 7
Explanatory power (R^2) of the model

Dependent variable	R^2	Adjusted R^2
OE	0.375	0.372
SAT	0.460	0.455
SRC	0.527	0.521

Table 8
Effect size (f^2) of the independent variables

Independent variable	OE	SAT	SRC
AI			0.010
AL_CW	0.059	0.017	0.039
AS		0.058	0.065
IS		0.082	0.024
MLB			0.000
PE			0.081
SRC	0.233	0.051	

Explanatory power (R-squared): The predictor variables in the model explained 52.7% (R-squared = 0.527) of the variance in Scientific Research Competence (SRC). In educational and behavioral research, this represents a highly satisfactory and realistic level of explanatory power, indicating that the proposed framework comprehensively captures the core factors associated with SRC development. Concurrently, the structural model successfully explained

37.5% of the variance in overall course effectiveness (OE) and 46.0% of the variance in student satisfaction (SAT).

- Effect size (f^2):
    - Among the factors predicting SRC, learning engagement (PE) was the largest contributor with an effect size of $f^2 = 0.081$, representing a small-to-medium meaningful effect.
    - SRC exhibited a medium effect on overall course effectiveness (OE), with $f^2 = 0.233$.
    - Notably, methodological and academic language barriers (MLB) had no practical effect on SRC ($f^2 = 0.000$), which directly aligns with the non-significant outcome observed for hypothesis H5.

4.3.3. Hypothesis Testing

The strength of association between variables was assessed through the path coefficient (beta), t-statistics, and p-value obtained from the bootstrapping process. A hypothesis was accepted when p-value < 0.05 and t-statistics > 1.96.

Table 9
Hypothesis testing results (Bootstrapping)

Hypothesis	Path	Original sample (O)	Mean (M)	Standard deviation (STDEV)	*t* statistics	*p* values	Conclusion
H1	PE -> SRC	0.279	0.281	0.042	6.627	<.001	Accepted
H2	IS -> SRC	0.140	0.140	0.041	3.442	.001	Accepted
H3	AS -> SRC	0.229	0.228	0.039	5.856	<.001	Accepted
H4	AI -> SRC	0.089	0.088	0.041	2.172	.030	Accepted
H5	MLB -> SRC	0.010	0.014	0.028	0.342	.733	Rejected
H6	AL_CW -> SRC	0.174	0.174	0.043	4.057	<.001	Accepted
H7	SRC -> OE	0.455	0.456	0.036	12.512	<.001	Accepted
H8	SRC -> SAT	0.229	0.229	0.043	5.381	<.001	Accepted
H9	AL_CW -> SAT	0.119	0.119	0.043	2.796	.005	Accepted
H10	IS -> SAT	0.261	0.261	0.042	6.237	<.001	Accepted
H11	AL_CW -> OE	0.230	0.230	0.039	5.860	<.001	Accepted
H12	AS -> SAT	0.232	0.233	0.041	5.667	<.001	Accepted

The bootstrapping results reveal that the proposed research model was robustly supported by the empirical data. Among the factors associated with scientific research competence (SRC), active learning engagement (PE) emerged as the strongest predictor (β = 0.279, $p < .001$), followed by assessment and feedback standardization (AS) (β = 0.229, $p < .001$), course design quality and continuity (AL_CW) (β = 0.174, $p < .001$), and system and lecturer support (IS) (β = 0.140, $p = .001$). Meanwhile, AI use guidance linked with academic integrity (AI) was a statistically significant but relatively weak predictor of self-assessed SRC (β = 0.089, $p = .030$, $f^2 = 0.010$). These findings suggest that the development of students' SRC relies not only on individual effort but also heavily on transparent assessment rubrics, logical curriculum sequencing, academic scaffolding, and institutional regulations regarding digital tools.

Crucially, Hypothesis H5, which predicted a negative relationship between methodological and academic language barriers (MLB) and SRC, was not supported. The relationship was found to be exceptionally weak and statistically non-significant (β = 0.010, t = 0.342, $p = .733$). In addition, SRC was positively and strongly associated with overall course effectiveness (OE) and student satisfaction (SAT). Moreover, institutional factors such as AL_CW, IS, and AS were also significantly related to the outcome variables, emphasizing the pivotal role of curriculum design, supervisory support, and assessment standardization in shaping the overall learning experience across the Project 1 and Project 2 sequence.

4.4. Summary of Quantitative Analysis Results

Table 9 summarizes the hypothesis testing results for the structural model. Out of the 12 proposed hypotheses, 11 were strongly supported by the empirical data ($p < .05$), confirming the theoretical validity and robustness of the model. The sole exception was H5, whose rejection provides vital nuances regarding students' coping behaviors, a phenomenon further explored through the qualitative findings.

4.5. Qualitative Data Analysis Results (In-depth Interviews)

To complement the quantitative findings, the study analyzed 19 semi-structured interviews. The thematic analysis was used to clarify how students experienced Project 1 and Project 2, why some relationships in the quantitative model appeared as they did, and what kinds of support students considered necessary for improving scientific research competence.

Overall, students described the Project sequence as academically valuable but mentally demanding. Most participants considered Project 2 more challenging than Project 1 because it required deeper methodological application, stronger theoretical reasoning, and more careful interpretation of research findings. Project 1 was often viewed as a starting framework that introduced students to questionnaire design, basic data collection, and the general structure of a research paper. However, several participants also reported that the connection between the two courses was not always smooth. Instead of developing into a clearly progressive learning sequence, Project 2 was sometimes perceived as repeating the structure of Project 1 with more detailed requirements. The transition from data collection to data analysis was especially difficult because students felt that they had not received enough preparation in SPSS or quantitative interpretation before being required to analyze and discuss results.

The interviews also showed that students developed certain aspects of SRC after completing the two courses, especially in searching for materials, designing questionnaires, organizing group work, and presenting research results. Nevertheless, their competence development was uneven. The most frequently mentioned bottlenecks were the Literature Review, Findings/Data Analysis, and Discussion sections. Students found it difficult to locate suitable academic sources, synthesize previous studies, identify a research gap, and transform statistical results into meaningful arguments. These difficulties were not only methodological but also linguistic. Many students reported that they had ideas but struggled to express them in an academic English style, paraphrase appropriately, and follow APA conventions. This confirms the "double burden" experienced by English Language students, who must learn both research methodology and academic language at the same time.

Several learning conditions helped explain why students' SRC varied across individuals and groups. Students who actively monitored deadlines, divided tasks clearly, searched for additional learning materials, and communicated regularly with teammates tended to understand the research process more deeply. Lecturer support also played an important role. Participants valued step-by-step guidance, direct correction, and specific formative feedback because these helped them recognize what was wrong and how to revise their work. In contrast, delayed or overly general comments made students feel uncertain and increased pressure. Teamwork was another influential factor. While a balanced and responsible group could reduce workload and support learning, unequal participation and free-rider behavior placed heavy pressure on group leaders and sometimes allowed less active members to pass the course without developing equivalent research competence.

The qualitative data also helped explain the unexpected quantitative result for methodological and academic language barriers (MLB). Although students described these barriers as serious, MLB did not show the hypothesized negative relationship with SRC in the structural model. One possible explanation is that the MLB scale may have captured students' awareness of research difficulties rather than only the actual obstructive level of those difficulties. Students with stronger research competence may be more capable of recognizing that Literature Review writing, SPSS analysis, and Discussion writing are difficult tasks. Therefore, they may report both higher SRC and higher awareness of barriers. In addition, students often used coping strategies to reduce the visible impact of barriers on their self-assessed competence. These strategies included relying on more capable group members, using templates or previous papers, and using AI tools for language support, idea generation, and data interpretation. As a result, the barriers remained important in students' lived experiences, but their direct negative association with SRC was not statistically confirmed.

AI use was common among the interviewed students. Participants reported using tools such as ChatGPT, Gemini, Claude, Grammarly, and QuillBot for brainstorming, grammar checking, paraphrasing, translation, summarizing documents, and sometimes interpreting data. Many students were able to distinguish between supportive and problematic AI use. They considered AI acceptable when it helped suggest ideas, check language, or clarify difficult concepts, but they regarded copying AI-generated content without understanding as a violation of academic integrity. However, because course-level AI guidelines were still unclear, students were unsure about the acceptable boundary of AI use. Under deadline pressure, some students admitted that AI could become a shortcut rather than a learning support tool, especially in writing the Findings and Discussion sections. This suggests that AI literacy and academic integrity guidance should be integrated more explicitly into the Project courses.

Finally, students' suggestions focused mainly on course design, learning materials, and feedback. Although the semester length of three to four months was considered generally sufficient for group work, the amount of knowledge was perceived as heavy and highly concentrated. Students expressed a strong need for sample papers, chapter checklists, templates, APA guidance, and clearer instructions on SPSS. Moodle was seen mainly as a submission platform rather than a learning resource repository. Participants suggested that Project 1 and Project 2 should be more clearly differentiated: Project 1 should focus on foundational research skills such as reading articles, identifying gaps, designing instruments, and practicing basic data analysis, while Project 2 should focus on applying those skills in a complete research paper. They also emphasized the need for timely, detailed, and constructive lecturer feedback throughout the course rather than only at the final submission stage.

5. Discussion

5.1. Discussion on the Scientific Research Competence of English Language Students

The mixed-methods findings show a multi-dimensional picture of HUFLIT students' SRC. Quantitatively, the self-assessment results were not concentrated only in the high group: 37.2% of students rated themselves as Good/Very good, while the remaining 62.8% were in the Average, Somewhat difficult, or Great difficulty groups. The qualitative data further explained the gap between perceived competence and real difficulties during the Project process.

In practice, students were often more confident in surface-level tasks such as basic literature searching, designing Google Form questionnaires, or making PowerPoint presentations. When they had to work on core tasks such as writing the Literature Review, analyzing data with SPSS, and writing the Discussion, many students admitted that they were confused and lacked direction. This gap may come from the fact that some students passed the course because of strong support from group leaders, unequal task division in groups, or heavy reliance on generative AI tools.

This reflects the "double burden" faced by English Language students (Ciraso-Cali et al., 2022; Le et al., 2023). They not only lack a strong background in statistical thinking, or the logic of quantitative data analysis, but are also limited by academic English when they need to paraphrase and argue according to international academic standards.

5.2. Discussion on Factors Associated with SRC

The structural model (PLS-SEM) supported 11 out of 12 research hypotheses. Because the study used cross-sectional self-report data, the following discussion interprets the paths as predictive relationships and associations rather than definitive causal effects. The combination of quantitative and qualitative data provides deeper explanations for these relationships.

5.2.1. The key role of learning engagement (PE) and lecturer support (IS).

The statistical results confirm that learning engagement (PE) was the strongest predictor of SRC (H1). The interview data reinforce this finding: students who actively monitored their progress, learned tools by themselves, and communicated well with their groups tended to develop a deeper understanding of the course. In addition, lecturer support (IS) worked as cognitive scaffolding. Lecturers who directly corrected students' work and provided detailed formative feedback helped students shape their research thinking, which is consistent with Self-Regulated Learning (Panadero & Broadbent, 2018).

5.2.2. The importance of assessment standardization (AS) and course design quality and continuity (AL_CW).

The study shows that rubrics and assessment transparency (AS) were positively related to students' competence and satisfaction. However, the qualitative data reveal a tension that deserves closer scrutiny from a curricular-design perspective. While the course sequence ostensibly follows a progressive model - Project 1 for data collection, Project 2 for methodology and full-report writing - the actual student experience suggests a structural misalignment that the current implementation has not resolved.

Specifically, students are required to produce a complete research report in Project 1, yet the statistical and methodological tools they need (particularly SPSS-based data analysis) are introduced substantively only in Project 2. This sequencing creates what Biggs (1996) would characterize as a failure of constructive alignment: the assessment task (a full report) outpaces the instructional preparation. The consequence is predictable - students resort to compensatory strategies such as template reproduction, peer dependence, or AI-assisted writing to bridge the competence gap, rather than developing the intended research skills organically. In effect, the curriculum asks students to demonstrate competencies it has not yet taught.

This structural deficiency is not merely a scheduling inconvenience; it undermines the pedagogical rationale of the two-course sequence. If Project 1 is meant to build foundational skills, its assessment should be calibrated accordingly - focusing, for example, on instrument design, pilot data collection, and literature review drafting, rather than demanding a complete manuscript. Project 2 would then function as the integrative course where students apply the full research cycle, including data analysis and discussion writing, supported by explicit SPSS instruction introduced earlier or concurrently. The department's current arrangement, where the most analytically demanding assessment precedes the corresponding instruction, not only overloads students but also dilutes the diagnostic value of Project 1 grades as indicators of genuine research readiness.

5.2.3. The unexpected result of methodological and language barriers (MLB).

One of the more noteworthy findings of this study is the rejection of H5. The quantitative data show that methodological and academic language barriers (MLB) had a positive but statistically non-significant relationship with SRC ($\beta = 0.010$, $t = 0.342$, $p = .733$), even though the hypothesis predicted a negative relationship and the interview data clearly documented students' struggles with academic English, research methods, and data analysis.

This anomaly warrants careful methodological reflection rather than superficial dismissal. The most parsimonious explanation lies in a construct-measurement problem: the MLB scale, as operationalized, appears to tap into perceived difficulty awareness rather than actual obstructive impact. These are conceptually distinct constructs. A student with strong research competence may be more cognizant of the inherent challenges of SPSS analysis and academic writing precisely because they have engaged deeply enough with these tasks to appreciate their complexity. Conversely, a student who has relied heavily on group leaders or AI tools may report fewer barriers simply because they have not confronted them directly. The result is a paradoxical positive association - or, at best, a null one - between barrier perception and competence.

This interpretation is corroborated by the qualitative data. Students frequently described coping mechanisms - including delegation to more capable group members, reliance on AI-generated text, and reproduction of report templates - that effectively attenuated the impact of barriers on self-assessed SRC without eliminating the barriers themselves from the learning experience. In other words, the barriers remained real and substantial in students' narratives, but the compensatory behaviors severed the expected negative link to competence outcomes.

Future research should address this measurement limitation by distinguishing between two dimensions of barrier experience: (a) awareness (the extent to which students recognize methodological and linguistic challenges) and (b) obstruction (the degree to which those challenges actually impede research performance). A two-factor operationalization of MLB would likely produce a clearer - and theoretically consistent - picture of the barrier-competence relationship. This should be treated as a design limitation of the current study rather than evidence that barriers are unrelated to SRC.

5.3. Discussion on Artificial Intelligence (AI) and Academic Integrity

In the context of wide AI use in learning, this study views AI guidance and academic integrity as a construct that can positively contribute to SRC (H4) when managed through explicit institutional protocols. Interviews reveal that most students used AI in some capacity during their Project courses. When AI was deployed for legitimate purposes - brainstorming, grammar correction, structural suggestions - it helped students mitigate part of the linguistic burden that characterizes the EFL research context.

However, the boundary of integrity is becoming increasingly blurred in the absence of clear, course-level guidelines. Some students admitted that they relied too heavily on AI to write or explain content, especially in the Findings and Discussion sections, where original analytical reasoning is most critical. This creates risks on two fronts: first, the ethical risk of academic dishonesty; and second, the pedagogical risk that AI dependence replaces - rather than scaffolds - the development of critical thinking. The Project courses therefore need a formal and explicit set of AI use regulations, integrated into both the syllabus and the assessment rubric, so that students can deploy digital tools as support mechanisms rather than substitutes for the research thinking process.

6. Conclusion

6.1. General Conclusion of the Study

This study was conducted to evaluate the scientific research competence (SRC) of English Language students at HUFLIT through Project 1 and Project 2, and then propose a competence framework and improvement solutions. By applying a convergent mixed-methods design, combining PLS-SEM for 500 quantitative responses and thematic analysis for 19 semi-structured interviews, the study answered the initial research questions. Because the data were cross-sectional and self-reported, the findings should be understood as evidence of associations and predictive relationships rather than definitive causal effects.

The findings show that students' SRC developed through the two courses but not evenly. Positive progress was found in literature searching, questionnaire design, and basic academic thinking. However, major bottlenecks remained in quantitative data analysis using SPSS, argument writing in the Discussion section, and academic English.

Regarding the associated factors, the quantitative data show that 11 out of 12 hypotheses were supported. Active learning engagement (PE), course design quality and continuity (AL_CW), lecturer/system support (IS), assessment and feedback standardization (AS), and AI use guidance linked with academic integrity (AI) were positively associated with SRC. Among them, PE was the strongest predictor of SRC ($\beta = 0.279$, $p < .001$). In contrast, methodological and academic language barriers (MLB) showed a positive but statistically non-significant relationship with SRC ($\beta = 0.010$, $t = 0.342$, $p = .733$), although students still described them as important difficulties in interviews. This suggests that MLB may reflect students' awareness of difficulty and their coping strategies, not only the actual obstructive power of those barriers. In addition, SRC was positively associated with overall course effectiveness (OE) and satisfaction (SAT), confirming the central role of SRC in the course experience.

6.2. Proposed SRC Framework for English Language Students

Based on the theoretical foundation, course learning outcomes (CLOs), and practical findings at HUFLIT, the study proposes a Scientific Research Competence framework for English Language students. It includes five core competence groups:

1. Methodological Competence: The ability to identify a research gap related to linguistics, teaching methods, translation, or culture, and to choose a suitable research design, such as qualitative, quantitative, or mixed methods.

2. Academic Linguistic Competence: The ability to read and synthesize specialized English materials, use standard academic writing style, paraphrase appropriately, and follow citation rules strictly, such as APA 7th edition.

3. Data Analysis Competence: The ability to design unbiased questionnaires/interview questions, use software such as Excel and basic SPSS to process data, and interpret statistical results into logical arguments.

4. Collaborative and Managerial Competence: The ability to plan and manage the research timeline in a scientific way, communicate effectively, solve group conflicts, and reduce free-rider behavior.

5. Digital Integrity and AI Literacy: The ability to search reliable academic databases and use generative AI responsibly: using AI to support idea generation and grammar correction, but never misusing it to fake analytical arguments or plagiarize.

6.3. Recommendations for Improvement

Based on the findings and the proposed competence framework, the study offers the following solutions to improve the quality of the two Project courses:

For the Faculty and the University (course design improvement):

- Reposition the goals of Project 1 and Project 2: Reduce the overlap in requirements between the two courses. Project 1 should be structured mainly as a skills course, focusing on how to read articles, write a Literature Review, design questionnaires, and practice basic SPSS/Excel. Project 2 should be the application course in which students conduct a complete research paper.
- Issue "Guidelines for AI Use in Academic Work": Clear regulations should be provided in writing and in the rubric about the boundary between AI "support" and "plagiarism". Tasks should also require students to submit a prompt log to show their independent thinking.
- Build a shared learning material repository (LMS/Moodle): Moodle should be improved by providing standard templates, chapter checklists, and an APA handbook so that students can self-study more easily and reduce complete dependence on supervisors.

For supervisors:

- Strengthen formative assessment: Instead of only using final summative assessment, lecturers should create small submission milestones to provide timely feedback. Feedback should be constructive and show students how to revise, not only say whether something is right or wrong.
- Manage teamwork strictly: Groups should be required to prepare a clear Task Assignment Log from the beginning of the semester. An anonymous peer-assessment

mechanism should be applied at the end of the course to individualize scores, ensure fairness, and reduce free-rider behavior.

For students:

- Students should improve their self-regulation and actively plan their research from the beginning of the semester instead of waiting until the deadline is very close.
- Students should strictly follow academic integrity principles and view scientific research as an opportunity to develop analytical thinking and critical thinking skills that directly support their future work and career development.

6.4. Limitations and Directions for Future Research

Although the study tried to ensure objectivity and scientific quality, it still has several limitations. First, the study was conducted at only one institution, Ho Chi Minh City University of Foreign Languages - Information Technology. Therefore, the generalizability of the findings to other universities with similar programs should be considered carefully. Second, the study used a cross-sectional design, reflecting students' competence at one point after they completed Project 1 and Project 2. It did not assess longitudinal changes in competence throughout the learning process. Third, the SRC variable was mainly measured through students' self-assessment. Therefore, future studies should include evidence from learning products, rubric scores, or independent lecturer assessment to verify actual competence. Fourth, as discussed in Section 5.2, the MLB construct may have conflated awareness of difficulty with actual obstruction by difficulty. Future research should operationalize these as separate sub-dimensions to more accurately capture the barrier-competence relationship and produce findings consistent with established theory (Ciraso-Cali et al., 2022; Le et al., 2023). Finally, because all quantitative variables were collected through the same survey, common method bias may still have influenced the observed relationships, even though the model showed acceptable reliability and validity.

In the future, further studies can expand the sample to different universities to increase representativeness. In addition, using an experimental design to directly test the effectiveness of applying the SRC framework, AI guidance handbook, or peer-review process in Project classes would provide more valuable and practical contributions to the teaching of scientific research methodology in Vietnam.

7. References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher Education, 32*(3), 347-364. https://doi.org/10.1007/BF00138871

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7-74. https://doi.org/10.1080/0969595980050102

Brookhart, S. M. (2018). Appropriate criteria: Key to effective rubrics. *Frontiers in Education, 3*, Article 22. https://doi.org/10.3389/feduc.2018.00022

Brookhart, S. M., & Chen, F. (2015). The quality and effectiveness of descriptive rubrics. *Educational Review, 67*(3), 343-368. https://doi.org/10.1080/00131911.2014.929565

Bui, T. L., & Tran, M. L. (2022). Các nhân tố ảnh hưởng đến ý định tham gia nghiên cứu khoa học của sinh viên Học viện Nông nghiệp Việt Nam [Factors associated with students' intention to participate in scientific research at the Vietnam National University of Agriculture]. *Tạp chí Khoa học Nông nghiệp Việt Nam, 20*(11), 1550-1560.

Ciraso-Cali, A., Martinez-Fernandez, J. R., Paris-Manas, G., Sanchez-Marti, A., & Garcia-Ravida, L. B. (2022). The research competence: Acquisition and development among undergraduates in education sciences. *Frontiers in Education, 7*, Article 836165. https://doi.org/10.3389/feduc.2022.836165

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE Publications.

Davidson, Z. E., & Palermo, C. (2015). Developing research competence in undergraduate students through hands-on learning. *Journal of Biomedical Education, 2015*, Article 306380. https://doi.org/10.1155/2015/306380

Dawson, P. (2017). Assessment rubrics: Towards clearer and more replicable design, research and practice. *Assessment & Evaluation in Higher Education, 42*(3), 347-360. https://doi.org/10.1080/02602938.2015.1111294

Ha, D. S., & Nong, T. N. M. (2019). Các nhân tố ảnh hưởng đến sự tham gia nghiên cứu khoa học của sinh viên: Nghiên cứu trường hợp Đại học Tài chính - Marketing [Factors associated with students' participation in scientific research: A case study at the University of Finance - Marketing]. *Tạp chí Nghiên cứu Tài chính - Marketing, 49*, 13-24. https://doi.org/10.52932/jfm.vi49.92

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112. https://doi.org/10.3102/003465430298487

Healey, M., Flint, A., & Harrington, K. (2014). *Engagement through partnership: Students as partners in learning and teaching in higher education*. Higher Education Academy.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

Le, X.-M., Phuong, H.-Y., Phan, Q.-T., & Le, T.-T. (2023). Relationship of using analytic rubrics for peer assessment on EFL students' writing performance: An experimental study. *Multicultural Education, 9*(3), 41-52. https://doi.org/10.5281/zenodo.7750831

Le, T. T. T., Nguyen, T. T. H., Vu, N. Q. D., & Pham, H. H. (2025). Đề xuất khung năng lực khoa học mở cho các nhà nghiên cứu và thực hành giáo dục tại Việt Nam [Proposing an open science competence framework for educational researchers and practitioners in Vietnam]. *Tạp chí Giáo dục, 25*(14), 1-6.

Panadero, E., & Broadbent, J. (2018). Developing evaluative judgement: A self-regulated learning perspective. In D. Boud, R. Ajjawi, P. Dawson, & J. Tai (Eds.), *Developing evaluative judgement in higher education: Assessment for knowing and producing quality work* (pp. 81-89). Routledge. https://doi.org/10.4324/9781315109251-7

Prosekov, A. Y., Morozova, I. S., & Filatova, E. V. (2020). A case study of developing research competency in university students. *European Journal of Contemporary Education, 9*(3), 592-602. https://doi.org/10.13187/ejced.2020.3.592

Reddy, Y. M., & Andrade, H. (2010). A review of rubric use in higher education. *Assessment & Evaluation in Higher Education, 35*(4), 435-448. https://doi.org/10.1080/02602930902862859

Tran, T. T., Pham, M. D., Tran, T. D., Chau, T. T., Dao, V. N., Nguyen, V. T., Hua, T. N., & Le, V. K. (2020). Hiện trạng và giải pháp nâng cao năng lực nghiên cứu khoa học của giảng viên Trường Đại học Cần Thơ [Current situation and solutions to improve the scientific research competence of lecturers at Can Tho University]. *Tạp chí Khoa học Trường Đại học Cần Thơ, 56*(4C), 161-171. https://doi.org/10.22144/ctu.jvn.2020.095

Vo, T. M. N. (2023). Nghiên cứu về những yếu tố ảnh hưởng lên động cơ tham gia nghiên cứu khoa học của sinh viên [A study on factors associated with students' motivation to participate in scientific research]. *Tạp chí Khoa học và Công nghệ - Đại học Đà Nẵng, 21*(4), 27-33.

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8. Bionote

Quoc Bao Mai is currently a student at Ho Chi Minh City University of Foreign Languages - Information Technology (HUFLIT). His learning orientation focuses on research and practical application in the English Language major. He has a strong interest in modern educational methods and students' scientific research skills. This research is part of his effort to understand and improve training quality, aiming to build academic standards and develop students' research competence in the context of applying technology, especially AI, to learning.