

Enhancing undergraduate EFL students' research-related writing skills through a mini e-book chapter project

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ABSTRACT

It is important for the university students to develop research-related academic writing skills as they need to prepare themselves to write a thesis proposal and other forms of academic writing communication. However, many still struggle to show comprehension and express basic research elements in writing, even after completing academic writing courses. Even though previous studies have shown Project-Based Learning (PjBL)'s effectiveness to enhance general writing performance and 21st-century skills, not much research in ELT higher education has focused on the use of PjBL for research-related writing in content courses. This gap suggests that students may not yet receive sufficient opportunities to practice research-related writing in meaningful and contextualized ways. To address this issue, the present study examined the effectiveness of a PjBL mini e-book chapter project in enhancing undergraduate EFL students' research-related academic writing skills in a Designing Research in ELT course. A mixed-methods explanatory sequential design was employed involving 24 fourth-semester English education students at a public university in Malang. In addition to students' reflections and interview responses, their learning gains were measured through pre- and post-tests. The findings suggest that the project had a meaningful impact on their writing performance. The mean scores increased from 69.69 to 79.74, and the paired-sample t-test indicates a significant improvement ($p < .001$) and has a large effect size (Cohen's $d = 1.02$). Qualitative findings further confirmed improvements in research literacy, motivation, and 4Cs. These results highlight the potential of PjBL as an instructional innovation for strengthening research-related academic writing skills in similar EFL contexts.

Keywords: academic writing; ELT research; mini e-book project; project-based learning; 21st-century skills

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INTRODUCTION

Soft skills are crucial in the twenty-first century for both professional and social success (Cimatti, 2016). The rapid pace at which information and technology are developing has changed both the

nature of employment and how people communicate with one another. The known 4Cs (critical thinking, creativity, communication, and collaboration) are especially important among the many soft skills needed by students to thrive in today's world (Ahmed, 2022; Trilling & Fadel, 2009). University students regularly face difficulties in their studies as well as in their social and personal life, yet they frequently lack immediate solutions for these problems (Kivunja, 2014). Therefore, they need effective problem-solving and decision-making, which particularly depend on their critical thinking skill. Additionally, students must successfully demonstrate the 4C abilities in social situations (Thornhill-Miller et al., 2023).

Project-based learning (PjBL) is an educational strategy that is well-suited to the requirements of today's era, as it offers an ideal environment for developing the 4Cs core competencies that are now necessary for college students. Since the 4Cs are the foundation of education in the twenty-first century, these abilities play a role in the classroom (National Education Association, 2014). The 4Cs can be effectively cultivated through the implementation of PjBL (Firda & Sunarti, 2022). This instructional model creates a learner-centered environment in which instructors can guide students to actively engage in and apply these competencies (Permata et al., 2019). This is evident in the way students, throughout the learning process, are given opportunities to sharpen and enhance their 4Cs. Even though PjBL is considered an effective strategy for developing these essential competencies (Guo et al., 2020; Harun, 2006; Silitubun et al., 2024; Zhang & Ma, 2023), not much research is directed to research-related academic writing required in content courses at the tertiary level, as most of this research has focused on general writing performance. Additionally, product-based outcomes such as structured research-focused writing have received limited attention despite their importance for academic assessment and research literacy development. To address these gaps, the present study explores a mini e-book chapter project as a PjBL product designed specifically to strengthen students' introductory research-related academic writing skills in an ELT higher-education context.

It is expected that 21st-century university graduates will prosper in a rapidly evolving professional environment which is characterized by the increase in not only artificial intelligence, global competition, but also and rapidly shifting labour demands. These 4Cs are highly appreciated by employers because they enable people to evaluate problems, discover new solutions, express ideas, and effectively collaborate in different environments (Bell, 2010; Thornhill-Miller et al., 2023). Furthermore, students with strong 4Cs can be flexible, employable and lifelong learners, who can act responsibly, demonstrate leadership, make intelligent choices and adjust to new circumstances easily. On the other hand, students without 4Cs might face challenges such as difficulties in solving real-life problems, expressing ideas academically and professionally, and falling behind in an increasingly competitive labour market, which requires independence and creativity (Guo et al., 2020). This indicates that classroom instructions which focus on a teacher-centered way is no longer sufficient to meet the needs of the 21st century. Instead, higher education must use learning-focused techniques, such as PjBL, to enable students have critical thinking, be effective collaborators, communicators, and innovative problem-solvers so that they are capable of overcoming complex future challenges (Khalaf & Alshammari, 2023; Zhang & Ma, 2023).

However, the effectiveness of PjBL remains inconclusive. While several studies have reported that PjBL can improve students' writing skills (Asrul et al., 2021; Cahyaningrum & Widyantoro, 2020; Giawa, 2022; Soffiany & Purbani, 2020), other research presents contrasting findings (Rahmalia & Utari, 2021). Moreover, there has been limited investigation into the effectiveness of PjBL in content-based courses. This study aims to examine whether implementing PjBL in the form of a mini e-book chapter project can effectively enhance students' ability to evaluate published research articles and write classroom-based mini research in the *Designing Research in ELT* course, as well as to explore their perceptions of this learning approach. The findings of this study are expected to contribute to the theoretical understanding of PjBL implementation in core courses. Although research on PjBL in language learning, particularly in foreign language contexts, has grown significantly, its application in content-based English language teaching (ELT) courses at the tertiary level—especially in the Indonesian context—remains underexplored and warrants further attention.

This study offers both theoretical and practical contributions. Theoretically, it contributes to the body of research on PjBL, particularly its implementation in core (content) courses at the higher education level—an area that remains underexplored in the context of ELT in Indonesia. It also provides and strengthens evidence that project-based writing activities, such as mini e-book chapter projects, have the potential to foster 21st-century skills, including critical thinking, collaboration, communication, and creativity (4Cs). Practically, the findings of this study present an alternative, innovative teaching approach for lecturers, especially in teaching research-oriented courses like *Designing Research in ELT*, through the application of product-oriented PjBL. Moreover, the study offers insights into students' perceptions of PjBL, which can serve as a valuable reference for curriculum development and instructional strategies, particularly in the context of core course instruction. In detail, this current research seeks to address the following research questions:

1. Is there a difference in students' abilities before and after the implementation of Project-Based Learning (mini e-book chapter project) in writing simple research papers for the *Designing Research in ELT* course?
2. What are students' perceptions of the use of PjBL in the *Designing Research in ELT* course?

LITERATURE REVIEW

PjBL and academic writing in higher education

Several important writing components must be taken into account in order to develop a well-written academic essay. As [Harvey \(2009\)](#) outlined, twelve essential elements should be present in an academic essay. These include a thesis statement, logical reasoning, keywords, supporting evidence, analysis, essay structure, logical sentence and paragraph organization, the use of credible sources, counter-argument reflection, orientation, writer's stance, and language style.

Academic essays are often characterized by its objectivity ([Hartley, 2008](#)) which is evident in the frequent use of passive constructions, specific terminology, third-person pronouns, and scientific sources. In addition, academic essays improve reading, writing, and communication skills ([Leon, 2023](#)) while encouraging critical thinking ([Imaniar and colleagues, 2018](#); [Leon, 2023](#)). Students must not only think critically about information and develop logical arguments but also represent their thinking in logic and clarity through writing in order for them to engage in higher academic writing practices. According to [Graham and Harris \(2019\)](#), students are able to develop an increased understanding of what they are learning if writing activities are part of the learning process. They further suggest that in core subjects, involving students in writing throughout the learning process facilitates better comprehension and retention by encouraging them to personalize texts and manipulate key ideas from what they read.

Previous studies on the use of PjBL in higher education content courses have generally focused on poster and paper-based projects. One such study was conducted by [Mali \(2016\)](#), who implemented poster and blog writing projects in a *Creative Writing* course and paper-writing projects in a *Second Language Acquisition* course. The findings indicated that PjBL enhanced student participation and encouraged instructors to adopt more innovative teaching practices. Similarly, [Karyawati and Ashadi \(2018\)](#) conducted a case study on the implementation of PjBL in an International Class Program for a *Drama* course at a university in Salatiga, Central Java. Students worked in groups to produce a drama performance project in their study. The results showed that PjBL contributed to improved speaking skills. More recently, [Wisanti et al. \(2024\)](#) found a positive correlation between students' communication skills and their conceptual understanding, as well as between communication and creativity during the implementation of PjBL. Similarly, biology education students at a public university in East Java were tasked with creating digital posters for a *Plant Systematics* course. These findings suggest that PjBL can support students' language skills and understanding of content subject matter. However, there remains a lack of research specifically focusing on the use of PjBL in research-oriented courses within higher education, particularly in the field of education.

Research-related academic writing skills

The nature of typical academic writing and research-related academic writing is actually different. As [Graham and Harris \(2019\)](#) and [Leon \(2023\)](#) point out, academic writing requires students to develop evidence-based ideas in a clear and logical manner, use credible sources correctly, and be supported as they navigate and think critically about the disciplinary knowledge expressed in writing. While academic writing is foundational, research-related academic writing is demandingly complex in its cognitive and rhetorical operations that go beyond surface-level language production and thus need explicit instruction, modeling, and scaffolding ([Sysoyev et al., 2023](#); [Mali, 2023](#)). According to [Sysoyev et al. \(2023\)](#), students are expected to accurately summarize scholarly works, justify the research's rationale, describe the methodology, and explain how the findings are interpreted. As students take on increasingly challenging writing assignments, this calls for step-by-step scaffolding ([Sysoyev et al., 2023](#)). Undergraduate EFL students often lack the ability to conduct research-related academic writing because they have not been exposed to research discourse in their coursework, thus they struggle in areas such as identifying a research problem or organizing their literature review, and struggle to communicate methodological components in writing ([Mali, 2023](#)). These sometimes lead to low confidence in writing research assignments or proposals for their thesis.

Authentic writing tasks can strengthen these research-related writing skills. [Miller \(2014\)](#) investigated university students' skills and perceptions in writing for Wikipedia entries based on research materials. He found that students' research skills and academic writing abilities improved as a result of the project. Similarly, [Ghufron \(2015\)](#) conducted a classroom action research study to examine the impact of using scholarly articles as instructional material on students' academic writing abilities. Conducted over two cycles, the study demonstrated that exposure to published research articles significantly enhanced students' academic writing skills.

However, research writing remains a challenge for EFL undergraduates. They are often faced with the complexity of academic writing related to research because of the limited exposure to research discourse. [Alfonso's \(2025\)](#) study reveals that even students engaged in active research courses face significant challenges in selecting research themes and titles, formulating research problems, developing appropriate procedures, and interpreting coherent in research findings. This conclusion is consistent with that of [Mali \(2023\)](#), which found that students of undergraduate EFL often struggle with initial research writing tasks such as literature review, the development of research questions, and making outline of research procedures. Likewise, [Nikoulina \(2020\)](#) also revealed that students who possess academic writing skills do not necessarily have the ability to apply research-related skills effectively in writing research within specific subject areas. The research also yields that students tend to struggle with synthesizing important information, particularly in reviewing relevant research and describing research methodologies clearly ([Nikoulina, 2020](#)). Furthermore, even postgraduate students find it difficult to develop clear and structured arguments, synthesize sources, and fulfill research writing academic rhetorical criteria in the absence of specific instruction ([Esfandiari et al., 2022](#)). If all of these elements are combined, the results of previous studies imply the need of targeted interventions are necessary to help undergraduate EFL students progressively develop confidence and proficiency in research-related academic writing assignments.

Need for pedagogical innovation in research-related writing task

Innovation in the teaching of research-related academic writing is crucial because traditional models of writing instruction is insufficient and often focus on general essays or exercises that are structure-oriented (e.g. grammar accuracy or essays that resemble the five-paragraph structure), which do not give students opportunities to develop higher-order skills related to academic research ([Sysoyev et al., 2023](#); [Mali, 2023](#)). To address this issue, lecturers need to apply instructional innovation to help students develop higher-order research-related writing skills, including formulating research problems, synthesizing literature, and presenting findings and discussion. Project-Based Learning (PjBL), which offers real, inquiry-driven learning and fosters the 4Cs are essential for both academic and professional success ([Bell, 2010](#); [Guo et al., 2020](#)). Studies have shown that PjBL encourages students to negotiate

meaning, solve real-world problems, and report findings in formal academic forms which makes it especially relevant to research-related writing. An example of a product-oriented PjBL task is a mini e-book chapter, which shows introductory aspects of research performed in structured writing, analyzes the articles content, and exhibits in-depth engagement with research materials. The research in Indonesian EFL contexts has shown that project-based learning can be immensely beneficial in enhancing students' writing performance in terms of content development, organization, vocabulary usage, and grammatical accuracy, while also increasing their motivation to undertake challenging writing tasks (Arochman et al., 2024).

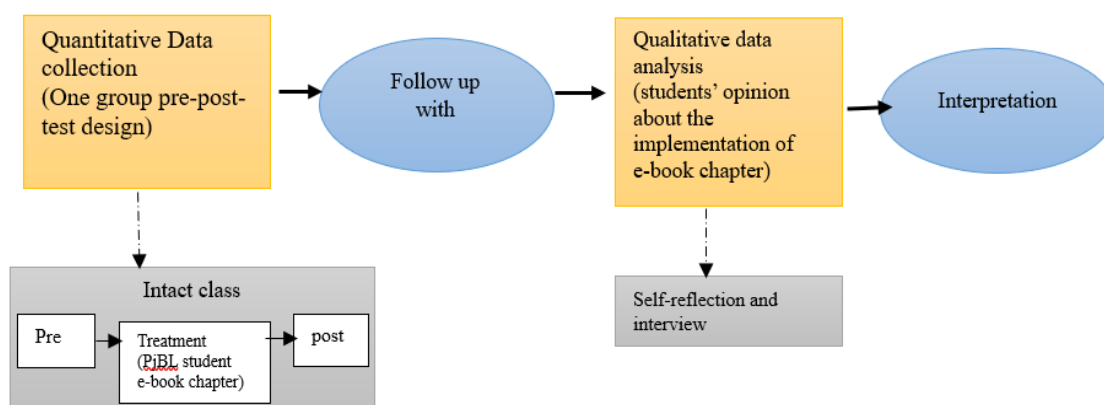
Even though the term "mini e-book chapter" is not commonly found in the literature available, numerous classroom and R&D studies have implemented e-book development as a product-oriented project-based learning (PjBL) task. These studies suggest that developing digital booklets and e-book chapters offers students an authentic purpose for synthesizing research materials, designing content, and practicing academic writing conventions in a supported environment (Churiyah et al., 2023; Himawan, 2024). To contextualize the mini e-book chapter project in this study, it refers to the form of the project as a specific e-book/PjBL product that focuses teaching and learning on research-related writing practice. Several studies have shown similar results, noting that project-based learning not only strengthens students' higher-level cognitive skills but also contributes to better writing achievement (Zhang & Ma, 2023; Guo et al., 2020).

METHOD

An explanatory sequential mixed-methods design was used in this study to assess the PjBL mini e-book chapter project's effectiveness. In classroom-based intervention studies where comparison groups are not feasible, a single-group pre-experimental pretest–posttest design was employed for the quantitative phase (Creswell, 2012). In order to evaluate the extent of improvement, students' initial research-related writing skills were evaluated both before and after the project was implemented. The PjBL mini e-book chapter project was the independent variable, while the students' achievement in research-related academic writing was the dependent variable. Due to the lack of a control group, this design does not provide strong causal claims; yet it gives beneficial educational implications for identical EFL classroom contexts and useful preliminary evidence of the project's effectiveness.

Figure 1

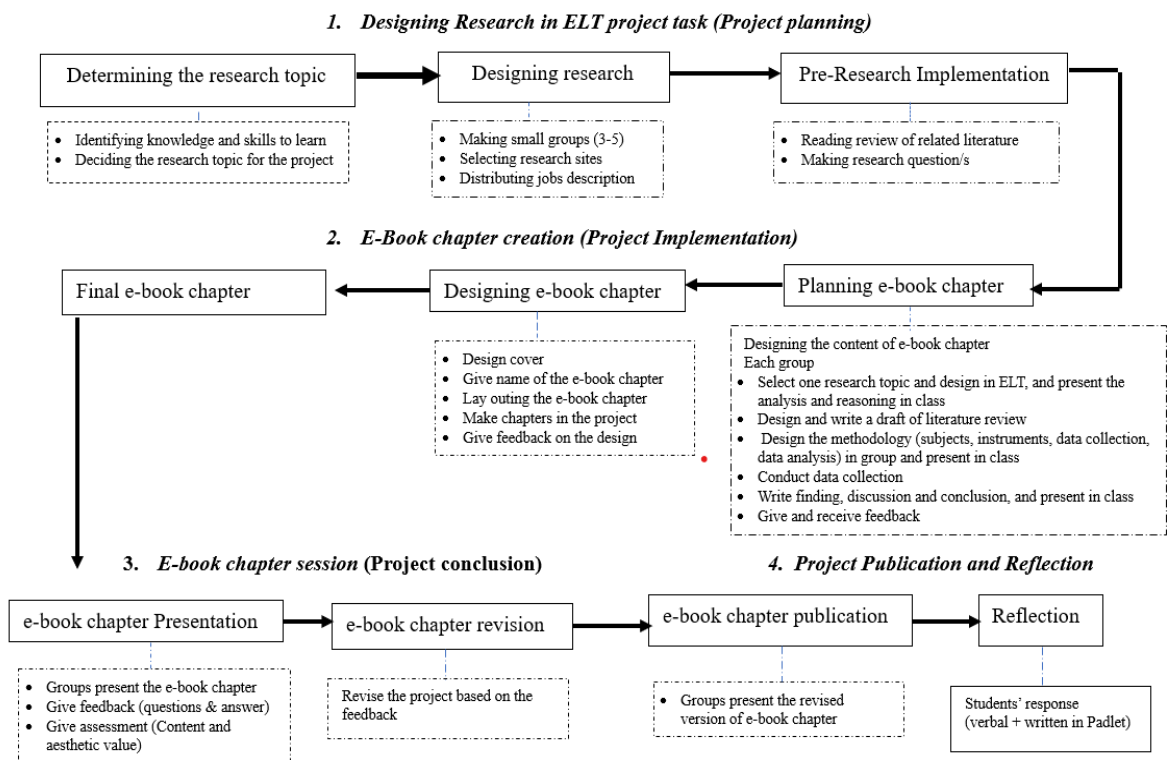
Research Procedure of Explanatory Sequential Design



Before the treatment, students were given a pretest to assess their initial ability to write a simple research-based essay and to answer multiple-choice questions before receiving the intervention. Following the pretest, students participated in a PjBL intervention focused on writing simple research papers. This intervention was conducted over eight sessions (excluding the pre- and post-test). In line

with the PjBL framework, students were presented with a guiding question or problem to solve. After that, they were given instructions to create a mini-e-book chapter assignment that comprised essays analyzing particular elements of existing research articles about teaching English in formal and informal educational settings. The project was then created and given to the class. During the presentation, the lecturer and peers provided feedback to the students. In addition to the development of the e-book chapter, the feedback also centered on the quality of the essays based on the analysis of the literature they had selected. Students published their mini e-book chapter in Google Classroom at the end of the project after they had revised and edited their work. At the end of the intervention, a posttest was conducted to evaluate the learning results and they were compared with the pretest scores.

Figure 2
PjBL Procedure



Population and sample

The fourth semester of undergraduate students of the English Education Program at one of state universities served as the study's participants. *Designing Research in ELT* course was chosen because it directly relates to the study's topic by introducing students to fundamental research concepts and early-stage academic research writing. During the 2024–2025 academic year, there were about 120 students enrolled in the course in five parallel classes. Purposive sampling was utilized to select one intact class comprising 24 students. This class was chosen because it was accessible to the researcher and represented students who were at an appropriate stage to begin learning research-related writing skills. As they were preparing for future research proposal development in subsequent semesters, the class served as a relevant setting for implementing and examining the PjBL mini e-book chapter project. The purposive sampling was also implemented for the interview session. There were one male and nine female students who willingly participated in the interview. Before the study, each participant gave his or her consent after being informed of the purpose of the study. They were assured that their participation was completely optional, that it did not affect their course grade, and that they could stop participating at any time or ask questions if it was uncomfortable for them.

Research instruments

According to [Creswell \(2012\)](#), there are two types of instruments used for data collection: pre-developed instruments and researcher-developed instruments. In this study, both types were employed. The instruments developed by the researcher included the writing test (used for both pretest and posttest) and a multiple-choice test. Two instruments were used in this study, namely a writing test assessing introductory research-related academic writing skills and an analytic scoring rubric. The writing test comprised two measurement components: a 25-item multiple-choice assessment of basic research concepts and an article-analysis writing task where students were required to evaluate a published ELT research article. The Course Learning Outcomes (CLOs) of the *Designing Research in ELT* course served as the basis for both assessments, which were designed to measure content appropriately throughout the assessments and comply with curriculum standards. The writing test underwent content validation through expert judgment. A lecturer specializing in academic writing and research methodology reviewed the test blueprint, item relevance, and task clarity. The small changes made to the writing test were mostly concerned with ensuring clear wording. The researchers used an analytical scoring rubric adapted from the Jacobs ESL composition profile (1981) to evaluate the students' article analysis. Content (30 points), organization (25 points), vocabulary (20 points), language (20 points), and mechanics (5 points) are the five areas covered by the rubric. The adaptation process involved some phases, namely expert validation, pilot testing, and revision. The latter instrument underwent revision and piloting. Cronbach's $\alpha = .688$ and $r = .524$ ($p = .009$) showed moderate and satisfactory inter-rater consistency for classroom assessment after revision. Quantitative data were analyzed using SPSS 25 with a paired-sample t-test. Qualitative data were collected through students' self-reflection essays and interviews with selected participants. For the qualitative phase, semi-structured group interviews were conducted to gather deeper insights into students' experiences with the mini e-book chapter project. There were ten students who willingly participated in the interview. Aside from their willingness, they were selected because they were able to provide reflective feedback on the learning process. The interview was conducted after the posttest administration. The interview protocol focused on students perceived improvements, challenges, and engagement in completing the PjBL writing task for the mini e-book chapter project. The qualitative data were analyzed thematically using basic coding procedures to identify common themes as mentioned earlier.

Data analysis

To determine the final scores for both the pretest and posttest, the researcher followed several steps. First, initial data collection was conducted. In the pretest and posttest, students completed two sections: a brief essay evaluating a research article (which evaluated their writing and critical thinking skills) and a multiple-choice test (which measured their conceptual understanding). Second, the two raters assessed the students' analytical essays once they were turned in. Rater 1 was an AI-based tool (OpenAI), and Rater 2 was the researcher. [Hartwell and Aull \(2023\)](#) state that writing assessment is increasingly introducing AI and digital corpora to enhance scale and objectivity, which underpin the use of automated rater alongside human scoring. In this study, OpenAI did not substitute human judgement, instead it acted as a supportive and complementary scoring tool to enhance objectivity and ensure scoring consistency across writing samples. The scores given by both raters were then averaged to determine each student's final score for the article analysis. The next step was scoring reliability testing, conducted using Cronbach's Alpha to assess the level of consistency between the two raters. Following this, score integration was carried out for each student. The average of the multiple-choice test and essay analysis scores was used to determine the final pretest score. Calculating the pretest data's overall mean and standard deviation (SD) was the fifth stage in the analysis process. At last, the scores of the students were divided into three categories: low ($\leq \text{Mean} - 1 \text{ SD}$), intermediate (between $\text{Mean} \pm 1 \text{ SD}$), and high ($\geq \text{Mean} + 1 \text{ SD}$).

FINDINGS

The effectiveness of project-based learning (mini e-book chapter project) in writing simple research papers in the designing research in ELT course

Pretest

During the pretest phase, the researcher used two types of scores: the scientific article analysis score and the multiple-choice test score. The article analysis score was obtained by averaging the evaluations from two raters. Cronbach's Alpha was used to analyze inter-rater reliability using the two sets of scores. The two raters' scores showed a satisfactory degree of internal consistency and a moderate level of internal reliability with a Cronbach's Alpha of .683. Each rater had variability in scale and distribution of the scores. The standardized items showed .750, indicating an acceptable internal consistency. The standardization of the items enhanced the reliability, as evidenced by the initial α = .683 score.

Table 1

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.683	.750	2

Table 2

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	74.375	74.042	74.708	.667	1.009	.222	2
Item Variances	41.607	20.650	62.563	41.913	3.030	878.352	2
Inter-Item Correlations	.600	.600	.600	.000	1.000	.000	2

According to the summary item statistics, the average scores of the two raters were extremely close, with a range of just .667 points, suggesting that the researcher's and the AI tool's evaluations were generally consistent. The fact that the items correlated at .600, showing a moderate positive correlation, also gives more confidence in how the scores were determined. To get the final pretest score for each students' essay, the scores from two raters were averaged and then added with the multiple-choice score. This final score served as a benchmark for assessing the effectiveness of the intervention and comparing it with the results of the posttest. The students' scores were then divided into high, moderate, and low. The data yielded a mean score of 69.69 and a standard deviation (SD) of 12.02. Using these values, the categories were defined as follows.

Table 3

Pretest Category

Category	Score range
High	≥ 81.71
Moderate	Between 57.66 and 81.70
Low	≤ 57.66

Figure 3
Pretest Score Distribution

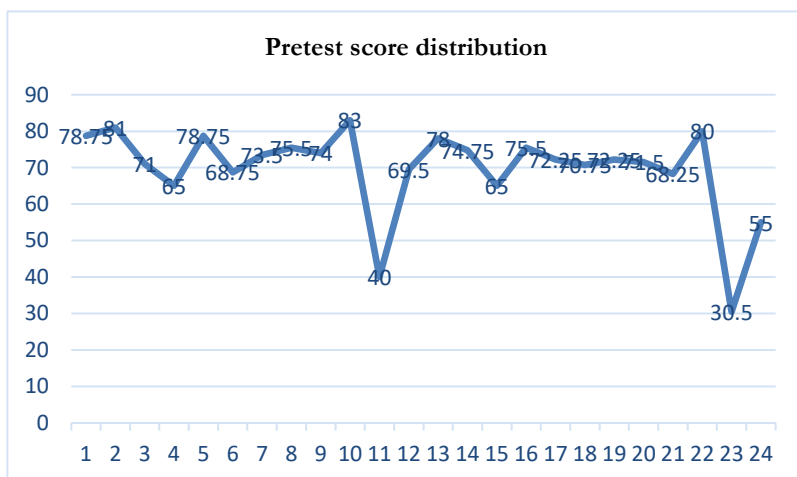
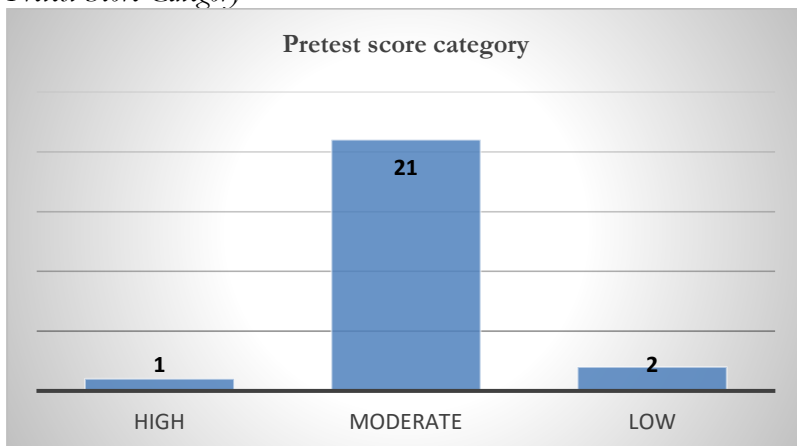
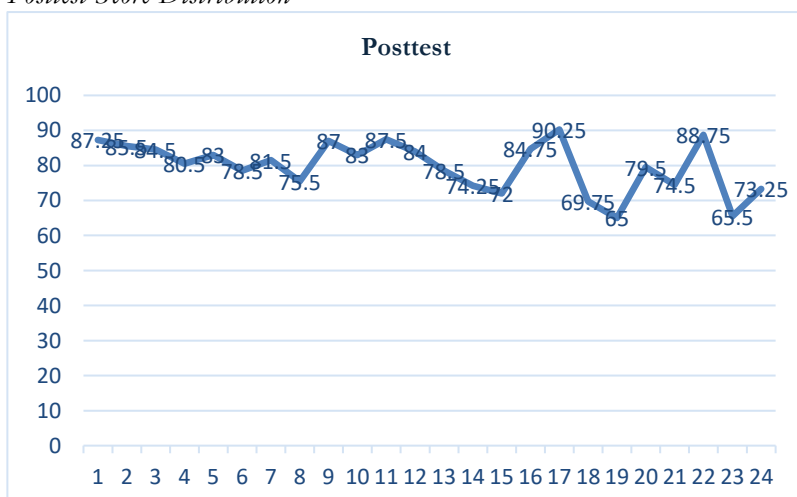


Figure 4
Pretest Score Category



This graph shows that the majority of students fall into the medium category, with a small number falling into the low category, and only one student reaching the high category. These findings offer an initial evaluation of the efficacy of learning prior to the intervention.

Figure 5
Posttest Score Distribution



The posttest score distribution shows that many students scored above 75, which indicates an improvement in their abilities in research-related academic writing after the intervention as compared to the data on the pretest.

Table 4

Reliability Statistics posttest

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.688	.688	2

The alpha value of .688 indicates a sufficient level of internal consistency between raters. The inter-rater reliability is also considered adequate, which makes the scores suitable for further analysis.

Table 5

Inter-Item Correlation Matrix

	Post_rater1	Post_rater2
Post_rater1	1.000	.524
Post_rater2	.524	1.000

The result of inter-item correlation between the two raters in the posttest was $r = .524$. This indicates that the scoring consistency is moderate and at an acceptable level. This suggests that although there are some scoring variations, it is a minor one, as both applied the rubric in a reasonably similar manner.

Table 6

Summary Item Statistics of Posttest

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	79.313	77.042	81.583	4.542	1.059	10.313	2
Item Variances	56.452	55.210	57.694	2.484	1.045	3.084	2
Inter-Item Correlations	.524	.524	.524	.000	1.000	.000	2

The finding is further supported by the summary item statistics. Table 6 demonstrates that the raters' mean scores were close (77.04–81.58), with a narrow range and comparatively low variance, suggesting that there was little variation in their scoring patterns. Furthermore, the inter-item correlation variance was zero, indicating that the two raters' scores continued to have a stable trend across the sample.

Table 7

Posttest Score Category

Criteria Category	Score range
High	≥ 86.77
Moderate	72.71 - 86.76
Low	≤ 72.20

Figure 6*Posttest Score Category*

The posttest results show an increase in the number of students categorized as low achievers, but this does not imply a decline in overall learning. Although the majority of students in the posttest continued to fall into the moderate group when compared to the pretest data, a rise in high performers was predicted. Even though the data indicates that the number of low-performing learners increased, those individuals were not the same low-performing students on the pretest, which means that this shift does not imply a decline in overall learning. At the group level, the overall trend remained positive as the mean score increased by more than ten points, and the number of high-performing students improved significantly. This indicates both a general increased tendency and variation in each student's improvement.

Table 8*Correlation between Raters*

		Post_rater1	Post_rater2
Post_rater1	Pearson Correlation	1	.524**
	Sig. (2-tailed)		.009
	N	24	24
Post_rater2	Pearson Correlation	.524**	1
	Sig. (2-tailed)	.009	
	N	24	24

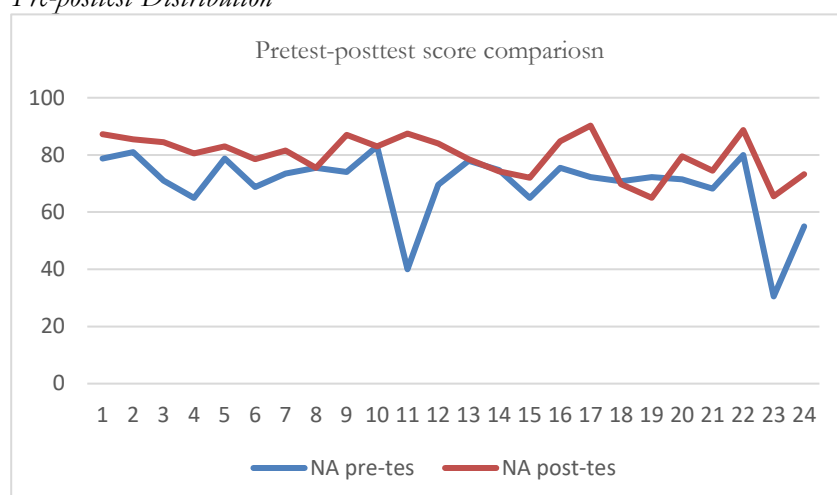
** . Correlation is significant at the 0.01 level (2-tailed).

The raters' agreement was statistically significant ($p = .009$), which indicates reliable judgment between raters. The result from the pretest implies that the students still have a chance to develop their research-related writing abilities, as the majority of them (87.5%) fell into the moderate category.

Table 9*Descriptive Statistics*

		Mean	N	Std. Deviation	Standard error mean
Pair 1	Pre_Test	69.6875	24	12.28317	2.50729
	Post_Test	79.7396	24	7.17956	1.46552

Table 9 shows an increase in the mean score from pretest to posttest by 10.05 points. The mean score improvement signs the impact of the mini e-book chapter project intervention on the students' research-related writing skills.

Figure 7*Pre-posttest Distribution***Table 10***Paired Samples Test*

		Paired Differences				t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower Upper			
Pair 1	Pre_Test - Post_Test	-10.05208	11.70818	2.38992	-14.99601 -5.10815	-4.206	23	.000

The null hypothesis (H_0 : no significant difference) was rejected. The statistically significant results confirm that the Project-Based Learning (PjBL) intervention improved students' ability to write simple research papers. The posttest score distribution and rating consistency suggest that students found the e-book chapter project both engaging and beneficial for developing critical thinking and collaboration skills—aligned with the goals of 21st-century skill development.

To determine the magnitude of the difference between pretest and posttest scores, the researchers calculated Cohen's d . The calculation results showed an effect size of $d = 1.02$, which is considered very large ($d > 0.8$). This finding indicates that the improvement in students' research-related writing skills is not only statistically significant ($p < 0.05$) but also has strong practical significance in the learning context.

Students' perceptions of using PjBL in the designing research in ELT course

Qualitative data from *Reflection and Feedback: Designing Research in ELT* indicate that the Project-Based Learning (PjBL) mini e-book chapter project effectively enhanced students' research writing skills as well as their 21st-century competencies. The following are key findings relevant to this study:

Improvement in research writing skills

Students reported significant progress in their research writing abilities throughout the PjBL mini e-book project in the *Designing Research in ELT* course. Initially, most all of the students had limited knowledge on research paper structure and how to design mini research on their own for their future research proposal. They struggled how to formulate research questions, analyze data, organize ideas systematically, and cite sources correctly. One student shared, "*At first, I only understood the basic structure of a research paper... Now I know how to formulate research questions, analyze data, and cite sources correctly*" (RAL). Other students also shared that the project raised their confidence to design future academic writing tasks. Some students reflected, "*I learned how to organize ideas systematically, use credible sources, and write in an academic style*" (RA) and, "*This project gave me the confidence to write my thesis in the future*" (YCE). By

working directly with research tasks, students had the chance to put what they learned into practice. They were able to connect data interpretation, argument development, and citation skills into a more coherent piece of writing. These results suggest that PjBL not only improves students' research-related writing abilities but also boosts their confidence and independence when completing academic work.

Development of 21st-century skills (4Cs)

Additionally, the students' 4Cs are also promoted during the completion of the mini e-book chapter project. Their critical thinking, creativity, collaboration, and communication skills were challenged and applied in the project. Students stated that their critical thinking was enhanced when doing data analysis and making connections between findings and theoretical frameworks. As one student explained, *"We had to analyze data and connect it to theory—this really trained our critical thinking"* (RMS). Through topic selection and digital e-book design, creativity was also fostered, encouraging original thought and a sense of ownership over learning. One student said, *"Choosing our own topics and designing the e-book encouraged creativity"* (RDP). Through the projects, students learned to efficiently distribute equal responsibilities, share ideas, and overcome disagreements, all of which helped them enhance their collaboration and communication skills. For example, two students stated, *"Group work taught me how to share ideas, resolve conflicts, and divide tasks"* (RPW), and *"We combined different perspectives to achieve a more objective analysis"* (WT). When taken as a whole, these experiences demonstrate how PjBL combines the development of social and cognitive skills, equipping students to deal with challenging research assignments while promoting interpersonal competence and teamwork.

Student motivation and engagement

Furthermore, results of qualitative data also show that the mini e-book chapter project gave a positive effect on students' learning involvement and motivation. In this project, students may choose their own research topics and present methods of presentation. Because they were given autonomy, the project gave a sense of personal meaning. One student shared, *"Being able to choose the topic and presentation format made the project feel more personal"* (SAS). By giving students concrete, publishable work to be proud of, the production of a little e-book further increased intrinsic motivation. As another student reflected, *"The digital e-book made our work feel professional and appreciated—like real authors!"* (SSJ). These features promoted thorough planning, rigorous investigation, and dedication to quality supported continued engagement. Learners' active engagement and interest in this project were also supported by a stimulating and pertinent learning experience that included a combination of autonomy, appreciation, and real-world applicability.

Role of the lecturer and feedback

The PjBL small e-book project's effectiveness was largely due to lecturer guidance and focused feedback. Students highlighted that timely, targeted comments strengthened overall study organization, improved citation accuracy, and clarified arguments. One student noted, *"The lecturer's feedback was very specific—it helped me improve unclear arguments and citations"* (SAH), while another shared, *"The guidance on research structure was especially valuable for a beginner like me"* (SFA). The lecturer's feedback benefits students with limited research experience and helped them to gradually gain competence and confidence through the scaffolding. A contextualized learning environment where students could develop both independently as researchers and cooperatively as problem solvers was established by offering a structure and allowing them to have some degree of autonomy.

Challenges and solutions

Students faced a number of difficulties while working on the PjBL mini e-book project, despite the overall favorable results. Among them, data analysis and group coordination were the most frequently mentioned challenges. Connecting study findings to theoretical frameworks was also particularly difficult, according to many students. As one student noted, *"It was difficult to connect the findings to theory"*, highlighting the cognitive demands of integrating empirical data with conceptual understanding.

Coordinating group work also presented challenges because unequal task distribution occasionally resulted in irritation and inefficiencies. One student reflected, *"The task distribution was uneven"*. The complain signs that clear roles and responsibilities in collaborative projects are substantially important.

To overcome these problems, students asked their lecturer and classmates for help and support. They used two methods to enhance their work quality and writing flow by asking each other to review their assignments and asking the lecturer for guidance and feedback. For example, one student explained, *"We edited each other's writing"*. The typical challenges they faced were developing an argument in the background, identifying a research gap, analyzing the data, and organizing the project. Thus, timely and focused feedback for clarity and direction from the lecturer was especially beneficial. As a student explained, *"The feedback provided clear direction"*.

These qualitative results point out areas that should be improved in PjBL future implementations. Students specifically recommended more balanced group roles to ensure equitable participation and a clearer rubric to set desired outcomes. The learning advantages of PjBL can be maximized while common obstacles are decreased by resolving these issues. All in all, despite the challenges, the project's successful completion and substantial opportunities for learning have mostly resulted from the students' selected strategies and the lecturer's support.

Table 11

The Qualitative Data

Theme	Student Quotes	Implications
Improvement in Research Writing Skills	<i>"At first, I only understood the basic structure of a research paper... Now I know how to formulate research questions, analyze data, and cite sources correctly."</i> — RAL <i>"I learned how to organize ideas systematically, use credible sources, and write in an academic style."</i> — RA <i>"This project gave me the confidence to write my thesis in the future."</i> — YCE	Through Project-based learning, students improve their technical research writing, through the process of generating research questions, analyzing data, proper citations, organizing concepts, and increasing their confidence to continue academic work.
Critical Thinking & Creativity (4C Skills)	<i>"We had to analyze data and connect it to theory—this really trained our critical thinking."</i> — RMShafira <i>"Choosing our own topics and designing the e-book encouraged creativity."</i> — RDP	Project-based learning promotes higher-order and innovative thinking, as students are required to engage with the data and allow creative freedom in the design of their project.
Collaboration & Communication (4C Skills)	<i>"Group work taught me how to share ideas, resolve conflicts, and divide tasks."</i> — RPW <i>"We combined different perspectives to achieve a more objective analysis."</i> — WI	Project-based learning develops interpersonal and collaboration skills, increasing students' communication, conflict resolution and synthesis levels.
Motivation & Engagement	<i>"Being able to choose the topic and presentation format made the project feel more personal."</i> — Shafa Adinda Salsabilla <i>"The digital e-book made our work feel professional and appreciated—like real authors!"</i> — SSJ	Recognition and autonomy boost intrinsic motivation, promoting greater involvement, active participation, and satisfaction in completing a high-quality task.
Role of Lecturer & Feedback	<i>"The lecturer's feedback was very specific—it helped me improve unclear arguments and citations."</i> — SAH <i>"The guidance on research structure was especially valuable for a beginner like me."</i> — SFA	Specifically for students with little prior experience, prompt, focused feedback offers crucial scaffolding that helps them acquire confidence and effectively develop research skills.

In conclusion, the qualitative data strongly supports the study's main findings; (i) the mini e-book chapter project was effective in improving students' research writing skills, (ii) Project-Based Learning (PjBL) fostered 4C skills through authentic tasks, and (iii) freedom of choice and constructive feedback from the lecturer were key factors in the success of the intervention.

DISCUSSION

The findings of this study confirm that Project-Based Learning (PjBL), implemented through a mini e-book chapter project, can significantly enhance EFL students' research writing abilities in a core university course. The statistically significant improvement between pretest and posttest scores, with a large effect size, demonstrates that the intervention not only improved technical writing skills but also fostered students' confidence in handling research tasks. The result of this study supports Cahyono et al (2024), who found positive effects of PjBL in enhancing EFL/ESL writing across 11 empirical studies. Furthermore, the results of the present study also align with previous research showing the effectiveness of PjBL on writing performance (Cahyaningrum & Widyantoro, 2020; Soffiany & Purbani, 2020; Asrul et al., 2021) but extend the discussion by situating the approach in a research-oriented ELT course, an area that has been less explored.

While the majority of studies indicate the positive impact of PjBL on student writing skills, there are always exceptions. For example, Rahmalia and Utari (2021) found that there was no statistically significant improvement in student writing when they used PBL with high school learners. This variation in findings suggests that the outcomes could be heavily dependent on the context in which PBL was delivered, including age group, content area, duration of project and the amount of scaffolding provided. In this study, the structured nature of the process, the amount of time allocated for the project, and the scaffolding provided by the lecturer all likely acted as positive factors for improvement. This means that implementation is key to the success of PjBL. In a related study, Prabowo et al. (2024) found that PjBL and PBL improved writing skills for introverted students. However, they identified no change for extroverted students as they related to writing skills. This relates to the broader theme in the literature that PjBL effectiveness is reliant on context and student characteristics. In their study, the students reported their high engagement and improvement, which could have been a function of their students' academic maturity and readiness for this type of engagement, but it is also possible that their improvement was a function of the structured support. This illustrates the importance of matching PjBL approaches based on student profiles while ensuring the needed scaffolding is provided to a wide range of student abilities.

This research, in addition to making a contribution to academic writing, has revealed the potential of PjBL in developing 21st-century skills. The student reflections indicated that the engagement with research data and linking their research with theory enhanced the students' critical thinking; creating e-books supported students' creativity. These results are aligned with the argument from Bell (2010) that PjBL provides authentic contexts in which students can develop higher-order thinking. Also, as the research of Fatmawati (2024) demonstrates, there is strong evidence of PjBL supporting academic writing, creativity, and critical thinking skills, through the collaborative stages of research, in an Indonesian higher ed context. The results of Wisanti et al. (2024) and Rohmah et al. (2024) corroborate this, arguing that PjBL can combine the development of subject knowledge with soft skills (e.g. communication, collaborative and teamwork, critical thinking and problem solving, self-management, and responsibility). All of the findings point to PjBL's ability to help students prepare for both academic and professional problems by bridging disciplinary knowledge with transferable skills.

Another important outcome relates to student motivation and engagement. The autonomy to select topics and formats, along with the tangible product of a digital e-book, increased students' sense of ownership and pride. This finding supports Graham and Harris (2019), who argue that writing activities integrated into meaningful projects enhance student engagement and learning depth. Le (2025) further demonstrated that PjBL increases student engagement and writing skills in university English courses. Importantly, lecturer feedback was identified as a crucial scaffold, echoing the claims of Khalaf and Alshammari (2023) that guided support is essential in research writing tasks.

Although these aspects all produced positive results, obstacles like the challenges of processing the data and the inequitable distribution of group tasks suggest that in some areas, there is room for improvement. Similar to Rahardi et al. (2023) whose research investigated PjBL in an academic writing course in Central Java - students faced similar challenges regarding time management and motivation

in group and research-based tasks. In addition, [Rahardi et al. \(2023\)](#) reported difficulties with the teaching-learning process and students' collaboration, which led to the suggestion of more proactive teacher direction and additional coordination methods. This acknowledges the current study findings and suggests that time management, motivation, and equitable roles should be part of a systematic initiative in future PBL practices.

Furthermore, these findings are consistent with [Rahmalia and Utari \(2021\)](#), who noted mixed results in PjBL application. Addressing these challenges through clearer rubrics, more structured role distribution, and ongoing scaffolding could optimize future implementations. In sum, this study provides evidence that PjBL, particularly through product-oriented tasks such as e-book chapters, is a promising pedagogical strategy for enhancing research writing and fostering 21st-century skills in higher education ELT contexts. It contributes theoretically by extending PjBL research into core ELT courses, and practically by offering insights into instructional design that balances autonomy with structured support.

Theoretically, this study adds to the literature on Project-Based Learning (PjBL), especially in the context of research-based English Language Teaching (ELT) courses in higher education, which have received limited research attention. While earlier research has concentrated on creative or narrative writing (e.g., [Cahyaningrum & Widyanoro, 2020](#); [Asrul et al., 2021](#)), this study shows that PjBL has comparable impacts on raising academic and research writing skills. This study also supports the notion that PjBL develops 21st century skills (e.g. critical thinking, creativity, collaboration, communication), such as the learning dimensions framework outlined by the [National Education Association \(2014\)](#). From a practical perspective, the mini e-book chapter project provides an example of how to incorporate authentic product-focused tasks into the content courses ELT curriculum. As demonstrated by the current study, giving students the freedom to choose their own topics and project designs may boost their motivation in addition to offering structured feedback to assist with scaffolding. It is clear that weighing student independence with structure is paramount for teachers. As well, the challenges highlighted the importance of developing clearer rubrics and ensuring groups have structured group roles to avoid students' unequal responsibilities. For curriculum developers, developing PjBL in research-oriented courses will set students up for success in their thesis projects as well as their professional pathways by intertwining preparation for research literacy alongside their employability skills or transferable soft skills.

While this study provides insights, there are limitations that must be considered. The fact that this study uses a small sample size (24 students) limits the generalizability of the findings. Thus, future studies should include bigger and broader groups of participants to support the studies' external validity. Second, in order to support causal claims, this study employed a pre-experimental model without a control group. A more comprehensive experiment or quasi-experiment would offer more convincing proof of causation, even though the study discovered statistically significant gains in students' writing abilities. Third, the study's environment may not be relevant to broader trends in ELT programs across Indonesia or global contexts, because it only examined one course from one university. In order to better understand how PjBL would be able to support students in their development of academic writing skills, comparative studies across institutions and contexts would be more challenging to complete but would offer additional insights. Lastly, although qualitative data revealed students' perspectives, future studies should try to employ a longitudinal observation method that might provide information on whether the abilities learned through PjBL are maintained during the thesis writing process or subsequently in professional tasks. Other research areas include the possible advantages of using digital technology, peer-assessment methods, or cross-disciplinary collaboration to integrate the PjBL method in higher education.

CONCLUSION

This research investigated the effectiveness of a mini e-book chapter project using a Project-Based Learning (PjBL) approach in improving the research writing skills of EFL students in a content-based university course. The efficiency and significance of the intervention were proved by quantitative data

that showed a significant improvement in students' posttest scores with a considerable effect size. Additionally, the qualitative findings demonstrated that students improved their research-writing skills and their ability to use 21st-century skills, including communication, creativity, critical thinking, and teamwork. By giving students freedom to choose their own subjects and giving them real-world experience of publishing a digital product, the mini e-book chapter project also increased motivation and engagement. Although lecturer feedback served as a crucial scaffold to help students progress, the data analysis and group assignment submissions revealed some project components that still need improvement.

Overall, the study's findings indicate that students can build both academic competences and the transferable soft skills necessary to succeed in the twenty-first century through product-oriented PjBL assignments, which can aid in bridging theory-related knowledge with associated practical skills. This study adds to the body of knowledge related to the PjBL in research-focused ELT courses and gives the reader some practical examples of how to incorporate authentic, collaborative, and scalable projects in higher education. Future research (specifically, research related to PjBL) should aim for a larger and more diverse sample, make use of stronger experimental designs, and include longitudinal studies to allow researchers to collect follow-up data from students after the PjBL mini e-books were completed to examine the sustainability of the skills from the projects. There are many reasons for being optimistic about PjBL, and though this study presents limitations, there is strong evidence that PjBL mini e-books can be an innovative and valuable approach to revising research writing practices, while preparing students for success in academic and professional contexts.

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