

**Critical Thinking in EFL Academic Writing:  
A Needs Analysis at the Define Stage of the 5D Model**

**By:**

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**Abstract:** The rapid advancement of artificial intelligence (AI) has significantly altered English language instruction, highlighting the importance of critical thinking (CT) in academic writing. However, CT-oriented writing materials for informatics students in English for Specific Purposes (ESP) contexts remain limited, indicating the importance of a thorough needs analysis to guide content development. This study seeks to examine students' needs for CT-integrated writing in English materials by applying the 5D Model (Define, Design, Develop, Demonstrate, Deliver). A mixed-methods approach was employed to collect extensive data, including questionnaires, interviews, and curriculum analysis. The findings demonstrate that, while students have a very high level of understanding of critical thinking, their ability to apply it in academic writing is uneven. The Define stage emerged as the most important phase because it clarifies learning demands, establishes instructional goals, and identifies skill gaps. Scaffolding approaches, critical reading exercises, and formative feedback are all important components for lecturers to assist writing development. As these instruments were introduced, students reported higher levels of confidence, conceptual knowledge, and the capacity to develop evidence-based arguments. The findings emphasize the necessity of incorporating critical thinking into writing instruction as a key component of ESP material production, especially in AI-driven learning environments. A comprehensive needs analysis is thus required to ensure that instructional materials properly meet learners' academic needs.

**Keywords:** academic writing, critical thinking, English for Specific Purposes (ESP), 5D model

## **INTRODUCTION**

The quick evolution of information technology has changed how students gain knowledge while also influencing the competencies required for academic

and professional success. Critical thinking (CT) is one of these talents that has grown in importance, as it allows students to not only perform academic work more efficiently, but also address complicated real-world challenges. In recent years, there has been a lot of talk about integrating artificial intelligence (AI) into higher education. Since its inception in late 2022, students from many disciplines have increasingly used ChatGPT to facilitate more efficient learning processes (Tayan et al., 2024). However, the extent to which AI helps to build higher-order thinking skills, particularly in academic writing in English as a Foreign Language (EFL) environments, is highly disputable. As a result, alongside technological improvements, traditional learning media such as textbooks continue to play an important role in developing students' critical thinking skills.

Textbooks serve not just as sources of linguistic information, but also as tools for promoting metacognitive development through tasks such as planning, organising, and reflecting on writing processes (Liu & Chen, 2022). However, their effectiveness is mostly determined by how effectively they are tailored to the needs of the learners. Textbooks that are not contextually prepared may actually hamper the development of students' critical thinking skills (Yazici & Hayta, 2021). At the same time, the increasing availability of digital learning resources such as Open Educational Resources (OER), blogs, and video-based platforms has improved learning experiences while also encouraging cooperation and critical review (Darojat et al., 2023 & Swain & Pathak, 2024). However, to properly assist CT development, the utilisation of such materials requires meaningful instructional design.

In this context, needs analysis is a vital stage in instructional material development. It helps lecturers assess students' initial skills, skill gaps, and individual learning needs (Inderawati et al., 2021). Previous research has demonstrated that EFL and English for Specific Purposes (ESP) students require structured, contextualised, and staged learning resources to help them enhance their skills (Cheng et al., 2022 & Park, 2022). However, the majority of these studies have focused on general writing training or career-oriented ESP materials,

rather than specifically including critical thinking within specific disciplinary contexts.

More precisely, research on CT-based writing tools for informatics students is scarce. Existing research has not thoroughly investigated how students' critical thinking skills might be systematically integrated into academic writing related to their disciplinary field. In reality, informatics students must not only demonstrate linguistic accuracy but also create logical, introspective, and evidence-based arguments. The absence of research addressing these needs suggests a large gap in the literature.

This divide is also visible in the local context. Informatics students at Universitas KH. Bahaudin Mudhary Madura has five semesters of English classes, which include writing courses. However, there is currently no systematically planned instructional material that incorporates CT into writing training based on its features and needs. As a result, writing education tends to focus on fundamental linguistic characteristics and has not yet fully developed higher-order thinking abilities. This issue demonstrates a mismatch between academic needs and the availability of appropriate educational materials.

These research questions are generated based on the following issues:

- 1) How do target students' needs align with the inclusion of CT in academic writing?
- 2) What are students' learning needs for CT-based writing skills?
- 3) How do instructors view the development of CT-based writing materials?

This study is expected to provide a solid foundation for designing instructional materials that not only improve writing skills but also stimulate critical thinking in a relevant and contextualised approach. Moreover, the findings are expected to help design ESP-based EFL materials and provide practical implications for incorporating CT into writing teaching in the digital era.

## **METHODS**

This study took a mixed-methods approach, adapting the 5D Model (Define, Design, Develop, Demonstrate, Deliver) given by Cennamo and Kalk (2019) and

Winaryati et al. (2021), with a focus on the first phase, the Define stage. This stage was prioritised to discover Informatics students' requirements for academic writing resources that incorporate critical thinking (CT). Focusing on the Define stage is vital because it serves as the foundation for creating contextually relevant and needs-based educational materials.

The research was carried out in the Faculty of Science and Technology at the Universitas KH. Bahaudin Mudhary Madura. The population included all Informatics students enrolled in the Writing in English course, which numbered 120 students across four classrooms. Purposive sampling was used to pick individuals who were deemed capable of delivering rich and relevant information about academic writing requirements (Cosgun & Atay, 2021). The participants included 120 students as primary respondents, as well as three Writing in English instructors from both the English Language and Culture Study Program and the Informatics Study Program.

Data were acquired using both quantitative and qualitative methods. Quantitative data were gathered using questionnaires, while qualitative data were gathered using semi-structured interviews and limited document analysis. The research tools included a questionnaire and an interview methodology. The questionnaire was created using nine needs analysis dimensions: CT awareness, learning goals, writing ability level, genre materials, learning resources, reference materials, deficiencies, necessities, and wants. Each dimension contained five elements, for a total of 45 assertions. A five-point Likert scale was utilised to assess students' opinions and learning needs. The items were derived from Destianingsih and Satria, (2020) and validated by two lecturers with experience teaching writing in English. Internal consistency tests revealed a satisfactory level of reliability.

Semi-structured interviews were conducted with three students and three lecturers. Student volunteers were chosen specifically based on their competence and desire to engage. The interviews employed open-ended guiding questions, were audio-recorded with participants' permission, and supplemented with field notes to ensure data accuracy. Data collection procedures were divided into three

stages: (1) administering questionnaires to all students to identify general patterns of CT awareness, difficulties, and learning needs; (2) conducting interviews with selected students and lecturers; and (3) reviewing relevant instructional documents such as syllabi and teaching materials. The document analysis provided more data to support the needs analysis results.

Data analysis was carried out in a comprehensive manner. Quantitative data were analysed descriptively using frequency distributions and percentages to determine students' learning requirements. Qualitative data were thematically analysed, with information organised into important categories such as CT integration, instructional demands, and academic writing issues. To ensure the findings' trustworthiness, triangulation of sources and methods was used. Data were gathered from students, lecturers, and documents, as well as via surveys, interviews, and document analysis. This technique enabled cross-validation of findings, which improved the consistency of the results.

## **RESULTS AND DISCUSSION**

The needs analysis in this study was organized into three main aspects: (1) students' target needs, (2) students' learning needs, and (3) lecturers' perceptions of developing critical thinking (CT)-based Writing in English materials. Quantitative data were collected through questionnaires completed by 120 students. Each item was measured using a Likert scale and analyzed in terms of percentages based on response frequency.

The qualitative data were obtained through interviews with both students and lecturers to support and provide deeper insights into the quantitative findings.

### **Students' Target Needs**

#### **a. Critical Thinking Awareness (CT Awareness)**

The questionnaire results show a relatively balanced distribution of students' responses across the five CT awareness indicators. As presented in Table 1, 22.9% of students (approximately 27 out of 120 respondents) indicated that critical thinking (CT) is an important component in academic writing, while 22.8% (approximately 27 students) expressed a desire to develop CT skills. In

addition, 21.3% (approximately 26 students) agreed that CT improves writing quality. Meanwhile, 19.5% of responses reflected awareness of LOTS and HOTS distinctions, and 13.5% (approximately 16 students) disagreed with the relevance of CT in writing (reverse-coded item).

**Table 1. The Result of CT Awareness**

No.	CT Awareness Indicators	Percentage (%)	Interpretation Basis
1.	Awareness of LOTS vs HOTS	19.5%	Students' understanding of cognitive levels in writing
2.	CT is important in academic writing	22.9%	Students' perception of CT importance
3.	CT improves writing quality	21.3%	Students' perception of CT impact on writing
4.	CT is not relevant in writing (RC)	13.5%	Low agreement with CT relevance (reverse-coded item)
5.	Desire to develop CT skills	22.8%	Students' willingness to improve CT ability

### b. Learning goals

Students prioritise grammatical aspects of writing, according to their replies to the five learning goal-related items. Grammatical precision was responsible for 21.1% (about 25 students), followed by argument building at 20.3% (roughly 24). In contrast, creative writing (19.7%; about 24 students) and critical academic writing (19.2%; approximately 23 students) achieved significantly lower percentages. These data indicate that students place a higher value on language accuracy as a major goal in learning to write. This trend is consistent with Pelenkahu et al. (2024), who contend that the quality of argumentative writing is determined not just by grammatical correctness, but also by the writer's ability to engage in critical thinking.

**Table 2. Students' Learning Goals**

No	Learning Goals Indicators	Percentage (%)	Interpretation Basis
1.	Grammar accuracy goal	21.1%	Students' prioritization of linguistic accuracy in writing
2.	Text genre	19.7%	Students' awareness of different text types and structures
3.	Strong argument	20.3%	Students' focus on developing logical and persuasive argumentation
4.	Creative writing	19.7%	Students' interest in expressive and imaginative writing skills
5.	Critical academic	19.2%	Students' orientation toward critical and analytical academic writing

### **c. Necessities**

In terms of necessities, the questionnaire results show that students' academic writing requirements are fairly balanced across all parameters. Lecturer input was seen as the most pressing need at 20.3% (about 24 students), followed by clear teaching on writing approaches and step-by-step scaffolding at 20.2% (roughly 24 students). The utilisation of information technology (IT)-related text examples accounted for 19.8% (about 24 students), while self-assessment was somewhat lower at 19.5% (around 23-24 students). In general, these findings indicate that students require structured and balanced instructional support, notably explicit guidance, constant feedback, and systematic scaffolding, in order to effectively promote their academic writing development.

**Table 3. Students' Necessities**

<b>No</b>	<b>Indicator</b>	<b>Percentage (%)</b>	<b>Interpretation Basis</b>
1.	Feedback	20.3	Lecturer feedback as the primary learning need
2.	Writing Technique	20.2	Explicit instruction on writing techniques
3.	Scaffolding	20.2	Gradual support in the writing process
4.	Sample Texts (IT)	19.8	Text examples based on Informatics-related contexts
5.	Self-Assessment	19.5	Self-evaluation in the writing process

### **d. Lacks**

Students identified numerous significant obstacles in the academic writing process. Limited awareness of writing tactics or approaches was identified as the most prevalent concern, accounting for 21.9% (about 26 students), followed by difficulties commencing writing (21.3%; approximately 26 students) and low confidence in grammar use (21.0%; roughly 25 students). The difficulty in forming logical ideas was noted at a comparable level (21.0%; roughly 25 students), while the need for more writing practice was highlighted as the least important worry at 14.8% (approximately 18 students). Therefore, these data suggest that students' writing issues are both cognitive (e.g., idea creation and approach utilisation) and emotive, particularly in terms of linguistic confidence.

This allows evidence to Patty’s argument that writing challenges can lead to worry, which can have a negative impact on students' academic performances.

**Table 4. Students’ Lack**

No	Indicator	Percentage (%)	Interpretation Basis
1.	Writing Methods	21.9	Limited knowledge of writing strategies/techniques
2.	Start Writing	21.3	Difficulty in initiating writing
3.	Confidence in Grammar	21.0	Low confidence in grammatical ability
4.	Logical Ideas	21.0	Difficulty in developing logical ideas
5.	Lack of Practice	14.8	Limited need for additional writing practice

#### e. Wants

Students' wants were relatively balanced among numerous writing techniques. The two most popular choices were creative and introspective writing (22.7%; around 27 students) and quick, effective writing skills. Other preferences included collaborative writing (20.3%; roughly 24 students) and project-based writing (20.2%; approximately 24 students), with no-class writing being the least desired alternative (14.1%; approximately 17 students). These findings imply that, in addition to linguistic accuracy, students enjoy flexible, diversified writing training that promotes efficient text output.

**Table 5. Students’ Wants**

No	Writing Approach	Percentage (%)	Interpretation
1.	Creative Reflective Writing	22.7%	Preference for expressive and reflective writing
2.	Fast Effective Tips	22.7%	Preference for practical and efficient writing strategies
3.	Collaborative Writing	20.3%	Preference for group-based writing activities
4.	Project Writing	20.2%	Preference for task/project-based writing
5.	No Class Writing	14.1%	Lower preference for independent writing without class support

#### Students’ Learning Needs Level

As indicated by the questionnaire results, students prioritise improving fundamental writing skills at 22.6% (approximately 27 out of 120 respondents),

followed by revision skills at 21.7% (approximately 26 students) and argumentative skills at 21.2% (approximately 25 students), based on responses to five items measuring learning needs. Although only 13.6% (or about 16 students) explicitly reported difficulties in constructing arguments, the relatively high demand for improving argumentative skills suggests that students still need more systematic guidance in logically organising ideas and developing coherent academic arguments.

**Table 6. Students' Learning Needs Level**

No	Writing Component	Percentage (%)	Interpretation
1.	Basic Writing Skills	22.6%	Highest priority for foundational writing competencies
2.	Revising Skills	21.7%	Need for improving editing and revision abilities
3.	Argument Development	21.2%	Need for strengthening academic argumentations
4.	Logical Structure	20.9%	Need for organizing ideas coherently
5.	Difficulty in Argument	13.6%	Lower explicit difficulty, but still indicates latent need

**a. Genre Materials**

Students' preferences for various kinds of academic books are fairly equal across all categories. Project proposals were somewhat more popular at 20.5% (about 25 students), followed by lab reports and technical evaluations, both at 20.4% (roughly 24 students). Technical descriptions accounted for 19.4% (about 23-24 students), while abstract writing accounted for the smallest share (19.3%, or around 23 students). These indicate that students do not significantly prefer a specific genre. Instead, students seem to gain from a variety of writing assignments that reflect different and contextually relevant techniques. This emphasises the importance of teaching materials that combine several genres typically utilised in the informatics sector, hence facilitating both academic and professional communication.

**Table 7. Genre Materials**

No	Types of Text	Percentage (%)
1.	Project Proposal	20.5
2.	Lab Report	20.4
3.	Technical Description	19.4
4.	Abstract Writing	19.3
5.	Technical Review	20.4

### **b. Learning Resources**

Students have a distinct preference for digital learning tools over traditional ones. The most popular platforms were web-based (21.0%; roughly 25 students), followed by AI-powered chatbot technologies like ChatGPT (20.6%; approximately 25 students). Course modules accounted for 20.2% (about 24 students), while journal articles made up 19.5%. Textbooks were the least popular, with 18.7% (about 22 students). These point to a move toward technology-enhanced learning environments in which digital tools play an increasingly important role in students' academic practices. This tendency emphasises the importance of improving students' critical evaluation skills, particularly in determining the authenticity, dependability, and academic validity of digital and AI-generated materials.

**Table 8. Learning Sources**

No	Learning Resources	Percentage (%)
1.	Web Platforms	21.0
2.	Chatbot/AI (ChatGPT)	20.6
3.	Journal Articles	19.5
4.	Course Modules	20.2
5.	Textbooks	18.7

### **c. Students' Criteria for Learning Resources**

Students also noted a demand for more structured writing instruction. Progressive exercises were found to be the most important (20.6%; roughly 25 students), closely followed by analysis samples (20.5%; approximately 25 students). Term guides in the information technology (IT) environment accounted for 20.2% (about 24 students), while materials demonstrating the evolution from lower-order to higher-order thinking skills (LOTS to HOTS) accounted for 19.7% (approximately 23-24 students). Writing rubrics received the lowest percentage,

19.0% (about 23 students). These indicate that students benefit from properly structured and scaffolded coaching, especially when transitioning from LOTS to HOTS. The high preference for analytical samples and progressive exercises emphasises the value of step-by-step instructional design in assisting students in evaluating and improving the quality of their academic writing.

### **3. Teachers' Perceptions of CT-Based Writing Materials**

The interview data demonstrate a high agreement among lecturers that critical thinking (CT) is fundamental to Writing in English training. Lecturer A emphasised that academic writing should go beyond language precision to promote analytical reasoning and evidence-based argumentation.

*“Our students need more than just the ability to write. They must be able to think critically about the topic, organize their ideas clearly, and support arguments with strong evidence.” (Lecturer A, interview, 2025).*

This viewpoint aligns with Imaniar et al., (2024) who contend that incorporating CT into writing training promotes not only higher-order thinking but also linguistic competency. Similarly, Lecturer B emphasised the significance of scaffolding in controlling students' cognitive load.

*“If we immediately assign a long essay without preparatory stages, students will struggle. Scaffolding is the key.” (Lecturer B, interview, 2025).*

This perspective is also consistent with earlier research Hassen et al., (2023) and Widiana and As Sabiq, (2021) which has demonstrated that scaffolding can boost students' confidence and autonomy in academic writing. Lecturer C emphasised the intimate relationship between reading and writing:

*“They must learn to read critically first, then write. Otherwise, their ideas will remain shallow.” (Lecturer C, interview, 2025).*

This finding matches up with Nguyen et al. (2024) who see critical reading as a necessary foundation for developing clear academic arguments. Students' opinions share comparable observations. Student 1, for example, noted that planned writing stages make the writing process more manageable:

*“If there are stages—from making an outline, writing paragraphs, to revising—it becomes easier. We also understand better how to develop ideas.” (Student 1, interview, 2025).*

Student 2 emphasized the role of classroom discussion in stimulating critical thinking:

*“Writing tasks accompanied by class discussions help us think more critically because we can see our peers’ perspectives.” (Student 2, interview, 2025).*

This conclusion coincides with Lee et al. (2022) and Sudirman et al. (2024) who emphasise the importance of collaborative conversation in encouraging reflective thinking. In addition, Student 3 emphasised the necessity of analytical examples:

*“If the lecturer gives a good example and explains why it is good, it is easier for me to imitate and improve my own writing.” (Student 3, interview, 2025).*

This is consistent with Jonsson et al., (2025) who argue that analytical exemplars and assessment rubrics assist students in better grasping writing quality while also enhancing their capacity to analyse their own work. Taken together, both lecturers and students see CT as an essential component of good writing teaching. Its implementation necessitates organised writing stages, scaffolded support, reflective classroom participation, and the use of analytical examples. These features not only promote language accuracy but also encourage critical, cohesive, and introspective writing. Overall, the requirements analysis results show that, while informatics students understand the value of CT, their writing styles are heavily driven by a focus on linguistic precision and limited writing strategies.

Both lecturers and students agree on the need for more structured help, improved integration of critical reading, and increased emphasis on digital literacy. Given students' growing reliance on digital platforms and AI-powered tools, these skills are becoming increasingly vital. In this regard, the Define stage of the 5D Model provides a solid foundation for identifying instructional priorities and guiding the development of CT-based Writing in English materials that are

not only linguistically sound but also critical, reflective, and aligned with students' academic and professional needs.

## **CONCLUSION**

The research investigates the incorporation of critical thinking (CT) into Writing in English teaching using a requirements analysis inside the Define stage of the 5D Model. The findings indicate that, while informatics students recognise the value of CT in academic writing, its use is restricted and frequently eclipsed by a greater emphasis on language accuracy and a lack of effective writing styles. Lecturers and students have identified numerous major instructional priorities, including the requirement for scaffolding, clearly structured writing phases, critical reading exercises, reflective discussion, and the use of analytical exemplars. These qualities are regarded as critical in assisting students in producing more structured, meaningful, and academically grounded writing. The research of learning materials demonstrates that students are highly engaged with digital platforms and AI-based tools, emphasising the growing need to incorporate digital literacy into writing teaching.

It is important to highlight that this research is limited to assessing learners' needs, obstacles, and preferences in the context of writing in English. As such, the Define stage is a critical step in informing the creation of CT-based writing resources. Future research should expand on this work by proceeding to the next steps of the 5D Model (Design, Develop, Demonstrate, and Deliver) to build, execute, and assess instructional materials based on the needs indicated in this study.

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