

**The Impact of Logical Thinking on Third-
Year EFL University Students' Writing Achievement**
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أثر التفكير المنطقي على تحصيل طالبات المرحلة الثالثة

في الكتابة باللغة الانكليزية بوصفها لغة اجنبية

طبيه عماد خضير & الاستاذ الدكتور شذى كاظم السعدي

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Abstract

EFL Iraqi university students face a major problem in writing skills, and the main reason for this problem is a lack of teaching on how to write smoothly and convincingly. This study aims to investigate the impact of logical thinking on third-year EFL University students' academic writing. This study has been conducted in the Department of English at the College of Education for Women, University of Baghdad. Furthermore, it examines the level of writing achievement by using a writing pedagogy known as the logical writing process cycle (LWPC). It stems from the value of logical thinking, as it allows students to present their arguments and provide evidence to enhance their achievement. Pre-post tests have been constructed and applied to third-year university students for ten weeks. The study proved that the distinction is considerable.

. Keywords: Argument; Logical Thinking; Writing; Writing Achievement

المستخلص: يواجه طلبة الجامعات العراقية في اللغة الإنكليزية بوصفها لغة أجنبية مشكلة كبيرة في مهارات الكتابة، والسبب الرئيسي لهذه المشكلة هو عدم تعليم كيفية الكتابة بسلاسة وبشكل مقنع. تهدف هذه الدراسة إلى معرفة أثر التفكير المنطقي على تحصيل طالبات المرحلة الثالثة في الكتابة الأكاديمية باللغة الإنكليزية بوصفها لغة أجنبية. أجريت هذه الدراسة في قسم اللغة الإنكليزية في كلية التربية للبنات جامعة بغداد. علاوة على ذلك، فهو يدرس مستوى التحصيل الكتابي باستخدام أساليب تدريس الكتابة المعروفة باسم دورة عملية الكتابة المنطقية LWPC. وقد ينبع ذلك من قيمة التفكير المنطقي لأنه يسمح للكتاب بعرض حججهم وتقديم الأدلة لتعزيز إنجازاتهم. تم إنشاء الاختبارات القبلية وتطبيقها على طالبات المرحلة الثالثة بالجامعة لمدة عشرة أسابيع. وأثبتت الدراسة أن التمييز كبير. الكلمات المفتاحية: الحجة ; التفكير المنطق ; الكتابة; تحصيل الكتابة

Introduction

Writing is an important skill that supports learning a foreign language. It is one of the most essential skills to master when learning English because it is both an academic ability and a skill that can be applied to any career field. EFL University students face a major problem in writing skills. They are not acquainted with the elements of writing: the content, organization, cohesion, register, vocabulary, and grammar. The instructors must help the students improve the writing process and solve the problems. Duegayesa (2014) has aptly stated that writing is a method of physically explaining, showing, or expressing oneself and putting together an object, person, or concept (p. 3).

The researchers have noticed that many university students lack confidence when writing essays, such as structuring paragraphs, discussing, giving counterarguments, providing evidence, describing the link between cause and effect, etc. The university students are unable to present their arguments and provide reasons to support their position. Writing logically requires the proficiency to use suitable structure paragraphs and the language of discussion to form meaningful sentences linking logically, choose appropriate transition words to link sentences, and write the introduction and conclusion logically. One of the responsibilities of the Department of English is to ensure that universities have enough English instructors. The researchers identified a pressing need to improve students' writing skills. Instructors should assist students in enhancing their writing process and resolving issues. It allowed students to develop clear and coherent arguments for their thoughts.

Significance of the Study

The findings of this study can be beneficial for university students studying English as a foreign language (EFL), as it can enhance their writing skills. Proficient use of critical thinking in academic writing contributes to the improvement of their capacity to analyze or discuss intricate topics and concepts. This can be particularly helpful for EFL students looking to enhance their writing skills in English. Therefore, it is crucial to teach and encourage the fundamental principles of good writing in the early stages of education. Furthermore, effective communication in academic writing is essential for EFL university instructors.

Objective of the study

This study investigates the impact of logical thinking on third-year EFL university students in academic writing.

Scope of the Study

The study involved 60 female third-year students in the Department of English at the College of Education for Women, University of Baghdad, Iraq. It took place during the academic year 2023-2024 and focused on teaching writing using the prescribed textbook titled (*Academic Writing*) (Bailey, 2015).

Literature Review

Writing and achievement

Writing is the process of expressing thoughts using written words. In EFL classrooms, writing is one of the most important linguistic skills. The term "achievement" comes from the verb "achieve" (Hornby, 1986, p. 7), which means making a successful performance that is reached by hard work. According to Khalil, 2022, this study investigates the relationship between writing anxiety and language learning. It suggests that cognitive strategies like PLAY & WRITE can help students reduce writing anxiety and improve their academic writing skills.

Writing achievements can be evaluated based on students' caliber. Ideas, organization, word choice, sentence flow, and norms are all necessary for successful writing (Carol et al., 2001). If the student encompasses all the characteristics as mentioned earlier, the teacher may consider her/his writing a success. Therefore, the writer has achieved writing success if the work possesses all of these attributes.

Aziz (2019) found that writing is an important part of teaching foreign languages because it is a skill that we need in our daily lives. The ability to write well is crucial because it allows students to solidify their knowledge and expand it with newly learned words in writing.

One of the most important linguistic skills in EFL classrooms is writing. Writing can be used to inform, entertain, express feelings, and communicate with students. Colmes (2003) states that there are at least six possible explanations of the word "writing": (a) a visible language recording method; (b) the activity of implementing such a system; (c) the result of such activity, a text; and (d) the precise shape of such a result, such as block letter writing; (e) artistic composition, as well as (f) a professional career.

According to Richards & Renandya (2002, p. 303), writing is regarded as a challenge since it generates, organizes, and converts ideas into legible text. Writing requires a writer to use a significant amount of cognitive work to manage multiple types of knowledge about appropriate written forms at the same time. Because ideas will be structured into written pieces that others will read and write, it is crucial to gather information and generate ideas through writing.

Students Difficulties in Academic Writing EFL

Writing proficiency is a necessary skill for everyone in general and students in particular. who must be able to communicate ideas, emotions, and feelings to others through written language. The definition of writing ability states that it cannot be exhaustive and comprehensive in and of itself. Writing ability has numerous facets of its own. Putting it differently, the capacity to write through a cognitively focused process is the ability to generate ideas, nurture them, and then apply precise editing and revision techniques to bring them to a mature state within a particular setting (Yi, 2009).

According to Hadley (1993), writing involves the ability to convey information through narrative, description, expository, or argumentative texts. It is a complex process that includes cognitive and metacognitive tasks such as brainstorming, planning, outlining, organizing, drafting, and revising. Researchers have focused on understanding the cognitive aspects of writing and the thought processes involved in student compositions (Flower & Hayes, 1981).

As for Mundriah & Parmawati (2016), citing Byrne (1995, p. 84), three things influence the writing process:

- **Psychology problem:** a student is expected to be able to write his/her own without the possibility of interaction or feedback, which makes the act of writing difficult.
- **Linguistics problem:** a student must maintain communication through his/her efforts and to ensure, both through his/her choice of sentence structure and by the way his/her sentences are linked together and sequenced, that the text he/she writes or produces can be interpreted on its own.
- **Cognitive problem:** a student must know the written form of the language and learn specific structures necessary for effective written communication.

According to Al-Gharabally (2015, p. 42), students who lack language proficiency are more prone to making mistakes in grammar, syntax, spelling, and punctuation. If they struggle with reading, they may find it difficult to generate ideas or provide evidence to support their viewpoints or opinions. Bancha (2013, p. 107) thinks that spelling mistakes occur when a student fails to focus effectively due to weakness or lack of concern for word correctness. The style of presentation of any piece of writing depends on effectively translating ideas into written form. Furthermore, the English spelling system is challenging and complex for Iraqi students due to the irregularities of the words. Khudhair (2016) investigated the impact of using mind mapping as a pre-writing tool for EFL college students' essay-writing skills, a visual tool for organizing ideas and thoughts, mind mapping is frequently used to help in writing. It is very beneficial for boosting language skills, particularly when writing essays.

Argument

Many writing experts and instructors have stressed the importance of well-crafted arguments in research writing. Wendy Belcher asserts that research papers are often rejected due to inadequate arguments. The root of the issue lies in the challenge of teaching argumentative writing (Belcher, 2009, p. 82).

According to Damer (2009, p. 51), a good argument must satisfy five standards:

- It must have a well-organized structure,
- Its premises must be relevant to the truth of the conclusion.

- Its premises must be acceptable to a reasonable person.
- Its premises must collectively provide enough evidence for the truth of the conclusion.
- Its premises must smoothly respond to any expected objections.

If any of the aforementioned standards are broken, the arguments will turn into logical fallacies. Langan (2007, p. 326) has aptly stated that the primary goals of argumentative writing are to persuade the reader to adopt the writer's stance on a contentious subject and to act accordingly. In argumentative writing, authors try to bolster or counter a viewpoint by providing reasoned justifications for their ideas, opinions, and positions. An argumentation essay should have a clear main thesis supported by a wealth of logical evidence to persuade the reader. When writing an argumentative paper, one can use a few techniques to convince readers.

According to Brereton (1982), when writing an argumentative text, the writer must find relevant and reasonable facts to support their argument about the topic. This can persuade the readers into an acceptance of the writer's knowledge, ideas, and perspectives.

Logical Thinking

Logic involves developing a set of guidelines and procedures to evaluate others' arguments and help them develop their own (Neneye, 2003). It depends on structuring information (analogous to mental maps), applying inference rules, and using accurate language (Swestyani et al., 2018, p. 569). Whereas Rivière (1990, p. 13) defines logic as a "way of reasoning correctly, or without making mistakes, to solve problems."

Before the time of Aristotle, logic was known for making valid inferences and criticizing people for the inferences of others. However, this does not necessarily mean that there was a formal beginning of logic before Aristotle. People performed various activities correctly without explicitly formulating the rules for those activities. Nonetheless, evidence from sources like Plato and Aristotle suggests that Greek philosophers discussed the principles of valid inference before Aristotle's "Organon." While the development of logical thought before Aristotle was based solely on

evidence, reasonable conjectures about the origins of logical reflection were supported to some extent by the evidence (Kneale & Kneale, 1962).

Logical thinking is the cognitive ability to "think critically" (Tittle, 2011, p. 434). Logical thinking is the process in which one uses reasoning consistently to conclude (Du Plessis, 2023). A key cognitive ability that enables you to reason, analyze, and make wise decisions in many facets of life is logical thinking. Stated differently, the process of analyzing a situation and reaching well-informed conclusions or judgments based on data or facts is known as logical thinking (Taylor, 2023). From a psychological perspective, logical thinking is the ability to analyze and solve problems. It has an important effect on scientific creativity and information (Ghazi & Karim, 2019).

Lawson (1992) defined logical thinking as thinking that proceeds to a conclusion by thinking resolutely, and this kind of thinking influences academic success and improves students' problem-solving and critical and creative thinking abilities. Kılıç & Sağlam (2009, p. 23) think that teachers should help students seize the opportunity for application of suitable assessment and evaluation. As argued by Al-Jwaïd & Tindale (2022), it's well known that logic challenges people's thinking with its perfect formal logical principles. Because of the application of pragmatics, which governs living in a community, logic may be dealt with as a component of human competence that is acquired throughout life.

Logical thinking, as defined by Demirel (2003), is the ability to find scientific solutions to problems, classify information, generalize concepts, perform calculations, formulate hypotheses, and effectively use numerical data to comprehend the distinctions between different ideas. This cognitive skill is universally recognized as a key human trait and reflects a high level of cognitive development. In other words, an individual's degree of logical thinking provides valuable insight into their cognitive abilities.

Logical Thinking Education

Many studies show the effective integration of logical thinking into EFL education, as well as for enhancing language learners' seriousness and language

competence. EFL learners develop relationships and judgments using background information and traces of embryonic criticality (Pineda-Báez, 2009, p. 58).

In general, it is a talent that allows students to comprehend what they have read or seen and build on that knowledge without the need for additional direction. Students learn that knowledge is flexible and expands upon itself through the use of logic (Derrick, 2012).

However, many EFL students are unfamiliar with the use of the statement of logical thinking and argument in an essay. They perceive the essay as a chance to report what they have read by copying a large portion of the text from the source as their own. This problem tends to be a dilemma as the students overlook the significance of using quotation marks to avoid plagiarism (Khalil, 1985, p. 346).

Hughes (2014) suggested some stimulating activities for improving thinking skills in the language classroom, such as:

1. building an independent mindset.
2. Generating opinions and reasons
3. Questioning critically
4. recognising context.
5. making connections between themes.

Rezaei et al. (2011) believed that arguments, media analyses, problem-solving tasks, and self and peer assessment enhance the thinking skills of students. Furthermore, they emphasized the advantages of urging students to ask questions for the same goal.

Previous Study

The researchers have chosen the most relevant study to that of the current study. The title of the previous study is "Logical Thinking Skills in Academic Writing: An Introduction to a Research-Writing Course at Nagoya University," which was conducted by Lai (2014). This study aimed to help graduate students develop the skills needed to write clear and convincing academic papers by using step-by-step training in logical thinking. A specific writing pedagogy was designed, developed, and called the Logical Writing Process Cycle (LWPC). LWPC consists of four stages. Stage one

develops a thesis statement; the second stage builds the logical argument; the third stage writes the abstract; and the final stage writes the body. The objective of the current research is to show the impact of logical thinking on third-year EFL university students' academic writing. The sample of the previous study consisted of 30 students who were selected to take the course at Nagoya University. Most of the students remained for the entire year, and after the first year, they were assigned to workshops. They were required to publish one or two papers to be eligible for graduation. The present research is consistent with Lia's study, as 60 female third-year students in the Department of English, College of Education for Women, University of Baghdad were enrolled in this experiment. The data from the current study was from thirty students who were selected randomly. They were led to present their thoughts, ideas, and arguments clearly and convincingly.

Methodology

The research design used in this study is an experimental design with a quantitative approach. The study's population consists of EFL third-year students at the Department of English, College of Education for Women, University of Baghdad for the academic year 2023-2024. The sample is purposive and includes 135 EFL students selected purposefully from the same department. The rationale behind choosing is that academic writing is studied in the third year only. Those students are distributed into five sections. Two sections, namely A and B, have been selected randomly. Section (B) is also selected randomly to be the experimental group, which involves thirty students, and the other has been considered the control group, which is Section (A), which contains thirty students.

Before implementing the study, it is important to evaluate the planned test. This involves examining the psychometric properties of the test, which are statistics obtained through validity and reliability (Catalano, 2016). Following approval and validation by experts in the fields of teaching methods and linguistics, item analysis, including item difficulty, is conducted to establish construct validity. Before the final version of the study instrument, a pilot study is carried out to assess the test's appropriateness for the study sample, check for any ambiguities in the test instructions, and make necessary adjustments.

The experiment began on February 13th, 2024. Both groups were selected on the same day, and a pre-test was administered. Ten weeks have passed since the experiment started. The experimental group received a two-hour lecture each day. The researchers created lesson plans for both groups. The experimental group was taught how to organize and develop their thoughts using logical thinking, while the control group was taught using the conventional method. The researchers used logical thinking to teach writing achievement and followed specific steps:

The working stages are clearly illustrated and explained so that students can understand the meaning of what they will do. The researchers have implemented a description of logical thinking.

Some advice has been given on how to use logical thinking to understand the titles before writing, using the established brainstorming as a preliminary step towards organizing paragraphs.

To aid understanding, the researchers used colors on the whiteboard, a PowerPoint presentation, and pictures.

The researchers used the whiteboard and a colored pen to write additional examples to clarify the topic and asked students to suggest more convincing arguments on their own. An example given was: “Peter cannot come to school today because his car broke down.” Each student gave new evidence that should be different from the others to generate new ideas and involve students in developing their thinking.

The researchers instructed the students to define each suggestion and to determine if the argument was convincing or not.

After the students finished presenting their arguments, the researchers used activities such as putting the students into small groups (3–4) and forming groups with a mix of students with different levels of knowledge. This encourages group learning and diverse perspectives, promoting communication and knowledge sharing.

Students were asked to discuss their topics and brainstorm how to write logically, take a position, gather evidence, present an argument logically, and provide counter-arguments to support the essay.

The researchers asked students to exchange papers with each other to write notices and gave feedback on the brainstorming for each group. Students revised and then began to write their complete essays.

The researchers held a competition between groups, asking them to consider whether their draft was convincing to the reader and whether it included sufficient evidence, reasons, and ideas. Finally, the students revised and then began to write their complete essays.

After conducting a content analysis of the prescribed textbook "Academic Writing," we chose a test form from the same textbook as the study tool. The reason for choosing questions from the textbook is that it contains questions closely related to logical thinking, which helps students construct logical arguments and build cause-and-effect sentences. We then sent the pre-and post-test to jury members in various colleges and universities who are experts in the fields of ELT (English Language Teaching) and linguistics. These tests were designed to measure students' writing achievement.

The Research Instrument and Procedure

Pre-Test

The test was designed to assess college students' theoretical knowledge of their writing skills and to identify the challenges they face in writing appropriate English essays. The pre-test results, collected by the researchers, showed that the students encountered difficulties in expressing their thoughts and made numerous errors in using transition words to connect paragraphs. The scores indicated that the students struggled to convey their thoughts when providing definitions and encountered challenges in writing complete paragraphs for the introduction and conclusion. Additionally, the results revealed that the students had difficulty organizing their ideas effectively to present their arguments and persuade the reader.

Post-Test

Over ten weeks, the researchers dedicated time to explaining the importance of logical thinking in academic writing. The focus was on organizing paragraphs and

arguments, writing effective introductions and conclusions, and understanding how to approach a given topic. Students worked in small groups, where they used brainstorming to arrange information logically. They were later given a topic to discuss before taking a post-test individually. The results showed significant improvement in the students' writing; they were able to effectively express and organize their ideas. A statistical analysis was conducted using data from both tests.

This table compares the achievement of the experiment groups in the pre-test and presents the post-test results. Marks have been omitted for brevity. The collected data in both tests has been analyzed using the SPSS statistical editor.

Table 1.

The t-test value of paired samples, the experimental group achievement in the pretest, and the post-test.

Group	No. of students	Mean	SD.	T-Value	DF	Level of Significance
Posttest	30	12.96	2.90	Calculated	Tabulated	
Pretest	30	9.80	2.55	4.219	2.045	29 0.05

The table displays data for 30 students. The difference in the student achievement between the experimental groups in the post-test is 12.96 with a standard deviation of 2.90, while in the pre-test it is 9.80 with a standard deviation of 2.55. The calculated t-value is 4.219, which is higher than the tabulated t-value of 2.045, at a degree of freedom of 29 and a significance level of 0.05. The difference between the means of the two tests showed progress greater than 0.5, indicating the validity of the study.

Results and Findings

The purpose of this study is to examine the influence of logical thinking on academic writing among third-year EFL university students. Logical thinking involves conveying thoughts through written language to effectively communicate, interact, and

solve problems, as well as to think clearly and persuasively. This skill helps students overcome challenges. Additionally, the study revealed significant differences in writing achievement between the experimental and control groups.

The participants in the experimental group, who were taught to use an interactive logical thinking process, displayed high engagement in organizing arguments. They effectively grouped similar ideas and separated them from contrasting ones, which improved their ability to create a clear writing structure and demonstrate how one idea leads to another. Consequently, this led to drawing conclusions based on the provided information and improved writing achievement throughout the semester, as reflected in their observed progress.

Using logical thinking has proven to be effective in helping students achieve positive results in writing. Achieving this involves nurturing the emotional aspects of learning English as a foreign language (EFL) by considering students' interests and experiences in a safe environment. This approach leads to students taking more responsibility for presenting their thoughts, arguments, and feelings and communicating their ideas logically. When students write even a few sentences of their own, they are responsible for all the tasks that are usually provided to them in a controlled assignment. This helps students build self-confidence, develop autonomy, and reduce the impact of factors that hinder their writing achievements.

The primary findings show that incorporating logical thinking into writing instruction helps students enhance three out of five aspects of their writing as evaluated in the rubric: content, organization, and vocabulary. However, the impact on mechanics and syntax is inconclusive. This could be due to the integrative nature of logical thinking, which encompasses various aspects of writing and does not solely focus on mechanics and syntax separately. This outcome may also be attributed to the emphasis on logical thinking to help students understand not only the construction of English sentences but also the formation of paragraphs and longer compositions, thereby fostering their creativity in writing. It is important to consider these results in future implementations of logical thinking in writing instruction.

Conclusions and recommendations

Based on the results and conclusions drawn from the study, the following recommendations are suggested:

1. Encourage EFL university teachers to incorporate the logical thinking process in their writing lessons. This approach has been proven to be effective in enhancing students' writing skills and promoting logical writing.
2. Ensure that EFL teachers are knowledgeable about the logical thinking process. This knowledge can help create a conducive and enjoyable learning environment where students are active participants in the learning process.
3. Focus on helping students develop their logical thinking skills in writing and other language learning aspects.
4. Support students' creative growth by teaching creativity as a process that focuses on developing students' convergent and divergent thinking abilities not only in writing but also in other skills.

Based on the findings of the current research, it can be concluded that:

Logical thinking positively influences the development of writing skills among Iraqi EFL university students.

Logical thinking breaks the monotony of lectures and boredom, sparking students' interest and enabling them to present compelling counterarguments and evidence in their writing.

Logical thinking can be utilized to promote the process approach to writing in an EFL classroom, allowing for multiple drafts and revisions to produce a final text.

Collaborative writing is fostered through the development of logical thinking, as participants learn to exchange ideas, refine new concepts, and learn from their own and others' mistakes.

Logical thinking creates a conducive learning environment that encourages meaningful and engaging student interactions.

When applied, logical thinking transforms writing from a mere activity to a valuable learning tool, aligning with the contemporary approach of "writing to learn and learning to write."

References

- Al-Gharabally, M. (2015). The writing difficulties faced by L2 learners and how to minimize them. *International Journal of English and Linguistics Research*, 3(5), 42-49. Retrieved from [http://www.eajournals.org/3\(5\)/3-42-49-August2015](http://www.eajournals.org/3(5)/3-42-49-August2015)
- Aziz, S. S. (2011). Analysis of errors in paragraph writing in English by second-year geography & history students at the University of Baghdad. *Journal of the College of Education for Women*, 22(2), [1-??]. <https://jcoeduw.uobaghdad.edu.iq/index.php/journal/article/view/711>
- Bailey, S. (2015). *Academic writing for international students of business* (2nd ed.). Routledge.
- Bancha, W. (2013). What causes spelling errors of the Thai EFL students? *ARECLS*, 10, 107-129. Retrieved from http://research.ncl.ac.uk/ARECLS/volume_10/bancha_vol10.pdf
- Belcher, W. (2009). *Writing Your Journal Article in 12 Weeks: A Guide to Academic Publishing Success*. Sage.
- Brereton, J. C. (1982). *A plan for writing* (2nd ed.). HOLT, Rinehart & Winston.
- Byrne, D. (1995). *Teaching writing skills*. Longman.
- Byrne, R. H. (1995). *The thinking ape: Evolutionary origins of intelligence*. Oxford University Press.
- Carol, J. S., et al. (2001). *Teaching writing: A guide to theory and practice*. Allyn & Bacon
- Catalano, A. J. (2016). *Streamlining LIS research: A compendium of tried and true tests, measurements, and other instruments*. Libraries Unlimited.

- Coulmas, F. (2003). *Writing systems: An introduction to their linguistic analysis*. Cambridge University Press.
- Coulmas, F. (2003). *Writing systems: An introduction to their linguistic analysis* (4th ed.). Cambridge University Press.
- Damer, E. (2009). *Attacking faulty reasoning: A practical guide to fallacy-free arguments* (6th ed.). Belmont, CA: Wadsworth Publishing Company.
- Damer, T. E. (2008). *Attacking faulty reasoning: A practical guide to fallacy-free arguments* (6th ed.). Wadsworth Publishing.
- Demirel, Ö. (2003). *The art of teaching from planning to evaluation*. Ankara: Pegem A.
- Derrick, C. (2012). Dyslexia Help: Case Study Presented at Kennesaw State University [Edublox Online Tutor]. Retrieved from <https://www.edubloxtutor.com/logical-thinking/>
- Douglas Brown, H., & Lee, H. (2015). *Teaching by principles: An interactive approach to language pedagogy* (4th ed.). Pearson Education ESL.
- Du Plessis, S. (2023). What is logical thinking? 6 types; 4 exercises to improve it - Edublox Online Tutor [Edublox Online Tutor | Development, Reading, Writing, and Math Solutions]. Retrieved from <https://www.edubloxtutor.com/logical-thinking/>
- Duegayesa, Wy. (2014). *College academic writing*. Medan: Unimed Press.
- Flower, L., & Hayes, J. R. (1981). A cognitive process theory of writing. *College Composition and Communication*, 32(4), 365-387. JSTOR [invalid URL removed]
- Hadley, A. O. (1993). *Teaching language in context*. Heinle & Heinle.
- Hornby, A. S., Cowie, A. P., & Windsor Lewis, J. (1980). *Oxford Advanced Learner's dictionary of Current English* (3rd ed.). Oxford University Press.
- Hughes, J. (2014). Critical thinking in the language classroom. [ELI]. Retrieved from https://www.ettoi.pl/PDF_resources/Critical_ThinkingENG.pdf
- Hughes, J. (2014). *Critical thinking in the language classroom*. Eli Publishing.
- Khalil, A. (1985). Communicative error evaluation: Native speakers' evaluation of written errors of Arab learners. *TESOL Quarterly*, 19(2), 335-351.
- Khalil, E. R. (2022). The effect of cognitive strategies on Iraqi EFL college students' writing anxiety. *Journal of the College of Education for Women*, 33(4), 27-39. <https://doi.org/10.36231/coedw.v33i4.1633>
- Khudhair, N. K. (2016). The Impact of Applying Mind Mapping Technique As a Pre-Writing Tool on EFL College Students in Essay Writing. *Journal of the College of*

- Education for Women, 27(1).
<https://jcoeduw.uobaghdad.edu.iq/index.php/journal/article/view/166>
- Kılıç, D., & Sağlam, N. (2009). Investigating students' logical thinking abilities in terms of certain variables. *Ege Journal of Education*, 10(2), 23-38.
- Langan, J. (2007). College writing skills. New York: McGraw-Hill Companies.
- Lawson, A. E. (1992). Science teaching and the development of thinking (second edition). Belmont, California: Wadsworth.
- Mundriyah, M., & Parmawati, A. (2016). Using think-pair-share (TPS) to improve students' writing creativity (a classroom action research in the second-semester students of STKIP Siliwangi Bandung). *Jurnal Ilmiah P2M STKIP Siliwangi*, 3(2), 84-91. <https://iopscience.iop.org/article/10.1088/1742-6596/2434/1/012006/pdf>
- Mundriyah, M., & Parmawati, A. (2016). Using Think-Pair-Share (TPS) to improve student's writing creativity (A classroom action research in the second semester students of STKIP Siliwangi Bandung). *P2M STKIP Siliwangi*, 3(2), 84-91.
- Neneye, E. P. (2003). *Introduction to logic and philosophy*. Owerri: Prosperity Publishers.
- Pineda-Báez, C. (2009). Critical thinking in the EFL classroom: The search for a pedagogical alternative to improve English learning.
- Rezaei, S., Derakhshan, A., & Bagherkazemi, M. (2011). Critical thinking in language education. *Journal of Language Teaching and Research*, 2(4), 769-777.
- Richards, J. C., & Renandya, W. A. (2002). *Methodology in language teaching*. New York: Cambridge University Press.
- Swestyeni, S., et al. (2018). An analysis of logical thinking using mind mapping. *Journal of Physics: Conference Series*, 1022(1), 012020. [DOI: 10.1088/1742-6596/1022/1/012020]
- Taylor, E. (2023, May 10). What is logical thinking? A beginner's guide. The Knowledge Academy. Retrieved from <https://www.theknowledgeacademy.com/blog/what-is-logical-thinking/>
- Tittle, P. (2011). *Critical thinking: An appeal to reason*. Routledge.
- Waleed Ridha Hammoodi Al-Jwaid & Christopher W. Tindale (2022). The Logical Pragmatics of Arguments in Argumentation. *Journal of the College of Education for Women*, 33(1), 1-15. <https://doi.org/10.36231/coedw.v33i1.1559>
- Yi, J.-y. (2009). Defining writing ability for classroom writing assessment in high schools. *Journal of Pan-Pacific Association of Applied Linguistics*, 13(1), 53–69.