

Logical Thinking Skills In Academic Writing:
An introduction to a research-writing course at Nagoya University

アカデミック・ライティングにおける論理的思考能力
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Abstract

A major problem facing graduate students in Japan is publication, and the root cause of the problem is the lack of a proper training in how to write clearly and convincingly. “Logical Thinking Skills In Academic Writing” is a graduate course tailor-made to solve this problem. Offered at Mei-Writing¹, Nagoya University, the course is specifically designed to train graduate students, through a writing pedagogy called the Logical Writing Process Cycle (LWPC), how to write a clear and convincing research paper for publication. This paper is to provide a brief introduction to the course. The paper begins with a brief history of the course, showing the demand and achievement of the course. Section 2 is about the course’s primary objective, which is accompanied by an explanation about why learning to write clearly and convincingly is important for publication. Section 3 presents the writing pedagogy, highlighting how the four cyclical stages of the LWPC are implemented to deliver clarity and convincingsness. From the LWPC we shall see that the basis of clarity and convincingsness lies in the presence of a thesis statement and an inferential relation that connects the statement with its supporting premise(s). Section 4 ends the paper by suggesting a new direction of academic writing education.

Keywords

logical thinking education (論理的思考教育),
academic writing (アカデミックライティング)

¹ “Mei-Writing” is a nickname for the Department of Academic Writing Education (アカデミック・ライティング教育部門).

1. History and Background of the Course

“Logical Thinking Skills In Academic Writing” was first launched in April 2009 at Hokkaido University as a graduate school common course (大学院共通科目). It was designed by the author and three other philosophers² to teach graduate students how to write clearly and convincingly, with an ultimate objective to increase the number of academic publications produced by the students.

Publication was indeed a serious problem facing graduate students at Hokkaido University. The students were required to publish one or two papers in order to be eligible for graduation, but most of them had problems fulfilling the requirement. The reason was fundamentally to do with the lack of a proper education in academic writing.

Before the launch of our course, there was not any academic writing course for graduate students at Hokkaido University. Although some workshops on academic writing were held regularly, they provide only superficial information on the styles and forms of academic writing. Many graduate students found the workshops “boring” and “frustrating”, and we often heard them voicing basically the same complaint: “If I want to know the format of writing a cover letter, I can search the Internet and learn it by myself. Why should I waste my valuable research time coming here for something that I can learn by myself at home?”

Indeed, academic writing education in Japanese universities is implemented mainly as a part of foreign language education program (Lai 2013), targeting at students who are not writing in their first language. The language program is helpful for the second language writers to gain a basic understanding about how to write their papers using a new language. It may be even helpful for those writers to learn how to make their writings looked more professionally; hence creating “a credible image as a competent member of [a] chosen discipline” (Swales & Feak 2012, p. 1). But such a program is not very helpful for graduate students who are writing for publication. For publication, what the students need is not a writing course that covers only styles and forms, nor a language course that is primarily designed for second language writers. What they need is a specialized training in how to communicate their research ideas in a clear and convincing manner. Meeting this demand was the motivation of our course.

On the first day when the course commenced, the fifty-seat classroom was fully packed, and many latecomers had to be turned away. But even fifty students were too many for us. Eventually we had to select just thirty students based on their reason for taking the course. Most of them stayed with us for the whole year, and at the end of the first year, 20% of these students succeeded in having their paper accepted for publication (Lai 2010).

In 2011 the course was moved and launched at Nagoya University based on the same objective and pedagogy. Once again, the classroom was fully packed on the first day of the course. Once again only thirty students were selected to take the course. At the end of the one-year course, twelve of the thirty students succeeded in having their papers accepted for publication at an international level. Among the publishable papers, one was awarded the Best Paper Prize at an international conference, and another was a journal paper published at the science journal, *Nature*.³

2. The Course’s Primary Objective: Academic Publications

The primary objective of the course is to help graduate students publish their research. The publication in question specifically means academic publication, and it covers a wide range of categories. It certainly includes professional publications, such as books, book chapters, journal papers, conference proceedings, etc. It also includes written works produced within an academic institution, such as graduate dissertations, theses, and year-end term papers. In some cases, such as presentations and other similar situations, it also covers the sharing of a written research idea with more than one reader⁴.

There is a very close connection between publication and writing an academic paper, especially a research paper. For almost every academic, the ultimate goal is to share his or her research with other fellow academics and eventually, the general public. No doubt, not every research paper succeeds in getting published. But if one did not start writing an academic paper with an ultimate goal to publish it, then writing the paper would be just like writing a personal diary, the purpose of which is to keep a private record of daily events and experiences.

2 They are Prof. Tomoyuki Yamada and Prof. Nobuo Kurada of the Graduate School of Letters, and Prof. Masahiro Matsuo of the Graduate School of Science, Hokkaido University.

3 The achievements of the course at Nagoya University have been officially reported to many senior faculty members of the university, including the president and the vice president. Those students who published papers were interviewed, and the interviews were incorporated into a DVD video about the course, “Logical Thinking Skills in Academic Writing”. The DVD was made and produced by the Institute of Liberal Arts and Sciences, Nagoya University.

4 This sense of publication is related to Donald Murray’s: “all [publication] means is that the writer has the opportunity to share a draft with more than one reader.” Donald M. Murray. *A Writer Teaches Writing*. Heinle, Thomson. 2004. P. 190.

Besides the close connection, using publication as the primary objective has several advantages. First, it serves as a visible and objective criterion for evaluating the effectiveness of the course. Second, it can be used as a basis of selecting students who apply for the course.⁵ But most importantly, it provides a solid justification for why logical thinking education should be incorporated into academic writing education.

To begin with, academic publication is very different from other kinds of publication. For example, news articles, novels, plays, etc., are also writings that are primarily aiming for publication. But they are significantly different from academic writings as far as publication is concerned. For publication, news articles are basically required to deliver a factual report about recent and noteworthy events that happened locally or globally. News articles are not basically required to convince the readers to accept what is reported in the articles. For example, in writing about the WMD investigation that eventually led to the Iraq invasion in 2003, a good news article only had to deliver a factual and unbiased report about what investigators claimed, regardless of whether the readers were convinced by those claims. Similarly, good novels and plays are basically required to provide entertainment and enjoyment to their readers. As long as the love story portrayed in a romance novel is attractive and entertaining, it does not really matter whether or not the readers find the story convincing.

Unlike news articles and romance novels, the basic requirement for an academic paper in publication is neither to entertain its readers nor to merely deliver an unopinionated report. A good academic paper is basically required to demonstrate a convincing power in publication.

By definition, academic research is fundamentally about doing something new. Because of the novelty, in order for research findings to be accepted by the readers or listeners, the process by which the findings were reached must be convincing. And in order for the paper to be convincing – hence publishable, it must demonstrate a clear research conclusion and a logical argument for the conclusion. This requirement for getting an academic paper published can be easily found in the submission guidelines for authors of almost any top class academic journal. For example, here is the guideline for how to get published in the science journal, *Nature*:

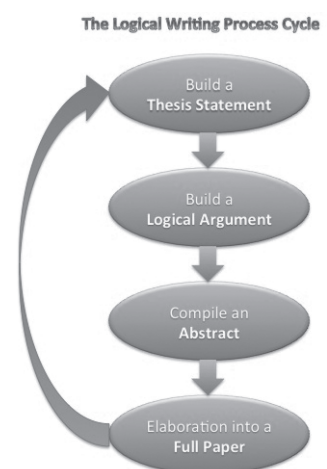
Submissions should be accompanied by a cover letter stating *briefly why the conclusion is an important scientific advance...* Authors are strongly encouraged to attempt two 100-word summaries, one *to encapsulate the significance of the work* for readers of *Nature...* and the other to explain the conclusions at an understandable level for the general public.⁶

It is not difficult to see what the authors are required to do in order for their paper to be considered for publication in *Nature*. By “stating ... why the conclusion is an important scientific advance”, the authors need to be able to convince the editor of *Nature* that the conclusion presented by the paper is worth publishing! To do that, they need, above all, to be able to explain *clearly* what the research conclusion is. As instructed by the guideline, authors are required to summarize the significance of their research in just 100 words. This means that they have to be very clear about the conclusion of their research in order to highlight its significance. Furthermore, they need to be able to make the research conclusion understandable by a wide range of readers. This means that they must make the steps leading to the research conclusion not only easy to understand but also *logically convincing*, so that even non-specialists could be persuaded. Accordingly, having a clear research conclusion and a convincing logical argument for the conclusion are necessary for an academic paper to get published in *Nature*.

3. Pedagogy: The Logical Writing Process Cycle (LWPC)

To help students learn how to write clearly and convincingly, a specific writing pedagogy was designed and developed. It is called the Logical Writing Process Cycle, or LWPC for short.

Briefly, under LWPC the entire writing process is the development based on a thesis statement. Such a development is composed of four cyclical stages. Stage 1 is to develop



⁵ As I reported earlier, each year there were more than thirty students applying to take the course. For this reason, I had to make a selection based on their reasons for taking this course. As far as the past selections are concerned, preference was given to those applicants who have an intention to publish their research.

⁶ Getting Published In *Nature*: The Editorial Process. http://www.nature.com/nature/authors/get_published/

a thesis statement that can be clearly expressed in just one sentence. Stage 2 is to develop a logical argument based on the thesis statement by finding the premise or premises that can provide a convincing support for the statement. Stage 3 is to compile an abstract by integrating the outcomes of stage 1 and 2 into a succinct logical structure of the paper that specifies the research's motivation, main task, method, and results. Stage 4 is a detailed elaboration of stage 3, which covers a detailed explanation about (i) why the research was carried out (Introduction section), (ii) how the research was carried out (Method sections), what was found in the research (Results and Discussion sections), (iii) how the future research might proceed from here (Conclusion section).

3.1. Stage 1: Build a Thesis Statement

Across the writing community in general, a *thesis statement* has been given many different roles in writing. Some regard a thesis statement as the “road map”⁷ of an academic paper, and some regard it as what “articulates the purpose of your paper”⁸. In LWPC, thesis statement is given a rather specific role. It encapsulates the central idea put forward by a research paper. The idea takes the shape of a hypothesis or merely intuition in the early stage of writing, and gradually transforms into a research conclusion after all the premises for the idea are properly established and confirmed.

Representing the central idea of a research paper, a thesis statement is ultimately responsible for the clarity of the paper. Like the presence of a properly functioning heart is vital to the survival of a living body, the presence of a clear thesis statement is vital to the success of a research paper. Unless the author of a research paper can clearly present a thesis statement in the paper, the thoughts he or she expresses in the paper cannot be properly conveyed to its readers.

In LWPC, a thesis statement not only is the central idea of a research paper, but also the center of the paper's development. The first thing our students are asked to do in LWPC is to build a preliminary thesis statement. No doubt, it is almost impossible to have the precise knowledge about the paper's conclusion in the early stage of writing, but it is not impossible to begin thinking and hypothesizing about it. In fact, it is highly beneficial for the entire writing process to have a preliminary thesis statement built in the beginning. That way the author will have a focus point and direction in the writing. The thesis statement will become the basis of the writing development. The subsequent writing stages will be predominately about the support, elaboration, and confirmation of the thesis statement. As a result, the statement will evolve through different stages of writing. It will be modified whenever some new information is discovered in the process of writing. Once all the premises for the statement are properly established, elaborated and confirmed, then the statement is done and the writing process is complete.

As far as learning how to build a preliminary thesis statement in LWPC is concerned, the primary objective to be accomplished is to have the entire statement constructed in just one sentence with a non-compound sentence structure.

Being able to write a thesis statement in just one simple-structured sentence is crucial to the clarity of the statement as well as the writer's mind about the research. It is possible that there are some rare cases in which the central idea of a paper cannot be summarized into just one sentence. But normally, if the writer is very clear about his or her research, he or she should be able to identify the key components and summarize them into just one sentence. Such process of summarization, by eliminating a large chunk of information that is not considered as vital, would enable the writer to focus on the components that are vital to forming the paper's central idea.

However, merely summarizing the idea into one sentence is not enough for the clarity. The sentence must be simple in terms of its sentential structure so that the relation between the sentence components can be clearly understood. This part of the clarification process is very important because the relation being depicted in the statement is the core of the statement. Besides knowing the key components of the central idea, ultimately people want to know how the components are related together.

In addition to being clear, there are other conditions for the sentence to meet in order to be a satisfactory thesis statement. Essentially, what the statement expresses must be *objectively verifiable*. The objective verifiability here means verifiability from a third-person point of view, independent from the point of view of a writer. Making the statement objectively verifiable is vital for an effective communication with the readers. If a thesis statement expressed something that could hardly be verified independently from a third-person point of view, then the expressed would not be effectively communicated to its reader.

7 The Writing Center of the University of North Carolina at Chapel Hill.
<http://writingcenter.unc.edu/resources/handouts-demos/writing-the-paper/thesis-statements>

8 Connors Writing Center, University of New Hampshire.
<http://www.unh.edu/writing/cwc/handouts/content/content-thesisstatements.pdf>

For example, it would not be very effective to communicate the meaning of the sentence, “this painting is beautiful”, as the term, “beautiful”, expresses some sentimental value that is subjective to the writer, and therefore could hardly be verified from a third-person point of view. In order for the idea expressed to be effectively communicated to the reader, it would be better to change the sentence into, for example, “The painting is composed of such and such colors, and it has such and such shapes, etc.”

In order to be objectively verifiable, what a thesis statement expresses should be either true or false. In other words, there must be conditions for the statement to be true or false. If a thesis statement is true, then what it expresses corresponds to some factual event in an objective world that could be accessible to everyone.

Although a thesis statement is objectively verifiable by having truth conditions, the proof for the statement should be inferable from the premise or premises that support the statement. In other words, the truthfulness of a thesis statement requires justification through building a logical argument. Although a true thesis statement is basically a representation of some factual event in the world, it should not represent a trivial fact whose truthfulness does not require justification. For example, the sentence, “the earth orbits around the sun”, represents a factual event in the world. But the represented is a commonly accepted fact, which no longer requires justification. If the sentence were to be used as a thesis statement, it would be rather trivial.⁹

To help build a satisfactory thesis statement, a step-by-step guidance is provided for the students who are taking the course.¹⁰

3.2. Stage 2: Build a Logical Argument

Having built a preliminary thesis statement, the next stage in LWPC is to provide a convincing support for the thesis statement by means of building a logical argument.

Many books and journals on academic writing have already highlighted the importance of building a logical argument in writing academic papers. For example, Wendy Laura Belcher believes that “the main reason why editors and reviewers reject articles is because authors do not have an argument...” (Belcher 2009, p. 82). However, almost none of those materials offered a practical and constructive method on how to build a logical argument in academic writing. Some of the materials do cite examples of logical arguments and fallacies demonstrated in standard textbooks of logic. But no specific explanation is given on how the concepts of logic behind the examples can be actually applied to the construction of a logical argument for one’s own research.

To enable a practical application of logic to writing a research paper, building a logical argument in LWPC is given a functional purpose; namely providing a convincing support for a thesis statement in the paper.

Oxford Dictionary of English defines the adjective, “convincing”, as “capable of causing someone to believe that something is true”. Accordingly, to make a thesis statement convincing is to be capable of causing someone to believe that the statement is true. Building a logical argument for a thesis statement generates convincing power for the statement because the building process is a process of proving that the statement is true. For example, consider a classical deductive argument.

- P1: Peter is in either Tokyo or Nagoya.
- P2: Peter is not in Tokyo.
- C: Peter is in Nagoya.

The argument presented is a combination of three statements, P1, P2, and C. P1 and P2 are the argument’s premises or supporting reasons, and C is the conclusion. The important thing to see here is that the three statements are connected via an inferential relation: if P1 and P2 are proven to be true, then C will be true by inference. The inferential relation implies a dependence of a conclusion upon its premise(s). A conclusion is an inferential product produced by its premise(s). Or, in other words, a conclusion is proven by its premise(s). Note that a different kind of arguments – i.e. inductive arguments – can also be used to illustrate basically the same point about the inferential relation.

In LWPC, to learn how to build a logical argument is to learn how to build an inferential relation linking a thesis statement and its premise(s). Since LWPC starts with building a thesis statement, building the inferential relation is finding the premise or premises that contribute to forming the proof of the thesis statement. This practice is significantly different from the conventional studies of logic including both formal and informal logic. Although the conventional logic studies are also interested in understanding how a

⁹ Note that the situation was completely different back in the fourteen century, when people used to accept the Aristotelian theory that earth was the center of the universe. The statement was not trivial back in the year 1543, when Nicolaus Copernicus first published the idea in his book, “On the Revolutions of the Celestial Spheres”. In order to defend the statement against the Aristotelian theory that the earth is the center of the universe, Galileo Galilei, who was a defender of Copernican theory, was even given a death sentence.

¹⁰ The thesis statement recipe is too long to be presented here. Please contact me to obtain a copy of it.

premise and conclusion are related inferentially, they tend to look at the relation from the perspective of a “whole argument”, which covers the totality of premise and conclusion in the argument. In that perspective, their interest lies primarily in the analysis of the principles or rules that constitute the validity of the relation, rather than how the relation can be constructed from scratch.

No doubt, the conventional approaches are useful for developing analytical tools and techniques that could help to distinguish correct from incorrect reasoning (Copi and Cohen 2005, p. 4), but based on my years of observation, students cannot learn how to construct logical arguments for their own research simply by learning how to analyze some given examples of logical arguments and fallacies. There is a gap between argument analysis and argument construction.

By starting from a thesis statement and then finding the premise(s) that can contribute to forming the proof of the statement, LWPC takes a construction approach towards building a logical argument. The major advantage of this approach is effectiveness.

In the conventional analysis approaches, an inference is made from premise to conclusion. But making inference in this way is boundless, simply because one can draw an infinite list of inferences based on a single premise. It is just like boarding a vehicle without knowing the destination. Going from a conclusion to premise, on the other hand, helps to draw a boundary in which the inference should be made. This is similar to how a crime investigation is conducted. Very briefly, in a typical crime investigation, the investigation will begin at the point that a crime has been committed – e.g. someone has been killed, or some bank has been robbed. A careful study of the crime scene is very crucial, and it determines the rest of the investigation. The injuries found on the body indicate the weapon used to cause the injuries, the hair found on the floor identifies the person who was at the crime scene, etc. In the same vein, building a logical relation from a conclusion enables one to know what needs to be proven, and thus what needs to be done to deliver the proof.

Besides creating a base for an effective inference, starting from a conclusion also creates a base for an effective distinction between evidence and data. Since the truth of a conclusion is to be proven by some premise or premises, and since the conclusion is an inferential product of the premise(s), the key to identifying whether or not a premise is relevant to the proof is to see whether or not it shares basically the same set of truth conditions as the conclusion. Thus the truth conditions shared by the premise(s) and conclusion form the basis of the relevancy. And the trick to building a convincing argument is the establishment of a same set of truth conditions across the premise and conclusion in the argument. The details about how to find the premise that shares the same truth conditions are too long to be presented in this paper. A step-by-step guidance on how to do it is provided for the students who take the course.

3.3. Stage 3: Compile an Abstract

Having developed a thesis statement and a logical argument, the third stage of LWPC is to compile these developments into an abstract.

An abstract is the most important part of a research paper. It is read independently from the paper and it functions to advertise the paper to as many readers as possible in the big wild world. Whether or not the readers are interested in reading the details of the paper purely depends on the quality of the paper's abstract.

Since an abstract functions to advertise a research paper, it is common to regard an abstract as a concise summary of the paper.¹¹ But it remains unclear what constitute the summary. An abstract is normally very short. As far as an abstract in English is concerned, the number of words normally ranges from 100 to 200 in a typical science paper, and from 200 to 300 in a typical humanities paper. Because of the short length, an abstract cannot summarize all the elements of a research paper.

To make the advertisement more effective, an abstract is given a specific purpose in LWPC. That is, an abstract functions to let the readers of a research paper grasp the central idea of the paper, and how the idea is supported. Thus the most important paper elements to be included in an abstract are (1) the paper's thesis statement and (2) the major supports for the thesis statement (e.g. experimental results, supporting claims, etc.). The thesis statement should be made as clear and specific as possible, and its connection with its major supports should be made as convincing as possible. Accordingly, an abstract in its ideal form is the concise summary of the main argument made in a research paper.

In order to make a better sense of the main argument being summarized, a high quality abstract, regardless of whether it is written for a science or humanities paper, should cover the following basic elements.

¹¹ See, for example, the definition of an abstract given by the writing support of the university of Melbourne. http://services.unimelb.edu.au/_data/assets/pdf_file/0007/471274/Writing_an_Abstract_Update_051112.pdf

- (i) *The main task or objective of your research (this is to let the readers know **WHAT** your research is about)*
- (ii) *Reason or motivation for carrying out the research (this is to let the readers know **WHY** your research is carried out)*
- (iii) *Steps or procedures taken to implement the main research task or objective (this is to let the readers know **HOW** exactly the research is carried out)*
- (iv) *The conclusion or thesis statement reached based on the steps you took to implement the main research task or objective (this is to let the readers know **WHAT IS FOUND** in your research)*

To help the students put the four elements together, several templates were designed as presentation options demonstrating how the elements could be arranged. For example, here is a template for writing an abstract of a science paper.

Template for writing a science paper abstract

{Motivation} Many studies on have demonstrated But there is a problem **{Main task}** In this study/research, we investigated ... **{Procedures & Results}** In particular, firstly we conducted an experiment on ... Then we compared the results from the experiment with ... Finally we conducted another experiment on ... **{Conclusion}** Based on the results we found in ... we can conclude that ... **{Implication}** [optional] One important implication of our conclusion is that ...

Using the template, the technicality of compiling an abstract becomes rather straightforward. All a student needs to do is to fill in the blanks and replace the suggested sentence or vocabularies with their own. And of course, the order of the elements can also be changed if a student sees fit.

Whether an abstract is of a high quality or not is not determined by the way the elements are put together. Among the abstracts submitted for reviews, the competition is not fought at the level of styles, formats, or other linguistic presentations. Anyone who follows the template can easily compile an abstract! The competition is ultimately fought at the level of clarity and convincingness of the research advertised.

For the reason of clarity, most of the writing specialists (e.g. Hartley, J. 2008, p. 31) would advise that an abstract should be the last thing to write in a paper, after all the research results have been collected and confirmed. However, an abstract should not be just a summary of the results achieved. Such kind of abstracts would be what Belcher regards as the “data-driven” abstracts. They are unintelligible and should be avoided (Belcher 2009, p. 86-89). To make an abstract intelligible, the results presented in it should form an argument. Data must be subordinated to an argument (Ibid., p. 88).

If an argument takes precedence over data in an abstract, then the summary is more about the ideas than results. In this sense, there is no reason why an abstract cannot be written first. Just like having a thesis statement in the earliest stage of writing, having an abstract before writing the paper body can bring about a more effective and efficient writing. What one can do is to have a preliminary abstract with unfixed research results.

3.4. Stage 4: Elaboration into a Full Paper

The fourth stage of LWPC is to elaborate the paper elements summarized at the abstract stage into a full research paper. Each of those elements will be elaborated into a full-blown section. The reason or motivation for carrying out the research will be elaborated into the introduction section of the paper. The main task or research objective will be elaborated into the section that defines the present research and specifies its main research task. The steps or procedures taken to implement the main research task will be elaborated into the detailed premises of the paper. The conclusion or thesis statement reached based on the research steps will be elaborated into the conclusion section of the paper.

Under LWPC, two of those major sections are equipped with a step-by-step guidance to help students write more effectively. They are the introduction section and the conclusion section.

When writing the introduction section under LWPC, a specific focus is given to the historical background that led to the current research. The author needs to explain why the present research is carried out based on some previous research or researches. The reason could be due to some unsolved problem found in the previous research, or an inadequacy for the previous research to account for some newly discovered phenomenon. Whatever the reason is, there must be some continuity between the present research and the past. In addition, the author must show that the present research is significantly different from the past, thus demonstrating the

research originality.

In contrast to the introduction section, the specific focus of the conclusion section is given to the future research implied by the current one. The section is of course the place to report the final version of the research conclusion put forward by the paper, after collecting and confirming all the research results. But in addition to that, the section can be also used to report the limitations of the current research or some other issues in the research field that need to be addressed in order for the current research to move on. For example, due to some technological limitation, such and such experiment could not be conducted. Or, due to the traditional setting of some education system, such and such pedagogy was not implemented. Reporting the limitations or unaddressed issues will pave the way for a further research in the future, hence closing the paper with an expectation.

4. A New Direction of Academic Writing Education

This paper has introduced an academic writing course that is specifically designed to help graduate students learn how to write clearly and convincingly for publication. As we have seen, the clarity and convincingness are essentially formed by the presence of a thesis statement and a logical relation linking the statement to its supporting premise(s). Accordingly, to learn how to write clearly and convincingly, one must learn how to build a satisfactory thesis statement and a satisfactory argument.

The approach to academic writing education introduced in this paper is significantly different from the conventional approaches. Whereas the latter mainly focus on the proper way of using a language in the writing, the former focuses on the proper way of thinking.

Without any doubt, appropriate use of a language in writing is very important. Just like what the Online Writing Lab instructs: “Inappropriate language uses can damage your credibility, undermine your argument, or alienate your audience.”¹² But only focusing on the appropriate use of a language is inadequate for research writing, especially if the purpose of the writing is publication.

In order to fulfill the publication purpose, what an author needs to do is not just to write in a style and flow that can be acknowledged by the editors and reviewers, but more importantly, the author needs to convince the editors and reviews that the paper is worth publishing. Writing in this case becomes a process of communicating a thesis statement by demonstrating the premises that lead to the statement. In other words, the writing is a process of communicating thoughts that are organized in a particular way.

If writing is ultimately a process of thinking, then what is needed in the writing education is primarily the training in thinking.

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(Web Resources)

The University of Melbourne Student Services – Writing an Abstract:

http://services.unimelb.edu.au/_data/assets/pdf_file/0007/471274/Writing_an_Abstract_Update_051112.pdf

The Purdue Online Writing Lab

<https://owl.english.purdue.edu/owl/resource/608/01/>

¹² <https://owl.english.purdue.edu/owl/resource/608/01/>