

# Cognitive Skills for Critical Thinking and Second-Language Academic Writing

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**Abstract:** Critical thinking (CT) includes cognitive skills such as inference, analysis, interpretation, evaluation, explanation, and self-regulation. Previous studies did not pay much attention to CT cognitive skills although they underlie the successful writing in an academic setting. Thus, the present study aimed to investigate the impact of CT cognitive skills on the academic writing of second language learners of Japanese (JSL). Fifty-four JSL learners were randomly divided into three groups: the critical thinking group (CT), the academic writing group (AW), and the control group (CG). Participants in the CT group received an essay writing instruction focused on CT cognitive skills. The participants in the AW group received conventional essay writing instructions. The participants in CG received no instruction. All participants wrote an argumentative essay. Using an analytical academic writing rubric, two raters evaluated the essays in terms of overall quality and the specific components of content, organization, and coherence. The results show that the participants in the CT group had significantly higher scores for overall quality as well as each of the specific components compared with the other two groups. This finding suggests that CT cognitive skills play a critical role in enhancing text quality.

**Key words:** critical thinking, cognitive skills, L2 academic writing, writing quality

## 1. Introduction

Academic writing courses in universities aim to provide students with opportunities to produce high quality essays. However, students still struggle with writing. Over the last two decades, there have been increasing efforts to use critical thinking skills (CT) for education in language learning. Part of this effort focuses on academic writing education (e.g., Bean, 2011; Brookfield, 2012; Suzuki, Takemae, Oi, & Matsumoto, 2007).

Although CT is a complex concept, experts agree that it is about reflective thinking. More specifically, CT is a process of deliberation and argumentation. It includes identifying others' claims and arguments, evaluating evidence, and presenting a point of view or claim in a structured and reasoned manner in order to convince others (Cottrell, 2011). In this way, CT is embodied in the formal structure of the argument (hereinafter, referred to as "the argument").

Substantial research has considered CT from different perspectives and emphasized the relationship between CT and writing (Erion, 2000; Facione & Giancarlo, 2000; Fahim & Mirzaii, 2014; Faulconer, Williams, & Packard, 1988; Gorjian, Pazhakh, & Parang, 2012). In terms of academic

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writing as a type of argumentative and expository writing, CT and academic writing are similar on a number of points. From a general perspective, Erion (2000) found analogies between arguments and argumentative essays, in that an argument and an argumentative essay are similar since an argument's premise supports the conclusion in the same way as the body of the essay supports the thesis. From another perspective, academic writing and CT follow a similar process. In CT, critical thinkers analyze information critically by finding a logical relationship between assumptions, expressing points of view (claims), and reaching a persuasive conclusion (Cottrell, 2011; Erion, 2000). Likewise, in academic writing, writers consider an issue from different perspectives, locate relevant information, state their thesis, and demonstrate their findings before reaching a conclusion in a persuasive way (Guy, 2015). A similar process, thus, links academic writing and CT since both seek to identify and clarify a position or a point of view, identify pieces of evidence and reasons to support that position, and attempt to persuade others to accept that conclusion. Clarifying the author's position and supporting it by using appropriate evidence to demonstrate a conclusion is referred to as the "argument" within the context of CT (Cottrell, 2011). CT and academic writing therefore share similar ground in terms of the argument.

Research that considered the effect of CT on writing performance in general has tended to focus on the argument as it affects either native students or second language (L2) learners (Fahim & Mirzaei, 2014; Gorjian, et al. 2012; Faulconer et al., 1988). Although the argument is interpreted as the common point between CT and academic writing, the question is whether CT is involved only in the argument. CT includes cognitive skills such as interpretation, analysis, evaluation, and inference (Facione, 2011). With regard to text quality, it remains unclear what role CT cognitive skills may play. Since previous studies focused more on the argument, considering the effect of CT cognitive skills is necessary. In the genre of academic writing, content-level features of a text such as content, organization, and coherence might be more closely associated with CT cognitive skills when compared with surface-level features of a text such as grammar, since content-level features are more related to a higher order of thinking than surface-level features. Thus, examining the effect of CT cognitive skills on both overall quality of writing and each of the above mentioned features, i.e., content, organization, and coherence, is the point of the departure of this study.

## 2. Literature Review

### 2.1 CT and writing research

Many studies have considered CT and writing from different perspectives. However, few studies have examined the effects of CT instruction on student's writing performance. One reason may be the debate over how CT instruction should be defined and delivered. Due to the broad concept of CT, different approaches have been employed for teaching CT. However, in terms of writing performance, research has been more concerned with the argument itself (Fahim & Mirzaei, 2014; Faulconer et al., 1988; Gorjian, et. al. 2012). Within the context of CT, the argument consists of presenting the author's position through a set of reasons designed to support it in order to convince the readers (Cottrell, 2011). A subset of these studies is introduced below.

Faulconer, Williams, and Packard (1988) considered the effect of the argument as CT, what they called critical reasoning, on persuasive essay writing. Participants were students of critical reasoning and freshman composition courses. In the freshman composition course, students were taught to write an essay based on parts of the book of *Reading for Writers* (McCune & Winkler, 1983). In the critical reasoning course, the focus was on logic, rhetoric, and grammar. For the experiment, the students in both courses wrote an expository essay in 50 minutes. The researchers found a significant difference between the two courses. The students in the critical reasoning course received significantly higher scores than the students in the freshman composition course. The researchers concluded that CT is

effective in improving student writing and should be taught in writing courses. However, this study focused on the argument in CT instruction and did not pay attention to CT cognitive skills.

Gorjian et al. (2012) investigated the effect of CT instruction on the writing performance of EFL learners. Participants in this study were taught to express their main idea and to support it. Thus, the focus was on the argument, and cognitive skills were downplayed. The participants were divided into control and experimental groups. The control group received essay writing instruction focusing on paragraph writing. The experimental group received CT instruction consisting of four steps. In the first step, the participants were asked to write their ideas about their favorite topic and narrow it down to one main idea. In the second step, they were taught to consider the unity of the arguments in each paragraph. In the third step, they were made to examine the consistency of the arguments within the text, and in the last step they classified the paragraphs based on the importance and in terms of which one better supported the main thesis. To measure the effect of both types of instruction, the participants in both groups wrote a descriptive essay at the end of the course. The researchers found that the participants in the experimental group received significantly higher overall scores than the control group, and concluded that CT affects the learners' descriptive writing while CT enhances their writing ability.

Fahim and Mirzaii (2014) investigated the effect of CT instruction on writing performance by using two argumentative writing tasks as pre- and post- writing tests. In this study, the focus was on the argument, less so on CT cognitive skills. Participants were divided into experimental and control groups. The control group received an instruction on how to write an argumentative essay, and the experimental group received the same instruction in conjunction with dialogic critical thinking tasks. For dialogic critical thinking, the researchers designed four simulated written dialogues occurring between two imaginary students. The participants in the experimental group were asked to read each of the written dialogues, express their opinion about the argument in the dialogue, and give their reasons. The participants in both groups wrote two 180-word, four-paragraph argumentative essays on different topics within 30 minutes. Comparing the scores for the pretest and posttest writings, the researchers found that the scores of both groups significantly increased from pretest to posttest writing. In addition, the experimental group received significantly higher scores on their posttest writing task compared to the control group. The researchers concluded that encouraging students to think critically enhances their writing performance.

The main focus of these studies was on the argument in that the students were taught how to state a claim, how to support that claim, and how to convince their readers. Thus, cognitive skills were implicitly used in the process of developing the argument. However, CT cognitive skills were never the focus of the studies, and the possibility of CT affecting writing performance independently was not considered. For this reason, it is not clear whether the positive effects of CT found in these studies came from the effect of the argument or that of CT cognitive skills.

## **2.2 CT from the perspective of cognitive skills**

Facione (2011) explained CT as cognitive skills including interpretation, analysis, evaluation, inference, explanation, and self-regulation. Interpretation skills consist of understanding and expressing the meaning and importance of positions, situations, data, etc. Analysis skills consist of identifying inferential relationships between statements, reasons, information, and opinion. Evaluation skills consist of assessing the logical strength in inferential relationships between statements. Inference skills consist of identifying and securing the elements needed to allow for reasonable conclusions to be drawn. Explanation skills are defined as the ability to express the result of one's reasoning in a persuasive and coherent way. Finally, self-regulation skills mean looking back at these dimensions and checking whether anything is missing from the logical chain.

On the other hand, Cottrell (2011) discusses CT from the perspective of an argument. CT is

a complex process involving the argument that presents a claim through well-structured, cogent reasoning by identifying and evaluating others' positions and assumptions. In this view, identifying and evaluating positions are included in the argument, so the argument and cognitive skills cannot be separated from each other. However, cognitive skills are necessary in order to form an argument, so CT cognitive skills may be the first step for making the argument when writers wish to write an essay. In this sense, CT cognitive skills can be separated from the argument, and they are the first to be involved in academic writing.

In addition, the process of writing an essay and that of CT are similar. When writing an essay, writers apply cognitive processes such as clarifying information relevant to the task, analyzing that information, determining their main thesis and supporting evidence, and making a persuasive conclusion (Guy, 2015). Likewise, CT includes clarifying meaning (interpretation skill), detecting and analyzing statements (analysis skill), assessing the quality of arguments (evaluation skill), and conjecturing alternatives and drawing conclusions (inference skill) (Facione, 2011). Therefore, the cognitive skills involved with CT such as interpretation, analysis, evaluation, and inference may be necessary for cognitive activities that occur while writing an essay. Despite the necessity of such cognitive skills, these have been overlooked in previous studies, and their effects on writing quality remain unclear. Therefore, the present study focuses on CT cognitive skills and attempts to consider their impact on text quality.

### 2.3 Academic writing and text quality

Text quality can be considered from different aspects. Some studies measure this factor from the surface-level structure of a text (Celce-Murcia, 1992; Hedgcock & Lefkowitz, 1992), while others examine the quality from the content-level structure of a text (Coulthard, 1994; Flower, 1984; Hui-Tzu, 2006). The surface-level structure is related to the surface features of a text such as language use, grammar, and mechanics, while the content-level structure consists of features related to idea development, rhetorical structure, organization, and consistency. As Hamp-Lyons (1991b) argues, every element in a text is important in holistic assessment and the evaluation of both surface-level and content-level structures is necessary in judging overall quality. Most writing scoring rubrics divide these elements into five criteria: content, organization, coherence, language accuracy, and mechanics (e.g., Hamp-Lyons, 1991a, 1991b; Jacobs, Zinkgraf, Wormuth, Hartfiel, & Hughey, 1981; Tanaka & Abe, 2014). Content includes expressing the author's thesis clearly and presenting supporting reasoning. Organization consists of organizing the ideas and information and arranging the structure of the text. Coherence involves consistency and unity in the text as a whole, as well as within each paragraph, phrase, and sentence. Content, organization, and coherence are more directly related to how the writer thinks critically as he/she organizes these elements in the text. Therefore, these content-level features may be more closely related to the writer's higher-order level of thinking and CT ability.

Some of the statements from the rubric used in the present study are as follows. For content, the thesis statement appears in the introduction and is relevant to the topic and the task, and the objective proposes a clear warrant for the writing. For organization, the writing should be well-organized and clear throughout the development of the introduction, body, and conclusion; the outline of the main ideas should be easily recognizable to the reader. For coherence, appropriate cohesion and discourse markers should be used, and no irrelevant information or an argument that contradicts the main idea should be present in the introduction or conclusion.

## 3. Research Questions

Based on the above discussion, this study attempts to investigate the impact of CT cognitive skills by focusing on overall text quality and the specific components of content, organization, and coherence

in academic writing among second language learners of Japanese (JSL). The study addresses the following research questions:

RQ 1. Do CT cognitive skills improve the overall quality of JSL academic writing?

RQ 2. Do CT cognitive skills improve the content, organization, and coherence of JSL academic writing?

## 4. Method

### 4.1 Participants

Fifty-four Chinese L1 learners of Japanese as a second language (JSL) volunteered to participate in this experiment (Females = 36, Males = 18; aged 18-26). All participants were advanced students studying in Japanese language schools in Japan where they were preparing for entrance examinations for Japanese universities. All of them had an N1 on the Japanese Language Proficiency Test (JLPT). To measure their writing ability, two pre-writing tests were administered. In addition, the level of the participants' CT was tested using the Watson-Glaser Critical Thinking Appraisal (2002) test. The participants were randomly divided into three groups: the CT group, the AW group, and the control group. Each group included 18 participants.

### 4.2 Raters

Two Japanese native speakers who were graduate students of Teaching Japanese as a Second Language assessed the essays independently. They were trained to assess the essays based on an academic writing scoring rubric. The average of the two raters' scores was used as the essay's score for each participant. The inter-rater reliability was very high and showed the stability of the rubric ( $r=0.9$ ).

### 4.3.1 Instruments

#### 4.3.1.1 Rubric

The rubric used in this study was adapted from Tanaka and Abe (2014), Hamp-Lyons (1991a, 1991b), and Jacobs, et al., (1981). It consists of five criteria: content, organization, coherence, language accuracy, and mechanics, each measured with a six-point scale. Tanaka and Abe's (2014) rubric was the only rubric developed for Japanese essay and it included the assessment of language accuracy and mechanics, so this rubric was adopted for all the criteria. In order to make the rubric more sensitive to academic writing, the rubrics by Hamp-Lyons (1991a, 1991b) and Jacobs et al. (1981) were also used to assess content, organization, and coherence. The new rubric was validated twice by Japanese graduate students who had received a formal training to evaluate Japanese essays in the university and work at the university's writing center. First, four students were asked to read each statement in the rubric, select unclear or problematic statements, and offer suggestions for improvements. Second, ambiguous statements were rewritten. Finally, two additional experts were asked to validate the revised version of the rubric and unanimously agreed on all the statements for each criterion.

#### 4.3.1.2 Pre-writing tests

Given that L2 writing proficiency was likely to affect the results, the writing ability of the participants was examined with two pre-writing tests (an argumentative and an expository essay) before the main experiment took place.

Two raters evaluated the pre-writing essays based on an analytical academic writing rubric. By running Kolmogorov-Smirnov and Levene tests, the normality and equality of variance were tested (Table 1). An ANOVA was then run for the argumentative essay and for the expository essay. The results showed no statistically significant difference among the three groups on any of the pre-writing tests ( $F(2, 51) = 2.639, p > .05$  for the argumentative essay,  $F(2, 51) = 2.438, p > .05$  for the expository essay).

Table 1: Descriptive statistics, normality, and homogeneity of variance for the two pre-writing tests

Pre-writing tests	Groups	N	Mean	SD	Kolmogorov-Smirnov		Levene test			
					Value	<i>p</i>	Value	df1	df2	<i>p</i>
Argumentative	CTG	18	48.17	7.99	.202	.053	3.006	2	51	.058
	AWG	18	47.83	7.85	.195	.070				
	CG	18	47.17	8.70	.170	.141				
Expository	CTG	18	48.17	12.01	.195	.070	2.031	2	51	.142
	AWG	18	40.17	10.16	.149	.200				
	CG	18	42.00	12.85	.176	.145				

CTG = CT Group, AWG = AW Group, CG = Control Group

#### 4.3.1.3 CT test

The Watson-Glaser Critical Thinking Appraisal measure (WGCTA) was used to evaluate the CT level of the participants. WGCTA was validated by the educational research institute of Pearson Education (internal consistency reliability = 0.93; test-retest reliability = 0.73). The WGCTA includes 80 items and is divided into five subtests of 16 items each. The subtests are entitled as follows: (1) Inference: determining the falsity of the statements drawn from given data; (2) Recognizing unstated assumptions: recognizing presuppositions in given statements; (3) Deduction: discriminating whether certain conclusions necessarily follow the information provided; (4) Interpretation: considering the weight of evidence and determining whether the information given is warranted by the conclusions; and (5) Evaluation of the arguments: distinguishing strong and relevant arguments from weak and irrelevant ones in a given particular issue. After testing the normality and equality of variance, ANOVA was run for testing the homogeneity of the data. No significant differences were observed for CT levels among the three groups ( $F(2, 51) = 1.364, p > .05$ ).

#### 4.3.1.4 Procedure

Each group was given 40 minutes to write an argumentative essay consisting of 700-800 Japanese characters. The participants were instructed to write about the advantages and disadvantages of technology under certain conditions in which they were placed. The number of Japanese characters and time for writing were determined based on a pilot study conducted prior to the main experiment.

The participants in the CT group received instruction on CT cognitive skills, focusing on interpretation, analysis, evaluation, and inference. The instruction lasted 40 minutes and it included two main parts: teaching and explaining, and thinking and receiving feedback. The part on teaching and explaining focused on essay writing and how to use CT cognitive skills during writing. The participants were taught the structure of an essay, namely introduction, body, and conclusion. They were also taught what contents were necessary for each of these sections, and how these sections should be linked together to make an effective essay. In addition, they learned to use CT cognitive skills and use them to interpret, analyze and evaluate an essay. For the interpretation skill, they were shown how to find and understand the main message in the text based on the text parts and evidence provided by the author. For the analysis and evaluation skills, they were shown how to examine and analyze the line of reasoning in the text. For the inference skill, they were shown how to identify which elements lead to the intended conclusion of the author.

The part on thinking and feedback focused on practice and giving feedback to students. The participants were given a series of short texts. Some of them were persuasive texts while others weren't. The students were asked to analyze different parts of the text based on what they learned in the previous phase. They were then asked to explain how they had analyzed the text, what they found in the text and why. In this way, they were encouraged to use the CT skills they had learned. After the

students gave their answers, the instructor (the researcher) gave them feedback so that the students could check the accuracy of their own analysis and obtain tips to improve their analytical skills if their initial analysis was wrong.

Using parts of two Japanese books,<sup>1</sup> the participants in the AW group were taught essay writing. Like the CT group, the AW group received instruction for 40 minutes and it included two main parts: teaching and explaining, and thinking and feedback. During the part on teaching and explaining, they were taught about the structure of an essay. During the part on thinking and feedback, they practiced what they learned and received feedback. The difference between the CT and WA instruction was that in the CT instruction, the focus was on CT cognitive skills, and the students were encouraged to use these skills. In contrast, the AW instruction focused on the structure of an essay, but not on the use of CT skills.

The participants in the control groups received no instruction but were simply given the topic and asked to write the essay. The purpose of having a group with no instruction was to create a real control group for both the CT and the AW groups, in order to examine the treatment effects.

### 5. Results

Normality and equality of variance for the three groups were tested using the Kolmogorov-Smirnov and Levene tests. The results of the tests, as shown in Table 2, showed that none of the distributions, i.e., the scores for content, organization, coherence, and overall quality, were normal. Thus, non-parametric Kruskal-Wallis test was used for the analysis of the data. Since multiple analyses had to be conducted to test overall quality, content, organization, and coherence (according to the Bonferroni correction for avoiding a Type I error), the level of significance was set at .01.

**Table 2: Test of normality and homogeneity of variance for each variable in each group**

groups	Kolmogorov-Smirnov test								Levene test										
	df	OQ		Con		Org		Coh		df1	df2	OQ		Con		Org		Coh	
		value	p	value	p	value	p	value	p			value	p	value	p	value	p	value	p
CTG	18	.321	.000	.308	.000	.501	.000	.501	.000	2	51	20.588	.000	30.478	.000	17.248	.000	13.909	.000
AWG	18	.249	.004	.257	.003	.311	.000	.276	.001										
CG	18	.260	.002	.301	.000	.421	.000	.501	.000										

CTG = CT Group, AWG = AW Group, CG = Control Group; Con = Content, Org = Organization, Coh = Coherence, OQ = Overall Quality

RQ1 asked whether CT improves the overall quality of an essay. A Kruskal-Wallis test revealed a statistically significant difference among the CT, AW, and control groups ( $H(2) = 47.502, p < .001, \eta^2 = .89^b$ ). Post-hoc testing (i.e., multiple comparisons) showed significant differences between the CT and AW groups, the CT and control groups, and the AW and control groups (Table 3). This shows that CT instruction improved the overall quality of texts compared with AW instruction or no instruction.

RQ2 asked whether CT improves the content, organization, and coherence of Japanese academic writing. Regarding content, a Kruskal-Wallis test showed a significant difference among the CT, AW, and control groups ( $H(2) = 41.87, p < .001, \eta^2 = .79$ ). Post-hoc testing results also showed significant differences between the CT and AW groups, the CT and control groups, and the AW and control groups. The results are shown in Table 4. This result shows that CT instruction improves the content of a text compared to AW instruction or no instruction.



**Table 3: Descriptive statistics for content, organization, coherence, and overall quality in each group**

	N	Content	Organization	Coherence	Overall Quality
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
CT Group	18	23.33 (.76)	23.83 (.38)	23.83 (.38)	116.00 (2.52)
AW Group	18	7.83 (3.63)	6.93 (2.93)	6.97 (2.19)	41.17 (5.39)
Control Group	18	4.33 (.97)	4.03 (.48)	4.01 (.38)	21.33 (1.41)

**Table 4: Results of Kruskal-Wallis test and Post-hoc testing for all variables in each group**

	Kruskal-Wallis test								Post-hoc testing							
	Con		Org		Coh		OQ		CTG				AWG			
	MR	H (df) p	MR	H (df) p	MR	H (df) p	MR	H (df) p	Con	Org	Coh	OQ	Co	Org	Coh	OQ
CTG	45.50		45.50		45.00		45.00									
AWG	24.75	41.87 (2) ***	26.00	46.02 (2) ***	26.75	47.89 (2) ***	27.50	47.502 (2) ***	26.90 (1) ***	28.85 (1) ***	28.96 (1) ***	26.71 (1) ***				
CG	12.25		11.00		10.25		9.50		27.29 (1) ***	29.64 (1) ***	30.73 (1) ***	26.80 (1) ***	13.30 (1) ***	20.50 (1) ***	24.91 (1) ***	26.71 (1) ***

Note. \*\*\* Significant at  $p < .001$ ; CTG = CT Group, AWG = AW Group, CG = Control Group; Con = Content, Org = Organization, Coh = Coherence, OQ = Overall Quality; MR = Mean Ranking

With regard to organization, the Kruskal-Wallis test revealed a statistically significant difference among CT, AW, and control groups ( $H(2) = 46.02, p < .001, \eta^2 = .86$ ). Post-hoc testing showed significant differences between the CT and AW groups, the CT and control groups, and the AW and control groups (Table 4). This indicates that CT, compared with the AW and control conditions, improves the organization of texts as well.

Regarding coherence, a Kruskal-Wallis test showed that there is a statistically strong and significant difference among the CT, AW, and control groups ( $H(2) = 47.89, p < .001, \eta^2 = .90$ ). Post-hoc testing showed significant differences between the CT and AW groups, the CT and control groups, and the AW and control groups (Table 4). This also shows that CT instruction enhances the level of coherence in a text.

## 6. Discussion and Conclusion

In this study, the impact of CT on overall text quality and the specific components of content, organization, and coherence in text were investigated. Three groups (CT, AW, and control) were considered. The CT group received instruction focusing on CT cognitive skills, the AW group received essay writing instruction, and the control group received no instruction. All groups wrote an argumentative essay, and the two experimental groups did so after the instruction. The results showed that there was a significant difference in the scores of the three groups and that participants in the CT group received higher scores for overall quality, content, organization, and coherence compared with the two other groups. This suggests that CT cognitive skills improve the overall quality of texts and also specifically content, organization, and coherence. However, since the CT instruction occurred only one time, it is difficult to say whether the instruction itself led the students to learn these skills or focusing on CT cognitive skills in the instruction helped the participants to use the skills they already



had. Regardless, paying more attention to CT cognitive skills seems to help students produce better essays.

Unlike previous studies which considered CT as an integral part of the argument, this study showed that the argument is not the key concern. Instead, cognitive skills such as interpretation, analysis, evaluation, and inference are involved in CT and academic writing. Faulconer et al., (1988) and Erion (2000) argue that the argument is the main concern in writing courses and that the “[argument] is absolutely central to good writing” (Faulconer et al., 1988, p. 240). The findings of the present study demonstrate that CT cognitive skills also play a critical role in text quality. Even before learning the argument, learning to improve these skills is necessary in order to produce a better essay.

Attending to CT cognitive skills is essential for writing an effective academic text. For example, writers need to identify whether or not their reasons truly support the thesis. Analytical skills help them to make this determination, thus enabling them to provide sound reasoning to support their arguments. In addition, writers should learn to decide what makes an effective conclusion. Thusly, inference and evaluation skills can help them produce acceptable conclusions. By providing sound reasons as well as an appropriate conclusion, writers can construct a strong argument in their text. Furthermore, as another important element in terms of organization in the text, writers should help readers follow their outline easily by producing a well-structured and well-organized text. By utilizing CT cognitive skills such as interpretation, writers can clarify their position and organize their ideas through the text clearly in order to do just this. Moreover, writers need to identify and show whether the ideas and sub-ideas in different parts of the text are linked together and whether they are expressed consistently and coherently if they are to convince readers. Creating a coherent text is another necessary element in academic writing. CT cognitive skills such as analysis and evaluation support writers in finding out whether or not they managed to produce consistency in their text. Therefore, CT skills applied to writing an academic text can enable writers to determine what to write and how to write it.

## Notes

<sup>i</sup> These two sources are as follow: (1) Hamada, M., Hirao, T., & Yui, K. (2013). *Daigakusei to ryugakusei no ronbun wakubukku* [An essay workbook for university students and international students], Kuroshio publication; (2) Nitsu, N., Oshima, Y., Sato, S., C. K., & Y, F. (2013). *Ryugakusei to nihonjin gakusei no tame no repoto/ronbun hyogen handobukku* [A handbook of expressions and mechanics for writing a Japanese report/paper: For international and Japanese students in every field]. Tokyo: Tokyo Daigaku Shuppan.

<sup>ii</sup> Chi-squared values were used to calculate  $\eta^2$ . For more information, see Green & Salkind (2009).

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