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Macro-Structure of Argumentative Text as Manifestation of Chinese EFL Students' Critical Thinking Skills

Meimei Wu[1], Fangfang Duan[2,*], Zongmin Ma[3]

[1]College of Foreign Languages, Baoji University of Arts and Sciences, Baoji, China
[2]School of Foundational Education, University of Health and Rehabilitation Sciences, Qingdao, China
[3]School of Foreign Languages, Xianyang Normal University, Xianyang, China
**Corresponding author*

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Abstract: Critical thinking cultivation has been regarded as one of the key objectives of tertiary education, which has drawn attention from the field of foreign language teaching in China. In contrast, the deficiency of critical thinking among English-major college students has become a heated-discussed issue in the past two decades. This study endeavored to combine two dimensions of argumentation: the nature of content and how it is organized, thus investigating the association between critical thinking skills manifested in each rhetorical move and EFL students' macro-structure of argumentative text. Both the move-structure approach based on Toulmin's model of argumentation and the text analysis approach were utilized to explore critical thinking skills manifested in each move. The findings show that participants had grasped the basic argumentative pattern (claim+ground) though lacking sufficient elaboration on evidence. But for secondary argumentative elements like counterargument and rebuttal, both quantity and quality lag the former. The most evident moves in the macro-structure of argumentative texts were introduction, claim, subclaim, ground, warrant, backing, counterargument, rebuttal, and conclusion. All in all, evaluation and inference critical thinking skills were the most evident in terms of composing a quality argumentation.

1. Introduction

1.1 Background of the Study

Contemporary society has shown an urgent need for enhancement of critical thinking (hereafter CT), especially for college students. Many scholars explicitly emphasized the significance of facilitating students to become critical thinkers [1][2][3]. In the past two decades, CT has become a buzzword in the Chinese education field and has been illustrated in curriculum rubrics. "Facilitating students' capacity of analyzing, synthesizing, and solving problems from multiple perspectives" were stated explicitly in College English Syllabus in 2000 (College Foreign Language Teaching Committee, 2000). Chinese Ministry of Education issued *The National Plan for Medium and Long-term Education Reform and Development* (2010-2020), putting a priority on students' CT and innovative ability. However, CT deficiency among Chinese English majors has been endorsed by scholars [4][5][6].

1.2 Definition of Critical Thinking

Though it is hard to define CT in education, it has been redefined ceaselessly. 'Critical thinking' was initially conceptualized by Dewey [7], who adopted the term of 'reflective thinking' instead. By defining the concrete taxonomy involving six levels, Bloom [8] contributed a lot to CT as an objective of education, making it a concrete and tangible educational standard, which has influenced many teaching philosophies all over the world especially in facilitating rational thinking, often focusing on higher-order thinking skills. In general, CT involves two dimensions: CT skill and CT disposition. The former is concrete and can be easily identified, while the latter, relatively speaking, is abstract and hard to be ascertained in written texts. What is common to all definitions of CT is that it falls in two categories: either brief statements that try to define CT in concise languages or taxonomies that endeavor to characterize the concept by outlining CT skills and sub-skills. Scholars such as Ennis [1], Lipman[9] and Paul[10] were put under the first category while Watson and Glaser[11], as well as "the Delphi Group", fall under the second category. This study adopts the second category.

1.3 Associations between CT and Writing

It seems that the ability to express ideas in writing reflects one's thinking ability because the two activities cannot be separated. Refining writing can shape a writer's thinking and help them become better critical thinkers. However, not every writing genre triggers CT. The writing genre that best reflects EFL learner's critical thinking is proved to be argumentative writing [12] [13] [14]. The possible reason may be that argumentative texts can be assessed accurately against writing conventions and argument models which relate to logic, the basic component of CT. More scholarships endorsed relatedness between CT and argumentation [15] [16] [17] [18] [19].

1.4 Argumentative Writing and Toulmin's Model

The mastery of argumentative writing strategies has long been acknowledged as essential in academic fields at various levels. Argumentative writing, however, is a challenging task. Majority of EFL learners felt some difficulties in constructing arguments, and many scholars argued that argumentation is not an inborn skill and needs long periods of professional training[20], and Toulmin's Model of Argument (TMA) manifests a practical approach to it [21].

Scholars[17][19][22][23]that applied original or modified TMA in argumentative writing, either by taking the overall structure as a consideration or probing into one or more component element(s). Qin and Karabacak[22] analyzed the structure patterns of argumentative essays based on the modified TMA which is composed of six elements. The study of McCann[23] stands out as one of the notable landmarks in the argumentative field. His study results showed that the 9th and 12th grade students performed much better in overall argumentative writing quality than the sixth-grade students, while on factors of TMA, the lowest graded students also lag the higher-grade peers in claim making and warrant adoption. As far as data is concerned, there is no difference, but the ninth-graders excelled in using qualifiers and rebuttals.

TMA is sometimes also taken as a tool for assessing the overall argumentative writing quality of persuasive essays[16][18][22][24][25]. In the study of Yeh[24], the scoring rubric of argumentative essays was composed of three dimensions: development, voice, and conventions, among which the development dimension was based on TMA. In regard with development, it referred to how well the reasons support the primary claim and whether the argument considered opposite viewpoint.

It is noteworthy that in the study of Soodmand et al. [26], they probed into the association between CT sub-skills and argumentative writing sub-skills. The results showed that the writing capacity of L2 learners is significantly correlated with all different sub-skills of CT as measured by CCTST.

However, among the sub-skills of writing ability, only organization was correlated with certain CT sub-skills. They discovered that analysis and evaluation were the most contributors to writing ability, while deductive reasoning had the lowest correlation. Their study differs from the previous CT-related studies in that it focuses on CT sub-skills and writing sub-skills, providing a more delineated correlation between the two elements. But such similar scholarships are quite limited in number.

1.5 Research gap and Questions

A review of the extant literature revealed that majority of previous CT-related studies show a positive link between learners' CT skills and argumentative writing strategies, but few studies have delved into the association between CT sub-skills and macro-structure of argumentative essays of college students. Moreover, most CT-related studies tend to be quantitative in nature, but the present study, as a genre analysis in nature, is qualitative. Thus, the present study endeavors to descriptively analyze argumentative essays of Chinese EFL learners' CT skills utilizing Facione's[27] classifications of essential CT skills and sub-skills, and to also capture the contour of macro-structure of sampled argumentative essays based on original TMA[28].

Through this study, the researcher hopes to contribute to the perplexing problem of whether Chinese college students exhibit CT in their argumentative writing, and more significantly, how each CT skill along with sub-skills contributes to EFL learners' argumentative writing quality. Thus, this study explores the critical thinking skills manifested in each argumentative writing move and macro-structure of argumentative texts. Specifically, the following research questions (RQ) were addressed:

RQ 1: What moves are evident in the macro-structure of argumentative text?

RQ 2: What critical thinking skills are manifested in each move?

2. Methodology

2.1 Research Design

This study is essentially a qualitative genre analysis research. The macro-structure of 64 argumentative essays were analyzed from the CT dimension. The study adopted TMA [28] to evaluate CT sub-skills of their argumentation through qualitative move structure analysis and text analysis. Move structure analysis can provide an insight into the rationale of the genre under study [29]. Text analysis approach was adopted in order to interpret its sematic significance, which is a typical feature of qualitative research [30]. Since this study aimed at content and organizational structure of argumentation, all spelling and grammar errors were neglected.

2.2 Participants of the Study

The participants of this study were 64 sophomores from two universities, specifically, 32 from School A and 32 from School B. Both schools are in the same province and both focus on cultivating potential teachers. When the data was collected for this study, the participants enrolled the subject of English Writing III, which had two sessions per week with a 100-minute time duration. Regarding classroom instruction, their teachers also provided additional complementary materials to facilitate participants' capacity to write satisfactory or at least qualified argumentative essays since sophomores were supposed to attend TEM-4 in their fourth semester.

2.3 Data Gathering Procedure

Data was collected by using an essay-writing test during the spring semester of the academic year

2019/2020. All essays were collected by a topic-given assignment from TEM-4 paper about 300-350 words. Participants were informed of the research purpose prior of the test and assured of the confidentiality of their data. It was an untimed writing test, because a familiar writing topic without time constraint enables students to perform best, challenge authorities and think creatively [31].

As the present study concerns argumentative writing, the focus is the Writing Section of TEM-4, which is a criterion-referenced test, whose guidelines highlight the significance of fostering CT. The excerpt was taken from a news report titled "How much screen time is too much for kids? It is presented under "technology" column on *The Guardian* (international edition), with URL being *https://www.theguardian.com/technology/2018/may/31/how-much-screen-time-is-too-much-for-kids-parents-advice-children-digital-media*. The author is Keza MacDonald, with the publication time and date being *07.00 BST, Thursday, May 31, 2018*.

2.4 Analysis of Data

This study took individual sentences as analysis units, but the sentences that fall in the same move category were simply combined. The analysis is based on TMA, which incorporates six component elements. The 'other types' of moves in this study refer to introduction, subclaim, counterargument, fallacy, integration, restating (a particular move) and conclusion.

Step One: Coding and Classification of the Moves

The moves in all sample writings were identified and labeled manually. Those Toulmin's move codes are presented in capital boldface, while the'other types' of codes, are shown in lower case forms. Intercoding was done by the two language teachers whose expertise is on writing, and the intercoders approved the coding of the researcher. To ensure the reliability of move coding based on TMA, a pilot coding of 16 samples was first conducted by the researcher, and then two intercoders were asked to do the coding independently. When there were variations in coding, the author consulted the intercoders and present her own understanding, and then consensual coding was achieved.

Step Two: Coding of Move-structure patterns

Toulmin's moves and 'other types' moves that appeared in the argumentative essays are presented in separate tables. The move that was similar to the preceding one was deleted, then Toulmin's pattern-structure was derived. The reason of doing this way is to explore the recursive reasoning process in argumentation. The segments after taking subclaims as claims in each sample were also presented, in order to get a closer look at the single argument that compose a wholesome argumentative essay. The subclaim is deemed to be a robust move in this study. It not only offers support to the main claim but also acted as a topic sentence in a paragraph. In the study of Liu and Stapleton [16], it was regarded as data, but this study followed the convention of Liu and Wan [19], taking them as subclaims, which was also a customized pedagogical practice in writing class in China.

Step Three: Presenting the Most Common Patterns

The common patterns as well as common segments with their own frequencies are presented tabulately. Under the most frequent patterns, the sample excerpts are also textually presented. The argumentation quality on the generic level and the argument quality of segments were assessed according to 10 levels as shown in Table 1. For convenience, notes for Table 1-6 are listed here, which signifies the referential meanings of abbreviations in the tables. Note: C=CLAIM; G=GROUND; B=BACKING; W=WARRANT; R=RRBUTTAL; Q=QUALIFIER; L=level; GL=argumentation quality on the generic level; Seg=segments; SL= argument quality level of segments.

Each level is composed of a claim plus either rebuttal, ground, warrant or backing. The qualitative measure focused on both rebuttal and reasons (ground, claim and backing). For example, the description of L7 is "C+ ⅓ (G, W, B) +R (≥2)", signifying the pattern structure is a claim being followed by either one of ground, warrant and backing plus rebuttals which are more than two in

number.

Besides, if the number of either reason (ground, claim and backing) is exactly two or more than two, the level number would be signified as a plus (+). For instance: the description of L5 was "C+ ⅔ (G, W, B) +R", but if the number of either type of evidence is two or more than two, L5 would be converted to "L5+". Lastly, GL concerned quality level on the macro-structure level and SL on segments (subarguments) level.

Table 1: Quality Level of Argumentation and Segment in this Study

Quality Level	Descriptions
L0	C+R
L1	C+ ⅓ (G, W, B)
L2	C+ ⅔ (G, W, B)
L3	C+ (G, W, B)
L4	C+ ⅓ (G, W, B) +R
L5	C+ ⅔ (G, W, B) +R
L6	C+ (G, W, B) +R
L7	C+ ⅓ (G, W, B) +R (≥2)
L8	C+ ⅔ (G, W, B) +R (≥2)
L9	C+ (G, W, B) + R (≥2)

3. RESULTS

3.1 Research Problem 1. Moves in the Macro-Structure of Argumentative Texts

The generic structure of argumentative essays was analyzed at the first stage in order to further analyze their quality. Table 2 presents the most common patterns after Toulmin's elements as well as 'other types' moves.

Table 2: Argumentation Quality on the Generic Level Based on Toulmin's Model in School A

GL	No. of GLs	Percentage (%)
GL5+	9	28.13
GL5	6	18.75
GL6+	5	15.63
GL4	5	15.63
GL8	1	3.13
GL8+	1	3.13
GL7	1	3.13
GL2	1	3.13
GL2+	1	3.13
GL1	1	3.13
GL0	1	3.13

As shown in Table 2, the most employed pattern structures by participants from School A fall under Level 5+ with the frequency of 9 and the percentage of 28.13. Next secondarily adopted pattern structures fall under Level 5 with the frequency being 6 and the percentage being 15.63%.

Table 3 shows that segments with fewer components based on Toulmin's model are more frequently seen in students' essays. The segments of quality level SL2 rank the first place. The segments of quality level SL1 and SL4 hold the second place.

Table 3: Argument Quality Level of Segments after Taking Subclaims as Claims in School A

SL	No. of Segs	Percentage (%)
SL2	13	22.03
SL1	11	18.64
SL4	11	18.64
SL5	10	16.95
SL0	4	6.78
SL3	3	5.08
SL5+	3	5.08
SL6	2	3.39
SL8	1	1.69
SL1+	1	1.69

Table 4: Argumentation Quality on the Generic Level Based on Toulmin's Model in School B

GL	No. of GLs	Percentage (%)
GL3+	6	18.75
GL4	6	18.75
GL2	5	15.63
GL2+	5	15.63
GL1	4	12.5
GL6+	2	6.25
GL5	2	6.25
GL5+	2	6.25

The argumentation quality levels in Table 4 demonstrate that the most employed pattern structures by participants from School B fall under GL3+ and GL4. The secondarily adopted pattern structures fall under GL2 and GL2+.

Table 5: Argument Quality Level of Segments after Taking Subclaims as Claims in School B

SL	No. of Segs	Percentage (%)
SL1	31	46.97
SL2	17	25.76
SL2+	4	6.06
SL0	4	6.06
SL4	4	6.06
SL5	2	3.03
SL3	1	1.52
SL3+	1	1.52
SL5+	1	1.52
SL6+	1	1.52

As shown in Table 5, the segments with fewer components based on Toulmin's model are the most frequently used in the essays. The segments of quality level SL1 rank the first place, taking up nearly half of the total appeared segments. The segments of quality level SL2 hold the second place.

3.2 Research Problem 2. Critical Thinking Skills as Manifested in Each Move

The classification of essential CT skills and sub-skills proposed by Facione (2015) were utilized as a benchmark to illustrate how participants understand and perform CT skills in the argumentative texts. The relation between a CT sub-skill and a particular argumentative move is not necessarily a

one-to-one correspondence.

Table 6: Interpretation Sub-Skills and Corresponding Moves in School A

Sub-skill	Corresponding move	Total	NUJM
decode significance	introduction	32	3
clarify meaning	qualifier	20	0
	claim	32	0
categorize	none		

Note. NUJM= No. of Unjustified Moves.

Table 6 shows the sub-skills under 'interpretation' CT skill and the corresponding moves falling in each category in School A. The move of 'introduction' fits the sub-skill of "decoding significance", none move falls under "categorize" sub-skill, and the move of 'qualifier' and 'claim' fall in the sub-skill of "clarify meaning". In regard to 'claim' and 'qualifier' move, all of them are deemed as "justified". As for the introduction part, 3 out of 32 are unjustified.

Table 7: Interpretation Sub-Skills and Corresponding Moves in School B

sub-skill	Corresponding move	Total	NUIM
decode significance	introduction	32	6
clarify meaning	qualifier	17	0
	claim	32	1
categorize	none		

Note. NUJM= No. of Unjustified Moves.

Table 7 illustrates the sub-skills under 'interpretation' CT skill and the corresponding moves fall in each category in School B. The move of 'introduction' fits the sub-skill of "decoding significance", none move falls under "categorize" sub-skill, and the moves of 'qualifier' and 'claim' fall in the sub-skill of "clarify meaning". All 'qualifier' moves are deemed as "justified", while 1 out of 32 'claim' moves is implicit. As for the 'introduction' part, 3 out of 32 are presumed as unjustified.

Table 8: Analysis Sub-Skills and Corresponding Samples in School A

sub-skill	Corresponding move	NSISM	NSIUSM
examine ideas	subclaim	15	0
identify reasons & claims	subclaim	14	1
identify arguments	none		

Note. NSISM= No. of samples including 'subclaim' moves; NSIUSM=No. of samples including unjustified 'subclaim' moves.

As shown in Table 8, the move of subclaim fits the 'analysis' CT skill. 29 out of 32 samples entail 'subclaim' moves in School A. The subclaims of 15 samples fall in the category of "examine ideas", and the subclaims of 14 samples are under the category of "identifying reasons and claims", with one sample incorporating unjustified move. None 'subclaim' move belongs to "identify arguments".

Table 9: Analysis Sub-Skills and Corresponding Samples in School B

sub-skill	Corresponding move	NSISM	NSIUSM
examine ideas	subclaim	21	3
identify reasons & claims	subclaim	6	1
identify arguments	none		

Note. NSISM=No. of samples including 'subclaim' moves; NSIUSM=No. of samples including unjustified 'subclaim' moves.

According to Table 9, 'subclaim' move belongs to the 'analysis' CT skill. Majority have

incorporated ‘subclaim’ moves in School B. The none ‘subclaim’ move belongs to “identify arguments”.

Table 10: Inference Sub-Skills and Corresponding Moves in School A

Sub-skill	Corresponding Move	NCM	NUJM
conjecture alternatives	rebuttal	3	0
query evidence	none		
draw logically valid or justified conclusions	rebuttal	8	2
	ground	75	10
	warrant	25	1
	backing	14	1
	conclusion	32	2

Note. NCM= No. of Corresponding moves; NUJM= No. of Unjustified Moves.

As revealed in Table 10, no move corresponds to the sub-skill of “query evidence”. All moves of ‘ground’, ‘warrant’, ‘backing’ and ‘conclusion’ fall under the sub-skill of “draw logically valid or justified conclusions”. The number of moves under each category and unjustified moves under each sub-skill is shown in Table 11.

Table 11: Inference Sub-Skills and Corresponding Moves in School B

Sub-skill	Corresponding Move	NCM	NUJM
Conjecture alternatives	rebuttal	5	3
Query evidence	none		
Draw logically valid or justified conclusions	rebuttal	2	0
	ground	91	5
	warrant	15	1
	backing	27	0
	conclusion	32	5

Note. NCM= No. of Corresponding moves; NUJM= No. of Unjustified Moves.

As presented in Table 11, no move falls under the sub-skill of “query evidence”; two ‘rebuttal’ moves correspond to the sub-skill of “draw logically valid or justified conclusions”. All moves of ‘ground’, ‘warrant’, ‘backing’ and ‘conclusion’ fall under the sub-skill of “draw logically valid or justified conclusions”.

Table 12: Evaluation Sub-Skills and Corresponding Moves in School A

Sub-skill	Corresponding move	Total	NSIPUM
Assess credibility of claims	claim	32	0
	rebuttal	4	0
	counterargument	17	1
Assess quality of arguments that were made using inductive or deductive reasoning	counterargument	15	1

Note. NSIPUM=No. of Samples Including each Particular Unjustified Moves.

As depicted in Table 12, under the sub-skill of “assess credibility of claims”, three types of moves are distributed, with the total number and the number of samples that include unjustified moves. 15 ‘counterargument’ moves fall in the sub-skill of “assess quality of arguments that were made using inductive or deductive reasoning”, with one being judged as unjustified.

Table 13: Evaluation Sub-Skills and Corresponding Moves in School B

Sub-skill	Corresponding move	Total	NSIPUM
Assess credibility of claims	claim	32	1
	rebuttal	1	0
	counterargument	4	2
Assess quality of arguments that were made using inductive or deductive reasoning	counterargument	1	0

Note. NSIPUM=No. of Samples Including each Particular Unjustified Moves.

As seen in Table 13, under the sub-skill of "assess credibility of claims", three types of moves are distributed, with the total number and the number of samples that include unjustified moves. One 'counterargument' move falls in the sub-skill of "assess quality of arguments that were made using inductive or deductive reasoning" in School B.

Table 14: Explanation Sub-Skills and Corresponding Moves in School A

Sub-skill	Corresponding move	Total	NURM
State results	rebuttal	12	2
Justify the procedure	rebuttal	18	0
Present arguments	none		

Note. NURM=No. of Unjustified Rebuttal Moves.

Table 14 shows that the move of 'rebuttal' in School A falls in this 'explanation' category, with 12 rebuttals being classified into the sub-skill of "state results", and 2 rebuttals among them are unjustified. Eighteen rebuttals are judged as "justify the procedure", and all of them are justified. No 'rebuttal' move falls in "present arguments".

Table 15: Explanation Sub-Skills and Corresponding Moves in School B

Sub-skill	Corresponding move	Total	NURM
State results	rebuttal	9	0
Justify the procedure	rebuttal	2	0
Present arguments	none		

Note. NURM=No. of Unjustified Rebuttal Moves.

As shown in Table 15, 'rebuttal' moves fit 'explanation' CT skill, with 9 rebuttals being classified into the sub-skill of "state results", and all of them are justified. Two rebuttals are judged as "justify the procedure", and both of them are justified. No 'rebuttal' move falls in "present arguments" in School B.

4. Discussion

4.1 Findings of the Study

Based on foregoing discussions, the essays in this study have undoubtedly shown that a vast majority of Chinese English-major sophomores can make their viewpoints explicit and draw an acceptable conclusion. In argumentation the order usually follows either "data, therefore claim" or "claim because data" model [19]. In this study, the latter model was more frequently observed, which means that majority of students had no difficulties making claims and stating propositions. They also bear the consciousness to support these claims with various reasons. But it seems that some participants somewhat failed to elaborate on the topic, lacked logic when supporting evidence to a thesis, had difficulties to find valid and pertinent evidences for an argument at hand, and more

evidently, lacked overall organizational strategies during the writing process.

Majority of participants can organize their argumentation in a model fashion, but the quality of argumentative reasoning may not be satisfactory. This may verify that the persuasiveness of an argumentative essay depends not only on a good model as well as an inclusion of counterargument and rebuttal, but also depends on relevant and convincing reasons to support claims, which largely resonates the findings of Stapleton and Wu [18].

Formally, every sample starts with an introduction supposed to summarize the given excerpt, which is required by the writing prompt. A claim or a thesis statement, is 100% presented after the introduction, which is also regarded as a must to an argumentation. Yet, good argument always depends on grounds that are likely to become the evidence in an argument and give rise to a major claim. However, without further elaboration of a ground, any essay is likely to be no more than a preconception or assumption or cliched popular belief that is unwarranted and indefensible [32].

Almost every subclaim is followed by ground, warrant or backing (without a fixed order among the three elements), or all of them, so whenever a ground shows, a subclaim always precedes (sometimes follows) it. For instance, in Sample A-S2, the Toulmin Pattern is C-W-G-B-G-B-W-R-Q, which may be regarded as two segments, namely, subC1-W-G-B, and subC2-G-B-W-R-Q. According to Osborne [33], arguments are collected under three groups: simple claims, arguments with verification, and arguments with verification and rebuttal. The above-mentioned separated segments and especially, the strings of those segments show the complexity and macro-structure of sampled argumentations.

The frequency of secondary Toulmin elements is much lower than basic elements, which is in accordance with Qin and Karabacak's [22] study. Liu and Wan [19] also claimed that counterargument and rebuttal in most circumstances go together in high-quality persuasive argument. The findings related to counterargument and rebuttal in this study supported the results of previous studies [16] [34], which regard the two elements as highly-demanded argumentative writing strategies contributing to good-quality essays.

4.2 Implications of the Study

Specific training on argumentative writing is highly demanded in EFL pedagogy in China, not only concerning the micro- and macro- structure of arguments, but also regarding the pertinent evidence to a particular stance. CT must be purposefully and systematically cultivated in augmentative writing class, and TMA may provide a pedagogical scaffolding.

4.3 Limit and Contribution of this Study

This study is far more conclusive. To obtain an accurate and complete picture of the argumentative writing ability of participants, a larger size of corpora should be collected and analyzed. This study did not incorporate an interview with participants, so "self-regulation" of the six essential CT skills proposed by Facione [27] was not covered. Since the present study examined the macro-structure of argumentative essays, which will be influenced by participants' language proficiency.

This study relates each move showed in collected samples with CT skills and concludes that besides Toulmin's moves, introduction, subclaim, counterargument, and conclusion are also crucial elements that manifest writers' CT skills. These 'other types' moves can be regarded as contributions of this study since they complement Toulmin's moves to construct macro-structure of argumentative text. Especially the "subclaim" is deemed to be the most significant contribution of this study.

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