COGNITION AND RHETORIC IN ENGLISH LANGUAGE LEARNERS' WRITING: A DEVELOPMENTAL STUDY

BY

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A DISSERTATION SUBMITTED TO

THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

GRADUATE PROGRAM IN

LINGUISTICS AND APPLIED LINGUISTICS

YORK UNIVERSITY

TORONTO, ONTARIO

JANUARY, 2017

Abstract

The present study examined the effectiveness of an instructional method in English language writing. The instruction was designed to teach a cognitive process *and* a discourse genre/type, and to trace the cognitive and rhetorical development of participants over time. The process was Bereiter and Scardamalia's (1987) knowledge-transforming and the discourse type was the Toulmin (1958/2003) model of argument. The instruction in the process is significant since generating the discourse content was identified as a problem for novice writers (e.g., Bereiter & Scardamalia, 1987). The instruction in the Toulmin model is significant since lack of attention to genre was identified as a problem in cognitive approaches to writing (e.g., Hyland, 2004). The Toulmin model is *only one* possible discourse type to which knowledge-transforming can be applied. The model makes the argument structure a visible and concrete schema as a basis for the discourse content generation process.

To teach *and* research knowledge-transforming composing and the Toulmin model, the tenets of cognitive strategy instruction in writing (CSIW) (e.g., Englert, Raphael, Anderson, Anthony, & Stevens, 1991) and sociocultural theory (SCT) of mind (e.g., Vygotsky, 1978, 1986; Lantolf & Thorne, 2006; Lantolf & Poehner, 2014) were adopted. The reason CSIW was adopted was that it defines the kinds of artifacts and instructional processes that have been shown to be effective for instruction. The reason SCT was adopted was that it makes instruction in discourse concepts scientific (Vygotsky, 1986), provides a theory of the microgenesis of the developmental process through mediation (Vygotsky, 1978; Lantolf & Thorne, 2006), and dialectically unifies instruction and research (e.g., Lantolf, 2008). Instruction was adopted after Scardamalia, Bereiter, and Steinbach (1984) and had three components: explicit strategy instruction in the Toulmin model, mediation of the writing process through artifacts, and two types of verbalization: (focused) freewriting (Elbow, 1973; Munday & Cartwright, 1990) by the participants and instructor and languaging (Swain, 2006a) by the instructor. The study had a mixed-methods design (e.g., Teddlie & Tashakkori, 2009) with a quasi-experimental quantitative component and a qualitative component consisting of textual analysis (Bereiter & Scardamalia, 1987; van Wijk, 1999), dynamic assessment (DA) (e.g., Lantolf & Thorne, 2008, Poehner, 2005; 2007), and semi-structured interviews as well as surveys. For the research part, some of the

artifacts and texts that were used and generated during instruction were used for research. This is consistent with an SCT *praxis* orientation to research (Lantolf, 2008; Vygotsky, 1978).

The results indicated statistically significant gains for two of the categories of the Toulmin model in the texts generated by the experimental group (EG) (n = 13) when compared with those of the comparison group (n = 13). Specifically, the EG's significant gains for rebuttal and response to rebuttal, which were operationalisations of the "rise above conflict" criterion (Scardamalia et al., 1984) in knowledge-transforming, indicated the effectiveness of instruction. Four EG participants' cognitive and rhetorical development was studied and analyzed in depth over an eight-week period. When the four participants' texts were analyzed developmentally, they also demonstrated learning in knowledge-transforming cognitive process and the rhetorical structure of their texts. In particular, some discourse features which were absent in the posttest essays were indeed present in those texts. Also, the text analysis indicated the participants were able to use the mediational artefacts to generate discourse content. The artefacts defined the rhetorical problem for discourse content generation, which is entailed in the definition of knowledge-transforming. From these, inferences about knowledge-transforming composing could be made. The DA results indicated that, with varying degrees of mediation, the participants were able to name, generate, and/or revise the discourse features, some of which were absent in the participants' posttest essays. The interviews and surveys indicated the participants' positive perceptions of the effectiveness of instruction and its effect on cognitive change and rhetorical structure of argumentative texts. The study has implications for L2 academic writing instruction, assessment, and research.

Dedication

To Lili, Eemaan, and Noora, with love.

Acknowledgements

Thanks and praise to Allah, God, the Sustainer of all that is, Who Carried me through the trials of this dissertation. Only by His Grace were the range of thoughts and emotions that this process entailed manageable. Many thanks to my loving wife, Lili Zahedi, and children, Eemaan, and Noora, without whose support, understanding, sacrifice, and, of course, good humour, none of this intellectual adventure was possible. I am grateful to my parents, Ghasem Hadidi and Godshi Shokooh-Zanganeh, both for their spiritual support and filling the gap that the time completing this work took away from family.

I would like to thank Dr. Linda Steinman for accepting to supervise this dissertation. She conducted her role with ultimate grace. Her help and suggestions in the development of the project were many. I am grateful for being introduced to Vygotsky and sociocultural theory in her class, her directing me to the appropriate research site, reviewing multiple drafts of this dissertation, attending presentations in which I developed various aspects of the work and providing encouraging feedback, and supporting my different academic requests throughout the course of my study. In particular, I am grateful that she granted me the freedom and scope to experiment and explore, to rise above the sometimes overwhelming, intellectual challenges of this work.

A great debt of gratitude is owed to Dr. Khaled Barkaoui who generously shared with me numerous hours to meet and discuss various features of the complex methodology and design. He provided invaluable advice, which helped me conceptualize and conduct this mixed-methods study, including locating the references, designing the rubrics, and performing statistical and qualitative analyses. He provided detailed, substantive feedback on the different drafts of the proposal leading to this study, and the dissertation itself. The projects I have worked with him on, as well as his courses which I audited, were substantial learning opportunities, for which I am grateful.

Many thanks to Dr. Brian Morgan, who was instrumental in inviting me to consider alternative ways of looking at the main constructs of the study. His voice was constantly in my head when resolving epistemological conflicts and binaries such as input versus affordance,

intercultural versus ethnocentric rhetoric, and different modes of argumentation. I am thankful for his feedback during various phases of this study.

I am grateful to Dr. Alister Cumming who was not only the External Examiner, but also the intellectual figure whose research and publications were indispensable to conceptualize the study. His incredibly meticulous review of the final draft of the dissertation made it an even better document. It was fortunate to have Dr. Ron Sheese as the Internal Examiner. Dr. Sheese's unique perspective as both a psychologist and writing specialist was exactly what this study needed, an examiner versed in "cognitive rhetoric." I am thankful for his insights and questions in the oral examination. Thanks to Dr. Philipp Angermeyer for insightful questions at the defence as Chair, as well as for the experience working with him as a teaching assistant in his courses in discourse analysis and linguistic anthropology, which informed this dissertation.

I would like to thank Dr. Jim Lantolf for being a great source of inspiration and support over the years, especially through stimulating conversation and valuable feedback on my presentations, especially on dynamic assessment and concept-based instruction.

I would like to thank Dr. Merrill Swain for leading the SCOLAR community, where I got to learn and discuss matters related to sociocultural theory, Dr. Rob Cribbie for answering my statistics questions and his very useful univariate statistics course, Dr. Carol Fraser in whose class I was introduced to cognitive process theory and the seminal paper that inspired this study, Scardamalia, Bereiter, and Steinbach's (1984) *Teachability of Reflective Processes in Written Composition*, and Professor Nick Elson, who reviewed the very first proposal draft for this study.

I am indebted to the four raters in the study, Maggie Roberts, Jessica King, Dan Cornish, and Monia Ponti, who painstakingly and professionally completed multiple rounds of the rating process. Their highly detailed discussions and thinking processes during rating ensured high quality data processing and consistency. Thank you all.

I would like to thank Henry Park and Jerry Carson for not only welcoming me to their classrooms, but their support before, during, and after the data collection and instruction. I am thankful to Joanne Millard for facilitating and coordinating my presence at the data collection site. I would like to thank the English language learners who agreed to participate in this study,

especially the ones who accepted to participate in the think-aloud, dynamic assessment, and interview sessions, which were conducted outside class.

I am thankful to the past and present staff of CUPE 3903, who negotiated guaranteed employment agreements, which helped me afford a livelihood while I was completing this study. My thanks also go to the York University Faculty of Graduate Studies, Graduate Student Association, Graduate Linguistics and Applied Linguistics Student Association, and the Ontario Graduate Scholarship Program for the funding they provided over the years. Sincere thanks also to my other employers, the University of Toronto and York Catholic District School Board.

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List of Abbreviations

B*	Backing
BP	Blueprint
C*	Claim
CG	the comparison group
CBI	concept based instruction
CSI	cognitive strategy instruction
CSIW	cognitive strategy instruction in writing
D*	Data
DA	dynamic assessment
DGE	discourse generation episode
DV	dependent variable
ELL	English language learner
ESL	English as a second language
ELTS	English Language Testing Service test
ETS	Educational Testing Service
EG	the experimental group
IV	independent variable
IELTS	International English Language Testing System
K-T	knowledge-telling
K-Tr	knowledge-transforming
L1	first language, home language, mother tongue
L2	second language, additional language
MM	mixed-methods (research)
MT	multiple-trait rating scale (or rubric)
PT	primary-trait rating scale (or rubric)
Q*	qualification
QUAL	qualitative research
QUAN	quantitative research
R*	Rebuttal (or Opposition)
ResC	Restated Claim
RR*	Response to Rebuttal (or Opposition)
SCT	sociocultural theory of mind
SCOBA	scheme for complete orienting basis of action
TOEFL	Test of English as a Foreign Language
W*	Warrant
ZPD	zone of proximal development

Note. *When Claim, Data, Warrant, Backing, Rebuttal, and Response to Rebuttal are spelled with an initial capital letter, they refer to a particular instance in the text being analyzed. When they are spelled with an initial small letter, they refer to the concept claim, data, and so on. Also, when they refer to the categories/traits in a rubric, or other artifacts, they begin with capital letters.

Chapter 1: Introduction

The purpose of the present study was to examine the effectiveness of an instructional method (henceforth Instruction) in "reflective processes in written composition" (Scardamalia, Bereiter, & Steinbach, 1984) otherwise known as "knowledge-transforming composing"(Bereiter & Scardamalia, 1987; Scardamalia & Bereiter, 2010) aimed to enhance the cognitive processes of text generation (e.g., Hayes & Flower, 1980) and the rhetorical structure of the argumentative texts of pre-university English language learners (ELLs) so that they would begin to appropriate a systematic approach to generating the content of their argumentative discourse. Throughout the dissertation, text production/generation specifically refers to "generating to the content of discourse" (Bereiter & Scardamalia, 1987, p. 7) through knowledge-transforming composing and not general idea generation achieved through activities such as brainstorming. Instruction (spelled with a capital *I*) was designed to improve both the quality of the final texts and the cognitive processes of composing.

The study concerns a basic problem in writing: "retrieving, ordering, and creating knowledge during text production" (Rijlaarsdam & Esperet, 1999, p. i). Fundamentally, a keen interest in the relationship between thought and language, or cognition and rhetoric, inspired this study. At a personal level and in my composition teaching practice, the problem arose from observations and questions about the genesis of ideas in writing or "knowing what to write" (Torrance & Galbraith, 1999) or "finding something to write about" (Torrance, Thomas, & Robinson, 1996).

As an English language teacher, I have had to respond to my students' challenges about having little to write about. Traditionally, the problem of ideation in writing instruction has been addressed with outlining and brainstorming activities (e.g., Rao, 2007), which are idea production activities as contrasted with text production (e.g., Collins & Gentner, 1980), or heuristics of discovery (e.g., Young, Becker, & Pike 1970), which are predominantly pre-writing activities. Outlining and brainstorming are common pedagogical activities consistent with a linear stage model of writing process, which Flower and Hayes (1977) criticized. Flower and Hayes (1980) confirmed Emig's (1971) finding that the writing process is not linear, but recursive. Cognitive processes of planning, generating, translating, and organizing happen on-

line while composing (Hayes & Flower, 1980) as well as off-line in the pre-writing phase, as most ELLs learn it.

Scardamalia et al. (1984) applied the idea of "rhetorical problem solving" (Hayes & Flower, 1980) as the driver of discourse content generation in writing. The instructional method in the present study was inspired by the seminal paper by Scardamalia et al. (1984), *Teachability of Reflective Processes in Written Composition*. In their experimental study, Scardamalia et al. defined expert composing as a dialectic between a rhetorical problem space and content problem space. They borrowed the idea of problem space from Newell (1978) who identified problem space as "a fundamental category" in cognitive science which he defined as follows:

> A problem space consists of symbolic structures (states of the space) and a set of operators over the space. Each operator takes a state as input and produces a state as output …. Sequences of operators define paths that thread their way through sequences of states (p. 697)

Without engaging with the mathematical aspect of Newell's (1978) "problem space," Scardamalia et al. (1984) used it to explicate the dialectical relationship between content and rhetoric in writing. They observed that the "interaction between the two problem spaces constitutes the essence of reflection in writing" (p. 176). They explained that while "novice" writers routinely move from the content problem space to the rhetorical problem, "expert" writers are able to take the "return trip" from the rhetorical problem space to the content problem space. The latter is the hallmark of "reflective" (Scardamalia et al., 1984) and "knowledge-transforming" (Bereiter & Scardamalia, 1987) composing. Reflective knowledge-transforming composing is the construct that Instruction in the present study sought to foster (see Chapter 2 for further discussion).

The interesting question that Scardamalia et al. (1984) examined was whether this composing behaviour, characteristic of expert writers, could be taught and the learning could be measured in an experimental setting. Their study was framed in cognitive psychology terms, with its own assumptions and constraints. Also, it examined English-L1 children's writing in the sixth grade. The present study, however, is informed by both cognitive writing theory and sociocultural theory of mind (Lantolf & Poehner, 2014; Lantolf & Thorne, 2006; Vygotsky 1978, 1986). It studies pre-university ELLs' writing. Furthermore, Scardamalia et al.'s rhetorical problem solving was not grounded in a theory of rhetoric/discourse. Instruction in the present

study, however, is grounded in Toulmin model of argument (Toulmin 1958/2003; Toulmin, Rieke, & Janik, 1984). Because of the different epistemologies and methodologies of the cognitive and SCT paradigms, a mixed-paradigm, mixed-methods approach (Tashakkori &Teddlie, 2003; Teddlie & Tashakkori, 2009) was adopted. It will be argued and empirically demonstrated that this complementary approach (Green, Camilli, & Elmore, 2006) enhances and enriches the original study and sheds light on certain aspects which the original study did/could not address in part due to the features of a cognitive perspective on knowledge-transforming composing which does not take into account the role sociocultural mediational means and processes play in constituting cognitive activity.

A theoretically asocial perspective inevitably raises questions about the role of social context in any instructional effort. The sociocultural orientation of the present study affords the inclusion of sociocultural tools that mediate the acquisition and development of the argumentative discourse features and the cognitive processes that mediate their production. This affordance is possible because higher mental functioning is mediated by social-semiotic tools (Vygotsky, 1978).

Given the above, the disciplinary nexus of the present study is conceptualized at the intersection of cognitive writing theory (e.g., Bereiter & Scardamalia, 1987; Hayes, 1996; Hayes, 2001; Hayes 2012 a & b; Hayes & Flower, 1980; Flower & Hayes, 1980; Flower & Hayes, 1994), cognitive strategy instruction (e.g., Berthold, Nu¨ckles, & Renkl, 2007; Harris & Pressley, 1991; Santangelo, Harris, & Graham, 2008), sociocultural theory (SCT) of mind (e.g., Vygotsky, 1978; 1986, Wertsch, 1985; 2007) and SCT's application to L2 development (e.g., Lantolf & Thorne, 2006; Lantolf & Poehner, 2014; Swain, Kinnear, & Steinman, 2011).

In the present study, whereas the rationale for tracing the genealogy of thought to cognitive writing theory is obvious (because that is where the problem was identified and rigorously studied), the application of SCT is less so, especially in light of some arguments about incommensurability of (some aspects) of the former with SCT's assumptions (e.g., Dunn & Lantolf, 1998; Zuengler & Miller, 2006). The philosophies underpinning this debate will be discussed in detail in Chapter 2, yet a brief discussion at the outset facilitates following the thinking that informs the study.

1.4. Why Sociocultural Theory of Mind

Learning to write happens in a social and cultural setting. Thus, understanding the extent to which this setting plays a role, influences, and/or mediates learning requires a theory of the context. Hayes (2012b) acknowledged the work of writing researchers who focus on culture and considered their perspective potentially supportive of research done in other paradigms such as the cognitive. He noted that "diversity increases our chances of discovering productive paths" (Hayes, 2012b, p. 23). The impact of the sociocultural context on human psyche is well-documented. For example, Wertsch, del Río, and Alvarez (1995. p. 1) referred to Elder (1974) who "documented the lasting psychological impact of the Great Depression on Americans." The sociocultural theory of mind explains the interaction between mind and society in mediating higher mental functioning (Vygotsky, 1978). According to Wertsch et al. (1995), "the goal of a sociocultural[1] approach is to explicate the relationships between human mental functioning, on the one hand, and the cultural, institutional, and historical situations in which this functioning occurs, on the other" (p. 3). The present study concerns how semiotic means mediate ELLs' development of written argumentative discourse and the cognitive processes that afford it.

While emphasizing the importance of culture and society, one should note the role of universals in human mental functioning in SCT. Wertsch et al. (1995) noted that Vygotsky believed in "some form of universal human rationality and progress. The rationality involved was viewed as being accessible to all humans, though some groups and individuals might lag behind others in their mastery of it" (p. 7). One of these universals, relevant to the core construct of the present study, is the ability to draw inferences from clearly understood premises during the writing process. Drawing valid inferences from the given promises is the foundation of the Toulmin (1958/2003) model of argument, which I used to operationalise reflective knowledge-transforming composing. Donaldson (1978) best defines inference, which is the essence of syllogism or deductive reasoning, as "drawing of the conclusion that if something is true, something else must also be true" (p. 40). Expressed in terms of classic syllogism, if the premises are true, the conclusion must be true, or in terms of the Toulmin model, if the data is true, the claim must be true. Donaldson provides many examples of children under seven years

[1] According to Wertsch et al. (1995) Vygotsky himself did not use the term "sociocultural," but opted for "sociohistorical" or "cultural-historical."

of age who are, in fact, capable of deductive inferences if they understand the question that they are asked.

In addition to SCT's recognition of both universal-biological and cultural lines of development, which makes it the appropriate paradigm for the present study, SCT provides the framework to conceptualise both Instruction and the study of it. In this study, Instruction was informed by Vygotsky's (1986) theory of concept development. Vygotsky discussed how scientific concepts which, when initiated by "*verbal definition* … gradually com[e] down to concrete phenomena" (Vygotsky, 1986, p. 148, italics in original). The instructional concepts in the present study were the elements of Toulmin model of argument (Toulmin, 1958/2003; Toulmin, Rieke, & Janik, 1984). These discourse concepts were used to drive the content generation processes by rhetorical problem solving. Each discourse feature was a scientific concept that drove the generation of text for that feature. Concept-based instruction (CBI) has been productively used in L2 SCT studies (e.g., Negueruela, 2003). Ferreia and Lantolf (2008) applied the principles of CBI to the teaching of genre, as defined by systemic functional linguistics. However, they did not focus the micro-structure of argumentative discourse and its features; the present study is the first SCT study, to my knowledge, to apply CBI to the acquisition and development of discourse features and the cognitive processes that mediate them.

The dynamic assessment (e.g., Lantolf & Poehner, 2004) component of SCT is defined as the dialectical unity between instruction and assessment. During a dynamic assessment session, the learner abilities are simultaneously promoted and measured. It is based on Vygotsky's (1978) method of "double stimulation" in which" auxiliary means" are inserted into the assessment process in order to mediate task performance. The purpose of the assessment is to differentiate between two types of participants: one who is unresponsive to mediation and one who does respond to mediation and whose performance is thereby enhanced. Vygotsky noted that these two learners' demonstrate different levels of development, which traditional static assessment does not capture, but dynamic assessment does. In the present study, dynamic assessment was used to differentiate between the discourse features and generating processes that were fully internalized, on the one hand, and those that were on their way to internalization, on the other.

1.5. An Overview of Cognitive Process Theory Research in L2

Cognitive process theory has been applied to many studies of (L2) writing in the past thirty years. Most of these studies have been descriptive in nature (e.g., Zamel, 1983; Raimes, 1987; Cumming, 1989; Sasaki & Hirose, 1996; Sasaki, 2000; Schoonen, van Gelderen, de Glopper, Hulstijn, Simis, Snellings, & Stevenson, 2003) and have mostly focused on the entirety of the composing sub-processes of the Hayes and Flower (1980) model which comprises planning, translating and revising. There have been only a few studies that have focused on the translation (i.e., converting ideas to text) or the discourse content generation component of the composing process (Zamel, 1982, Cumming, 1990; van den Bergh & Rijlaarsdam, 2007) and even fewer with an experimental design focusing on discourse content generation (Scardamalia, Bereiter, & Steinbach, 1984). Most of such studies have looked at composing processes from what is conceptualized as a cognitive process theory of writing (Hayes & Flower, 1980; Bereiter & Scardamalia, 1987). The present study contributes to filling the gap by examining the problem of discourse content generation from an SCT perspective.

1.6. A Mixed-paradigm Approach

Whereas references to Vygotsky's ideas such as the zone of proximal development (ZPD) and internalization and inner voice abound in educational cognitive psychology research (e.g., Bereiter & Scardamalia, 1986; Kellogg, 2008; Schunk & Zimmerman, 1997, Chenoweth & Hayes, 2003), there is little theorizing about how the SCT concepts and constructs inform our understanding of cognitive structures and processes involved in writing development. The present study offers a detailed application of SCT concepts to explicate the writing development of L2 learners

Serious SCT research draws on studies framed in cognitive psychology. For example, Zhang and Lantolf (2013) applied Baddley's (1986) working memory model in SCT's concept-based instruction (CBI) (e.g., Negueruela, 2003) to argue against Pienemann's (1984) teachability hypothesis, which posits that instruction cannot skip the natural order of language development. Lantolf and Thorne (2006) also used the cognitive psychology literature on explicit and implicit knowledge (e.g., DeKeyser, 2005) to explicate Piaget/Vygotsky's constructs of scientific and spontaneous concepts. This is not to suggest that SCT and cognitive science concepts are always commensurate (cf. Dunn & Lantolf, 1998; Zuengler & Miller, 2006), but

that SCT researchers do make use of structures, constructs, and processes conceptualized in cognitive psychology, when there are grounds to do so. The argument for their use in SCT is developed in Chapter 2.

1.7. Significance of the Study

The study is significant for at least four reasons: first, the importance of discourse content in composition; second, the need for process pedagogy to be grounded in a theory of discourse/rhetoric that acknowledges generic conventions (argumentation in this case); third, the necessity of assessing rhetorical development and its cognitive processes in view of not only the abilities that are fully realized, but also those that can be realized with mediation during the assessment procedure; and, that the study should be useful for classroom application. These features are discussed below.

It is important to differentiate the kind of discourse content that is the focus of the present study as that which is generated on-line, while the student is composing, and not that which is based on external sources of ideas. The latter was investigated by Graesser, Hopkinson, Lewis, and Bruflodt (1984), who found that media and formal education were significant sources and direct experience and social interaction were insignificant sources of information in student writing

First, the English language learners' problem with generating the substance or ideational/discourse content of their writing cannot be overstated. From an assessment point of view, Connor and Carrell (1993, cited in Connor & Mbaye, 2002, p. 275) found that the development of ideas was considered more important by raters than some other criteria in the scoring rubrics. They found, for example, that idea development was more important than "addressing specific requirements of the task." Leki and Carson (1997) reported that a large number of their interview participants found "writing off the top of their heads" difficult because they did not know how to generate ideas in the time constraint they were given (p. 47). Hamp-Lyons (1991) reported a study by Bridgeman and Carlson (1983) in which English language teachers and science professors ranked "development of ideas" second and fourth among 12 and 11 criteria, respectively. Many analytic scoring rubrics for ESL writing allot a large proportion of the total score to the content of the composition. For example, the ESL composition profile

developed by Jacobs, Zinkgraf, Wormuth, Hartfiel, and Hughey (1981) allocates 30% of the total score to the content feature of the composition. The level descriptors for a score of 27-30 for content in their rubric include the following words: "substantive, thorough development of thesis, and relevant to assigned topic" (p. 30). Similarly, many ESL writing holistic scoring rubrics such as those for TOEFL describe a high-score essay with terms such as "well-developed, using clearly appropriate, explanations, exemplifications, and/or details" (Educational Testing Service, 2005, p. 2), which are all related to the ideational content of the writing Additionally, analytic writing scoring guides used in pre-university ESL courses feature similar descriptions for a high-quality essay: "All ideas are logically and clearly presented" according to the York University English Language Institute (2010, p.1). These scoring rubrics point to the importance of the ideational content of compositions and the development of such content.

The construct of the content feature of essays is what Hadidi (1998, 2010) investigated. In an investigation of the relationship between writing quality, assessed holistically and analytically, and essay content, Hadidi found a significant moderate correlation between writing quality and the number of propositions. In addition, an exploratory factor analysis indicated that the three variables of propositions, content, and organization cluster under one factor. This common factor suggests that the three variables may represent one construct, which I called *the information load* of the writing. Information load applied to the Jabobs et al. (1981) rubric, translates to 50% of the total score once the subscores for organization and content are added. That is, half of the total score in this rubric is related to the information load, comprising constructs of content, organization, and propositions. Whereas the three features are manifest in the final text, there is little understanding of the processes that afford the genesis of these features in the final product. The present study focuses on fostering reflective knowledge-transforming strategies (Scardamalia et al., 1984), which are designed to enhance both the writing process and final text.

Second, a critique of cognitive approaches to writing instruction according to Hyland (2004, p. 8) is that they seem to presuppose generic knowledge of the text to be produced. Instruction seems to assume that the student can either pick up the generic moves such as those identified in research articles by Swales (1990), or be initiated into the genre at some point independently of the cognitive processes. This critique seems to apply to Scardamalia et al.'s

(1984) approach to the instruction in reflective thought. The cue cards that they designed to foster reflection do not seem to reinforce the generic properties of the opinion essay, nor the factual exposition. The cue cards seem to have been designed to facilitate the generation of the next item in the text. In the present study, by contrast, the Instruction in cognitive processes is embedded in the argument genre, and informed by a model of discourse (Toulmin, 1958/2003).

Third, assessment of rhetorical and cognitive development should take account of both full and potential development. The original Scardamalia et al. (1984) study was based on a summative assessment of participants' texts generated before, during, and after the intervention. The present study, on the other hand, complements summative assessment with dynamic assessment (e.g., Lantolf & Poehner, 2004), in which the learners' text generation processes were mediated by the researcher in order to observe and record the amount of mediation required to identify and generate the discourse features which are the focus of the study. Dynamic assessment delineates the discourse features that the learner cannot produce at all, those that he/she can produce with mediation, and those already present without mediation. Dynamic assessment provides a fuller picture of the learner's abilities.

Finally, this research has direct practical applications and implications for pedagogy. Nassaji (2012) surveyed ELL teachers to find how relevant they found L2 research to their practice. While a majority of them found knowledge of such research useful, they indicated they did not find them as relevant to their practice as actual experience. The *praxis* model of research (Lantolf, 2008) which is followed in this study is a step toward ameliorating the problem of relevance. It is believed this classroom based study conducted by a researcher-practitioner is directly relevant to classroom practice, not only because of the inside perspective, but also the action research methodology employed and that it is cognizant of the many sociocultural influences that mediate the efficacy of Instruction.

Two important cognitive writing research concepts in this study are **knowledge-telling** (K-T) and **knowledge-transforming** (K-Tr) composing, introduced by Bereiter and Scardamalia (1987). Knowledge-telling (K-T) is a composing process in which the content problem space leads the generation of content. Bereiter and Scardamalia characterize this as "think-say" composing. Writing within a discourse schema that one has fully internalized is another example and requires no problem-solving.

Bereiter and Scardamalia (1987) defined knowledge-transforming (K-Tr) composing as a dialectic between a rhetorical problem-space and the content problem space. Subsuming knowledge-telling, knowledge-transforming is characteristic of expert composing in which a rhetorical problem of discourse leads the way to the retrieval and generation of content in the content problem space. It materializes when the writer's intention to solve a discourse problem (e.g., generating data for a claim or responding to opposition) leads to the production of content. Three examples are conscious discourse-schema driven composing[2], discourse prompt-mediated composing, and focused freewriting mediated by prompts (see Chapter 3 for examples). Note that what is knowledge-telling for an expert may be knowledge-transforming for a novice, and the novice's knowledge-transforming can become knowledge-telling with practice.

1.8. Research Questions

The present study sought to answer the following research questions. The questions were framed from a mixed-methods research perspective because both the theoretical framework and the methodological approach in this study were mixed. In general, two classes of questions are asked. There are question(s) that are asked to reject a null hypothesis (Jaccard & Becker, 2002; Howell, 2007; Hatch & Farhady 1981). These questions are confirmatory (Teddlie & Tashakkori, 2009, p. 127) and drive the quantitative component of the mixed methods design (Onwuegbuzie & Leech, 2006, p. 482). Also, there are questions that are exploratory (Teddlie & Tashakkori, 2009, p. 127) and phenomenological (Creswell, 2007), which are asked to understand the themes and patterns that develop through the course of the study. Such questions drive the qualitative component of the design (Onwuegbuzie & Leech, 2006).

1. Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in improved writing quality, in general, and argument quality, in particular, as reflected in their scores? If so how?
2. Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in a change in their cognitive writing processes and argumentative rhetorical structure as reflected in the characteristics of their texts? If so, how?

[2] After a discourse-schema is internalized and becomes a stable cognitive-rhetorical structure, then employing it would be an instance of knowledge-telling.

3. Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in a change in their cognitive writing processes and argumentative rhetorical structure as reflected in the dynamic assessment of their writing ability? If so, how?
4. What are the perceptions and experiences of the participants of the Instruction?

The yes-no questions confirm or disconfirm the existence of a phenomenon and the *wh*-questions explore it. In that sense the questions are complementary, consistent with the mixed-approach.

1.9. Organization of the Dissertation

After this introduction, the Literature Review follows in Chapter 2, where the following areas will be covered: literature related to cognitive writing theory, cognitive strategy instruction, the sociocultural theory of mind, and the philosophical underpinning that drove this study toward pragmatism and mixed-methods. Chapter 3 covers Instruction, presenting the theoretical principles, the tools, materials, and processes, as well a description of each instructional session. Chapter 4 presents the methodology adopted to answer the research questions. This chapter is divided into four parts, each corresponding to a research question, for which the tools, data collection procedures and analyses are described. Chapter 5 covers statistical score analysis findings answering Research Question 1. Findings for Research Question 2 are presented in Chapter 6, where a longitudinal textual analysis will be presented for four participants in the experimental group to provide evidence (or lack thereof) for rhetorical development in the use of the Toulmin model (1958/2003) and cognitive development in knowledge-transforming. Rhetorically, the analysis seeks to assess the students' developing argumentative discourse during instruction for structural soundness and substantive strength (Toulmin et al., 1984). The analysis also provides indirect evidence for reflective knowledge-transforming composing. Chapter 7 deals with microgenetic development and assessment of the learners' writing ability in dynamic assessment sessions to answer Research Question 3. Chapter 8 presents the findings of surveys and interviews conducted to collect emic perspectives of the participants about the Instruction, answering Research Questions 4. The final chapter, Chapter 9, summarizes the findings and concludes the dissertation. (The List of Abbreviations used in the study is presented above.)

Chapter 2: Literature Review

This study ultimately concerns the relationship between thought and language, or cognition and rhetoric, or their realization as thinking and writing. It is also a study in educational linguistics. It draws on three areas of scholarship: cognition, rhetoric, and pedagogy. The purpose of this study was to examine the effectiveness of a writing instructional method, i.e., Instruction, to effect cognitive change and improved writing quality. The cognitive process which is the focus of the present study is content generation, which involves planning, generation, and translation of content (Hayes & Flower, 1980). Specifically, it concerns the rhetorical problem of discourse content generation (Bereiter & Scardamalia, 1987). The study, therefore, draws on the L1/L2 cognitive writing theory which examines both composing processes and instructional methods. At the same time, however, such literature (e.g., Bereiter & Scardamalia, 1986) frequently draws on Vygotskyan (1978) ideas of zone of proximal development, mediation, and internalization to explain the mediational aspect of instruction, without sufficient theoretical grounding in Vygotskyan sociocultural theory of mind (SCT). Such often cited concepts in instructional psychology are rarely grounded in SCT principles. This literature review aims to fill this gap by providing the background for why and how SCT principals were used to *teach* and *study* cognitive change. Thus, this literature review is organized to first review the relevant cognitive theory writing research, and, then, to review the basic SCT concepts that bear on the instructional method and its assessment. In this study, change in cognitive processes is measured through text analysis; therefore, studies that sought to infer such processes from text are briefly reviewed.

Because the present study concerns both an instructional and a research component, it is important to delineate what to teach, how and why, and what to research, how and why. Instruction aimed to teach the process of "reflective-knowledge-transforming composing" (Scardamalia et al., 1984; Bereiter & Scardamalia, 1987) to generate an argumentative text following the Toulmin (1958/2003) model. Thus, both the process and product of writing were the subject of instruction. The reason knowledge-transforming and the Toulmin model were taught was that they offer a solution to the problem of generating the discourse content (Bereiter & Scardamalia, 1987) in argumentative writing. Knowledge-transforming and the Toulmin model were taught based on the principles of cognitive strategy instruction in writing (e.g.,

Englert et al., 1991) and SCT (e.g., Lantolf & Thorne, 2006). These two fields of inquiry are relevant because the former informs some of the artifacts and activities to be used for instruction and the latter provides the principles that undergird instruction. Instruction in knowledge-transforming entails knowledge-telling (Bereiter & Scardamalia, 1987). To operationalize knowledge-telling in Instruction, I used freewriting (Elbow, 1973) and focused freewriting (e.g., Munday & Cartwright, 1990). Thus, this review argues why freewriting is an appropriate operationalization of knowledge-telling, and why and how freewriting taps into inner speech, which Vygotsky (1987) considered writing presumes. For Instruction, the SCT principles of concept based instruction (Lantolf & Thorne, 2006; Negueruela, 2003; Vygotsky, 1986) were used in order to apply Vygotsky's (1986) theory of concept formation to the generation of argumentative discourse features. This theory makes the acquisition of the argumentative discourse features scientific, a departure from "rule of thumb" (Negueruela, 2003) ways to teach argumentative writing.

Informed by the four research questions, presented above, the research component of the study examined the effect of Instruction on (a) students' general and argumentative writing quality and (b) cognitive process of knowledge-transforming. These two dependent variables were assessed through statistical analysis (Research Question 1) as well as textual analyses (Bereiter & Scardamalia, 1987; Mann & Thomson, 1988; Toulmin, 1958/2003; Toulmin et al. 1984; van Wijk, 1999) (Research Question 2). In addition, dynamic assessment (DA) (e.g., Lantolf & Thorne, 2006) was used to differentiate between the elements of Instruction that were fully internalized and those that needed further mediation to be actualized (Vygotsky, 1978) (Research Question 3). The review of relevant DA literature is presented as part of the SCT section. Statistical analysis measured the effect of Instruction with respect to groups. Text analysis and DA qualitatively determined the effect of Instruction with respect to individual participants. The interviews also revealed individual participants' perceptions (Research Question 4). The SCT research paradigm adopts a *praxis* model which dialectically unifies research and practice (Lantolf, 2008). To that end, some of the activities and tools used during instruction were used for data collection. This methodological point will be reviewed in the SCT section below.

2.1. Relevant Cognitive Research on Writing, Phase I, and Toulmin Model of Argument

Research on cognitive writing processes arguably began with Emig (1971) who investigated the writing processes of twelfth-graders by collecting think-aloud data while they composed. During the 1970s, Hayes and Flower (1980) collaborated to present a model of composing behaviour, using the think-aloud protocol technique (Ericsson & Simon, 1993), which is still currently applied in different studies. Their research culminated in the famous Hayes and Flower (1980) model which divides the writing processes into three sub-processes of planning, translating, and revising, which interact with the task environment and the long-term memory. The important insight in their model was that writing is not a linear, i.e., sequential process, but that it is a recursive process in which all the processes (can) act on one another and upon the resources at any given moment in time. The recursive model of writing is in contrast to the "stage model" in which writing is posited to consist of sequential stages of planning, drafting, and revising, which Flower and Hayes (1977) critiqued.

The Hayes and Flower (1980) model consists of three components: the writing process (planning, translating, and revising), the long-term memory, and the task environment. Planning subsumes generating, organizing and goal-setting. The long-term memory is where items of knowledge are stored and are retrieved through the generation process. In addition to the long-term memory, the planning process interacts with the task environment components, which comprise the writing topic and audience considerations. As such, planning engages both with the long-term memory, which is internal to the person, and the task environment, which is external to the individual. The items of knowledge thus retrieved and organized are translated into text while the writer is both interacting with the text produced thus far and is engaged in the revision process. This interaction suggests that generation may follow any process such as revision, as was later empirically demonstrated (e.g., van den Bergh & Rijlaarsdam, 2007).

Translation is a process of converting propositions into linear sentences. Propositions for Hayes and Flower (1980) are "structures such as [(concept A) (Relation B) (Concept C)] or [(Concept D) (attribute E)], etc. where concepts, relations, and attributes, are memory structures, perhaps complex networks or images, for which the writer may or may not have *names*" (p. 15, italics added). Therefore, according to their second formulation: i.e., [(Concept D) (attribute E)], a proposition is not necessarily a complete subject and predicate sequence as is the case in

propositional calculus (cf. Hadidi, 2010). By this definition a proposition may be a "complex" consisting of, for example, the Concept *Mountain* and the Attribute *Beautiful* without a relationship expressed in a predicate. This suggests that ideas that are translated into language are not necessarily linguistic because the writer may not either have a name for them or may not have formulated them in a complete subject-predicate sequence. This formulation of idea generation is akin to Vygotsky's (1986) idea of inner speech which will be discussed in the SCT section.

Hayes and Flower (1980) did not discuss the temporal distribution of memory resources during text production. This temporal distribution is significant in deciding on the precise timing of instructional steps. Knowing the cognitive resources that are involved informs instruction so that the educator can decide when to offer mediation, e.g., during dynamic assessment, so that learning is enhanced. De Beaugrande (1984) examined this temporal distribution. De Beaugrande divided the text production along a timeline, comprising three segments. The central time segment is aligned with the short term memory storage which spans from -2 seconds to +2 seconds, measured from the moment of writing, and is mostly responsible for the more mechanical features of the writing processes such as sound-letter mappings while inscribing. The middle time segment corresponds to the short-term memory which spans from -20 to +20 seconds and is less engaged with mechanical aspects and more with planning. The outermost segment represents the long-term memory, which does not have a time span associated with it and is more involved with goal-setting and ideation. De Beaugrande's model explicates how memory resources are allocated to the writing levels across time. In the more distant past and future, the global ideational aspects are attended to. At the moment of composing the more local, surface aspect are processed. These aspects are "letters [and] sounds, phrases, expression, conceptual development, ideas, and goals" (De Beaugrande, 1984, p. 128). With this background in cognitive writing theory, I will review the seminal article that informed the present study.

2.1.1. Reflective thought in writing: knowledge-transforming (Scardamalia et al. 1984).

The connection between thought and language/discourse in writing had not been made explicit in cognitive writing models prior to Scardamalia et al.'s (1984) *Teachability of Reflective Processes in Written Composition*. Scardamalia et al. defined a watershed point in cognitive writing theory by introducing the dialectical relationship between thinking and writing, in what

they termed as *reflection* in writing or as later referred to as knowledge-transforming composing (Bereiter & Scardamalia, 1987), which the present study is modelled after. Because their research undergirds the present study, it is reviewed in depth.

Scardamalia et al. (1984) outlined three types of reflective processes: discovery heuristics (Young, Becker, & Pike 1970), teacher-student dialogue (Graves, 1983, Staton 1980), and their own assisted monologue in the form of reflective knowledge-transforming composing. Scardamalia et al. conducted a quasi-experimental study in which they tested their hypothesis as to whether "reflective thought" can be taught and learned. Their study falls under the general rubric of cognitive strategy instruction in writing (e.g., Englert, Raphael, Anderson, Anthony, & Stevens. 1991; Guzel-Ozmen, 2009; Harris & Pressley, 1991; MacArthur & Lembo, 2009; Paz, 2007; Pressley, McGoldrick, Cariglia-Bull, & Symons, 1995). Below I first review the conceptual basis of their study, which informs the present study, and, then, will describe its method and findings.

Scardamalia et al. (1984) defined reflection, "following Piaget (1980), as a dialectical process by which higher-order knowledge is created through the effort to reconcile lower order elements of knowledge" (p. 173). Later in Scardamalia and Bereiter (1985), they defined dialectic in writing as "the process in which conversation promotes thought" (p. 309). The purpose of Scardamalia et al. (1984) was to test whether an instructional method would help writing to "induce thought" (Scardamalia & Bereiter, 1985, p. 308).

Scardamalia et al. (1984) contrasted reflective with non-reflective writing activity. The latter is a process in which writing is reduced to a "routine," whereby the writer thinks of what to say next and says it. They characterized this process as "knowledge-telling" because it involves "reducing writing assignments to topics, then telling what one knows about the topic" (Scardamalia, et al., 1984, p. 174).

Scardamalia et al. (1984, p. 176) described reflective processes of expert writers as operations working both ways between a "content problem space" and a "rhetorical problem space". They characterized this process as dialectical (p. 178) (although they did not base it on a theory of dialectical movement). Their contention is that this dialectic constitutes the "essence of reflection in writing". This interaction can be

> thought of as productions or condition-action pairs, some of which take beliefs [i.e., knowledge states in the content space] as conditions and convert them to rhetorical goals, some of which take rhetorical problems and convert them to subgoals to be satisfied in the content space, that is, through operation on beliefs. (p. 176, words in brackets added)

To describe condition-action pairs, Scardamalia et al. (1984) drew on the concept of problem space developed by Newell (1980). According to Newell, a problem space consists of states and operators which take "a state as input and produce a state as output (Newell, 1980, p. 697)." The problem consists of "a set of initial states, a set of goal states, and a set of path constraints" (Newell, 1980, p. 697). Scardamalia et al. (1984) explained how condition-action pairs or productions operate: beliefs, i.e., knowledge states in the content space, are converted into rhetorical goals for expression. That is, the condition *What do I mean?* In the content space is converted to the action *How do I say it*? in the rhetorical space. In other words, when an item of belief or knowledge state in the content space should be expressed rhetorically, a rhetorical heuristic search is set in motion. An example by Scardamalia et al. concerns when the writer believes that a term is unclear; then, a rhetorical problem of giving a definition is converted to a search for a semantic representation of the term in the content problem space. So far, it is similar to the linear model of knowledge-telling demonstrated by novice writers, in which-the output of the content space serves as input for the rhetorical space. The essence of reflection lies in the reverse process, by converting rhetorical problems to content problems. Such a search for a definition in the content space may lead to a realization that the writer does not have a clear concept of the term and thus he or she sets off a heuristic search for clarification of the term in the content space. The heuristic that is the basis of the rhetorical problem could be the definition formula in classical rhetoric: T*erm = Class + Sum of Differences* (Trimble, 1985). Once the formula is retrieved in the rhetorical space, the writer might realize he or she does not know the class which the term belongs to. Then, a search in the content space begins. As another example, the cause-effect relationship between A and B might be converted to a search for rhetorical operators of cause-effect in the rhetorical space such as *because*, *since*, and participle clauses. However, once the operator is located, the writer realizes the cause-effect order is unclear, so a heuristic search in the content problem space is conducted to resolve the conflict. This dialectic between the two problem spaces is the basis of "literate expertise" (Scardamalia & Bereiter, 1991).

Regarding such rhetorical problem solving processes, Bereiter and Scardamalia (1987) observed "these less obvious problems have to do with generating *the content of discourse* rather than with generating written language" (p. 7, italics added). In the present study, "content generation" is used in this strict sense: generating the content of discourse. Having reviewed the conceptual basis of the Scardamalia et al. study, I describe their method below as a frame of reference for the present study.

Method. The participants in the Scardamalia et al. (1984) study were two classes in the sixth grade. One served as the experimental group (n = 30) and the other as control (n = 32). There is no indication that they were English language learners. The instructional component of their study consisted of two 45-minute periods per week for a total of 15 weeks. The researchers conducted the instruction themselves. The instruction for the first 10 weeks was on an opinion essay and the remainder was on factual exposition. Their instruction consisted of three parts: procedural facilitation, modelling thought, and direct strategy instruction.

Instruction. Procedural facilitation entailed having the participants think aloud (a monologue) while writing and inserting cues, which were sentences previously written on cards, into their thinking. First, the instructors modelled the procedure for the participants. Later, the participants volunteered to do them independently. When the participants experienced a moment of "stuckness," they would select a cue from a deck of cue cards, say it as part of the think-aloud, and continued as though the cue occurred spontaneously. Later in the study the cue cards were categorized according to genre and type of writing and function of thinking. For example, for the opinion essay, and under the category *New Idea*, one cue read, "A whole new way to think of this topic is …"; for the factual exposition, and under the same category of *New Idea*, the cue read, "I might explain a method used to …." The participants were taught to first decide what category they needed, and, then, make the selection from that category. There were five categories for either type of writing: *New Idea, Improve, Elaborate, Goals, and Putting it Together*. The presence of these cues in the think-aloud protocols would indicate knowledge-transforming behavior because content generation process would start from the rhetorical problem space by asking the questions on the cue cards.

Modelling thought concerned modelling planning by thinking aloud both with and without the cue cards. Both the instructor and the participants acted as models. Modelling was followed by class discussions about the thinking strategies that were observed.

Direct strategy instruction involved explaining the idea of dialectic "as a matter of trying to 'rise above' opposing arguments by producing an idea that preserves what is valid on both sides" (Scardamalia et al. p. 181). The participants were "urged" to reconcile "thesis, opposing argument, and supporting argument" (p. 181). They were further told that "rising to a plane above the conflict" (p. 181) applies to both matters of content and planning of their composition. For example, the plan to have a neat organization may conflict with the decision to add a point and that they were encouraged to rise above this kind of conflict.

Data collection. The procedures involved having the participants write pre- and posttest essays, as well as a major topical essay in class over a period that lasted up to four periods, on a self-selected topic. The pre- and posttest essays were in two formats: an opinion essay and a factual exposition essay, for neither of which any aids were allowed. While writing each of the four essays, six randomly selected participants from each group thought aloud and were audio recorded. For the major topical essay, the participants could use library materials. The experimental group could use the cue cards for this essay. The control group teacher encouraged the students to plan and take notes while writing their major essay.

Analysis and findings. Three sets of analyses were conducted: (1) The think-aloud protocols were coded using Hayes and Flower (1980) categories of generating, organizing, and goal setting. Coders also marked the protocols that they judged to be "reflective." The findings indicated that for the "reflective" category, the experimental group mean increased, while that of the control group decreased from the pre- to the posttest. The group differences were found to be significant. No statistical analysis was reported on the other categories, although it was reported the majority of protocol segments were on generating content; (2) The major essays, which were written in class, were rated by two raters on a 9-point scale, which ranged from knowledge-telling on one end to reflective on the other. The experimental group preformed significantly better than the control group on the major essay; (3) pre- and posttest essays were assigned difference scores based on two sets of criteria: one for the expository and one for the opinion essay. For example, one expository rating dimension read "a distinctive viewpoint on the topic"

(Scardamalia et al., p. 183). One opinion essay rating dimension read "a distinctive viewpoint on the topic-in contrast to reporting conventional wisdom, typical personal reactions, or familiar scenarios" (Scardamalia et al., p. 184). The experimental group scores were significantly larger than those of the control group for the expository essay, but not for the opinion essay, although the latter scores were higher for the experimental group.

Scardamalia et al. (1984) concluded that their intervention enabled the participants to "sustain reflective processes in writing independently" (p. 188). That is, the think-aloud protocols indicated movement between the content and rhetorical problem spaces. The ratings of the reflectiveness of the essays confirmed this conclusion, although they acknowledged the reflection was "at the local level … focused on individual ideas" (p. 188).

Critique. Despite its seminal status in cognitive strategy instruction in writing, the Scardamalia et al. (1984) study can be *critiqued* on the following grounds: First, procedurally, the study is not clear about the way in which judgments about reflection were made in the coding of the *think-aloud protocols*. It is unclear how the return trip from the rhetorical problem space to the content space, which was theorized to be the essence of reflection, was judged. They seemed to collapse the think-aloud data from both essays in the two genres and then judged reflection independently of essay type/genre, whereas the authors acknowledged that the kind of reflection required in opinion essays was different from that in factual exposition. This lack of theorizing about the importance of genre is consequential about the instruction itself, too. Grabe and Kaplan (1996), for example, reported one of the problems with cognitive strategy instruction was that problem-solving is insufficiently defined. For instance in Scardamalia et al. (1984, p. 180), the cue cards are so general that they could be applied to any academic or non-academic genre. For example, cue card prompts such as "an even better idea is …," or "a goal I could write to …," are general enough for any genre of writing. General prompts are problematic because for instruction to be effective it should reflect the generic conventions. A general prompt may not enable the writer to activate, retrieve, or generate the specific item required for a particular generic move (Swales, 1990). Therefore, it seems appropriate that that coding of the protocols be based on a particular genre. The one selected in the present study is the Toulmin (1958/2003) model of argument.

Second, in the rating of the major essays, assessment seems to have been impressionistic and void of any theory of the genre. Nor was instruction based on a theory of genre. As Hyland (2004) observed in process approaches to writing, it is assumed that a generic knowledge of the discourse schema is available to the writer. However, it is unclear if the Scardamalia et al.'s (1984) participants were presented with such knowledge, as judged, for example, by the broad wording of the cue card prompts. Similarly, it was not explained how the two sets of rating criteria used for the rating of the pre- and posttest essays would capture reflection in writing. For example, it is conceivable to produce a "distinctive view on the topic," which Scardamalia et al. (1984, p. 183) purported to indicate reflection in writing, without any rhetorical problem solving, which was considered the essence of "reflection" in writing, and simply through the knowledge-telling routine. Klein (1999) argued that a genre approach to writing instruction is compatible with knowledge-transforming and rhetorical problem solving and that genre instruction can be considered a cognitive strategy (p. 230). Thus, the use of a discourse model such as the Toulmin's (1958/2003), defining the argumentative genre, allows the assessment of the essays to be based on precise discourse features that are the basis of both Instruction and assessment

Third, no attempt was made to infer reflective processes from the pre- and posttest texts. Bereiter and Scardamalia (1987) discussed ways in which texts can be used as data sources for this purpose. Fourth, the details of instruction are not provided so that the cognitive and rhetorical development of the students from one class to the next can be traced so that the study can be replicated. The present study seeks to address these issues in its design by basing the study on a theory of discourse (Toulmin, 1958/2003) that is the basis of instruction and assessment, incorporating text analysis to infer cognitive processes from textual data (Bereiter & Scardamalia, 1978; Toulmin, 1958/2003; van Wijk, 1999), and adopting a sociocultural approach (Vygotsky, 1978; Lantolf & Thorne, 2006) that is accountable for the details of instruction *in* and assessment *of* knowledge-transforming so that the study can be replicated in a manner that the causal inferences and observed effects can be justified and explained with more rigour.

2.1.2. Knowledge-transforming delineated.

Because the construct of knowledge transforming is central to the present study, it will be reviewed in more detail as a basis for instruction and assessment. After Scardamalia et al. (1984), knowledge-transforming was further theorized in Bereiter and Scardamalia (1987). In addition

to the presence of the procedural facilitation cues, which indicated rhetorical problem solving, in the think-aloud protocols of novice writers as described in Scardamalia et al. (1984), the amount of revision and the quality of the think-aloud protocols were taken as evidence for knowledge-transforming by Bereiter and Scardamalia (1987).

First, the amount of revision from the first draft to the next was considered as evidence of knowledge-transforming. Bereiter and Scardamalia (1987) differentiated between expert and novice composing according to the amount of revision they do. When the revised text resembles the unrevised one, that would be characteristic of knowledge-telling, but when the former is a selection of the latter, it indicates expert composing. They noted that the "knowledge-transforming process … reveals itself in substantive modification of previously written text" (p. 22). These modifications should go beyond simple lexical edits, which are indicative of knowledge-telling, and should suggest "reconsideration of thoughts that informed the original composition" (p. 22). Other previous studies also indicated that unskilled L1 and L2 writers engaged in less substantive revision (e.g., Perl, 1979) than experts (e.g., Sommers, 1980). Sommers' advanced participants wanted to revise because they had a sense of "dissonance," which was defined by Odell's (1998) as "a sense that things don't add up, that our understanding is incomplete, that something is incongruous" (p. 8). Sommers characterized revision as "discovery of meaning" (p. 385), a theme that was picked up by L2 writing researchers including Zamel (1982, 1983) and Raimes (1985) to also conclude that revision was not a feature of novice writing. Thus, fostering knowledge-transforming composing requires attention being paid to the revision process.

Second, the think-aloud protocols of expert writers who engage in knowledge-transforming are characteristically different from those of novice writers. Novice writers transcribed most of what they think aloud, whereas expert writers' transcribed texts reflected modifications to the think-aloud protocols. Bereiter and Scardamalia (1987) noted:

> The knowledge-telling model would suggest that what goes on mentally in the novice writer would bear a close resemblance to what appears on the page. … The knowledge-transforming model, on the other hand, would suggest that among more expert writers there should be a great deal of activity revealed in the thinking-aloud protocols that is not directly represented in the text. (p. 18)

They found empirical evidence for these two composing behaviours in the think-aloud protocols of school children and adults. The construct of knowledge-transforming was further explained by drawing an analogy with reading processes. Scardamalia and Bereiter (1991) related the knowledge-transforming model of expert composing to general "literate expertise." They cited van Dijk and Kintsch's (1983) model of discourse processing, which posits a similar dialectical relationship between a *situation model* and a *textbase*. The situation model is the domain knowledge that is relevant to the text being read, and the textbase is the mental representation of the text being created as processing unfolds. The textbase both changes and is changed by the situation model. The central idea in literate expertise theory is that experts learn from their text composing (or reading) process, whereas the novices simply get the job done. In the present study, the van Dijk and Kintsch model of discourse comprehension informed inferring knowledge-transforming processes from texts. Because knowledge-transforming in the present study relies on the Toulmin model (1958/2003) for rhetorical problem definition and solution, as part of Instruction, assessment, and text analysis, the model will be reviewed next.

2.1.3. Toulmin's model of argument to operationalize knowledge-transforming.

In this section, the Toulmin (1958/2003) model of argument is described. To address the points which I raised about the Scardamalia, et al. (1984) study, the use of this model defines a genre and makes rhetorical problem solving scientific (Vygotsky, 1978) because the rhetorical problem solving will be based on discrete and precisely defined discourse features and schemata that are the basis of instruction and assessment. Having discrete discourse features will define the kind of rhetorical problem to be solved.

Toulmin's (1958/2003) program was to describe the structure of everyday arguments. Toulmin demonstrated the way in which arguments are constructed by drawing an analogy with the field of jurisprudence. His purpose was to explain a mode of reasoning which contrasted with a "rigidly demonstrative deduction of the kind to be found in Euclidean geometry" (p. viii) and contended that not all arguments could be expressed in strictly formal terms. He suggested that his model was not to be pitted against Aristotelian syllogism because "for Aristotle himself any inference can be called a 'syllogism' or 'linking statements'" (p. vii). He further identified Aristotle as a pragmatist (p. viii). Toulmin's goal was to establish the connection between "formal analysis of theoretical logic" and "business of rational criticism" (p. 6).

Toulmin's (1958/2003) central thesis was that different fields of argument require different kinds of grounds, which are field-dependent, but the force of an argument is field-invariant. To support his claim he provided six examples in Chapter I of the *Uses of Arguments*, and argued that although the grounds to support the claim vary from field to field, the force of all of the arguments are (almost) the same. His method was to apply the modal "cannot" to different claims in different fields and analyze the grounds required for the claim and the force of the modal. The six examples (Toulmin, 1958/2003, pp. 22-27) and their analyses are represented below.

The first claim is "You can't lift that weight single-handed," (Toulmin, 1958/2003, p. 22) which is addressed to a person whom the speaker suspects is unable to lift the weight. The basis, grounds or criteria, for this claim is observations of a person's physique, which warrant making a prediction about his future performance, i.e., his inability to lift the weight. The second claim is "You can't get ten thousand people into the 'Town Hall'" (p. 23). The grounds are observations or calculations made about the capacity of the room. In the first two examples the force of the utterance is one of "impossibility." The third example is "You can't talk about a fox's tail" (p. 24). The grounds for this claim are the knowledge of linguistic usage in the activity of fox hunting, whose parlance forbids one to use the word "tail" to refer to the fox's tail, and instead requires the use of the word "brush." Toulmin explained that once the phrase "fox's tail" is uttered, however, the speaker has, in fact, "talked about" it, so the modal "cannot" does not indicate an impossibility, but an "impropriety" in "fox hunting" usage, a linguistic solecism which makes the force of the claim different from that of the first two claims. The fourth example is "You can't have a male sister" (p. 24). The grounds for this claim are the facts about sexes and that a sister must be female. The force of the claim indicates an impossibility. The fifth example is "You can't smoke in this compartment" (p. 26), whose grounds are a by-law which prohibits smoking on a train compartment. The force is an impropriety with its legal consequences. The sixth example is "You can't turn him away without a shilling" (p. 27), which, as grounds, appeals to a father's moral obligation toward his son, and indicates another impropriety. Toulmin explained that by the force of a modal he means "the practical implications of its use" (p. 28)

A general example of the force of an argument is when it is claimed that something is impossible. Toulmin (1958/2003) suggested that "impossible" means that the argument has no

"demonstrable contradiction" (p. 34), but that it should be considered and its impossibility be demonstrated. This much of the argument structure is field-invariant, Toulmin maintained. However, the kind of evidence provided to support the claim varies from one field to another. From a discussion based on these examples, Toulmin concluded that criteria, grounds or standards, based on which conclusions are drawn, are field-dependent, but the force of the modal "cannot" is field-invariant. He wrote: "All the *canons* for the criticism and assessment of arguments, I conclude, are in practice field-dependent, while all our terms of assessment are field invariant in their *force*" (italics in original, p. 35).

Having established the distinction between the grounds and force of an argument, and the field-dependence of the former and the field-invariance of the latter, Toulmin (1958/2003) went on to present his model in Chapter III of *The Uses of Arguments.* He stated that the validity of an argument is a function of both its form as well as the procedures followed to arrive at a conclusion. Toulmin suggested that the layout of an argument is more complex than the three-proposition layout, consisting of a major premise, minor premise, and a conclusion (used in classical syllogism). Instead, he proposed the model that is used in jurisprudence as the appropriate model to be used for practical arguments.

Toulmin (1958/2003) presented the layout of an argument as follows. The model is presented in Figure 2.1. To support a claim (C), which he defined as the "conclusion whose merit we are seeking to establish" (p. 89), one needs to provide facts as foundation for the claim. He called such facts data (D). Data answers the question, "What have you got to go on?" (p. 90). The data do not always manifestly show the connection to the claim; thus such a link, which he called warrant (W), should be provided explicitly. The warrant answers the question, "How do you get there?" (p. 90). The warrant is a statement that authorizes the step taken to establish the claim from the data provided. Drawing on an analogy with law, Toulmin explained that data concern "questions of fact" and warrants "questions of law" (p. 92). Because all warrants do not *necessarily* support the claim, a degree of *probability* needs to qualify the claim. Toulmin called the degree to which data (D) warrant the claim (C) qualification (Q). Adverbs such as *probably* and *presumably* are examples of qualification. Different warrants impart different degrees of force that a conclusion can draw upon. qualification (Q) signifies the "degree of force" (p. 93) that the warrant authorizes to infer the claim from the data. Some warrants license a claim *necessarily* and others *presumably*. This degree of force is expressed in the qualification. Having

taken the steps to state the claim, provide data, warrant the data, and specify the degree of the force, one needs to acknowledge the "circumstances in which the general authority of the warrant would have to be set aside" (p. 94). Such "conditions of exception" to the warrant (p.93) are called the rebuttal (R) and are needed to sustain an argument. The rebuttal takes into account what the opposition might argue to refute the claim. By definition, rebuttal should target the warrant, but in practice it can also go against data and backing (which supports the warrant). The warrant itself needs to be supported to bolster the argument. To support the warrant, one needs to provide "field-dependent" backing (B). Depending on the field of argument, Backing may be an account of statutes passed in parliament (in law), a system of classification (in science), and the like. The backing establishes the account on which the warrant (W) supports the claim. Backing answers the question, "Why *in general* this warrant should be accepted as having authority?" (Toulmin, 1958/2003, p. 95, italics in original).

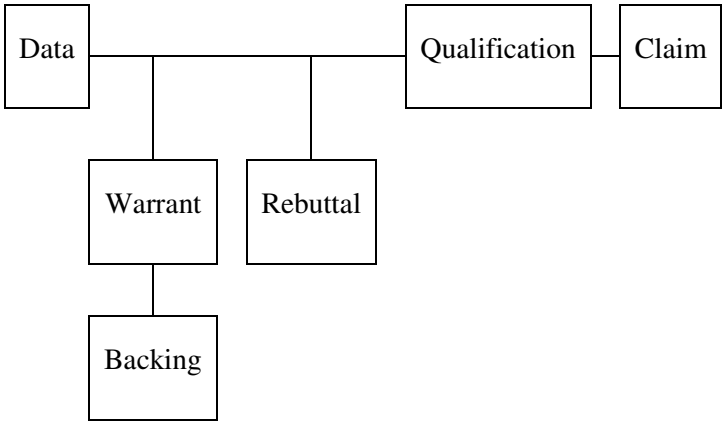

Figure 2.1. Toulmin Model of Argument (1958/2003)

The following example, adapted from Toulmin (1958/2003), illustrates the model elements (or the discourse features as they are referred to in this dissertation). The sentences that represent the model elements are coded accordingly. Letters *p, q,* and *r* represent the three terms that comprise the underlying syllogism. Letters C, D, W, B, and R stand for Claim, Data, Warrant, Backing, and Rebuttal, respectively. The Claim is first mentioned in the topic sentence and restated in the reworded topic sentence which includes the Rebuttal.

> John (p) has violated the Highway Act (r) (C) because John (p) was driving over 50 km/h in a residential area (q) (D). Generally, if one dives over 50 km/h in a residential area (q), one is in violation of the Highway Act (r) (W), on account of provision/clause X in the Highway Act (B). Unless John is subject to a speed limit exemption (R), John (p) is presumably (Q) in violation of the Highway Act (r).

In the above example, the Rebuttal is an exception to the applicability of the Warrant. It was formulated so that it would be in agreement with the canonical definition of the Rebuttal, an exception to the Warrant, and not the Data. However, it is possible to write a rebuttal that challenges the data or the backing. Toulmin (1958/2003) suggested the distinction between the data and warrant is not absolute. He asked whether the force of "What have you got to go on?" and "How do you get there?" is distinct (p. 91). He answered the question by appealing to grammatical facts and concluded that

> the distinction is far from absolute, and the same English sentence may serve a double function: it may be uttered, that is, in one situation to convey a piece of information, in another to authorize a step in an argument, and even perhaps in some contexts to do both these things at the same time (Toulmin, 1958/2003, pp. 91-92).

The conflation of data (also referred to as grounds by Toulmin et al, 1984) and warrant also depends on whether the argument is one of substantiation or evaluation. Fulkerson (1996) explained that according to classical rhetoric *stasis* theory, claims of substantiation establish the truth or falsity of a state of affairs in the past. In contrast to substantiation claims, Fulkerson noted that evaluation claims concern issues of value, whether something serves its purpose well or badly, is ethical or unethical, desirable or undesirable, good or bad. Evaluation claims concern the present state of affairs. Fulkerson located the evaluation claims within the purview of axiology (ethics and aesthetics). Toulmin et al. (1984) observed that "the connection between grounds and warrants in ethical arguments is so close that we rarely trouble to spell them both out" (pp. 407-498).

Furthermore, Toulmin (1958/2003) acknowledged the possibility of conflating the data with backing when the differences between the two are "disguised by our forms of expression" (p. 98). He explained that warrants are "hypothetical, bridgelike statements, but the backing for the warrants can be expressed in the form of categorical statements of fact" (p. 98). In the above example, the warrant was formulated as a conditional sentence to act as a bridge between the data and the claim. However, the warrant need not be a conditional sentence, but a simple

declarative one such as, “Generally, driving above 50 km/h is a violation of the Highway Act.” The warrant may be left out, if the listener accepts the implicit link between the data and claim. The resultant argument is what Aristotle called an enthymeme.

Additionally, the distinction between the data and the backing should also be made clear. While both data and backing are statements of fact, it is the former that must be explicitly stated, whereas the backing may be left unstated, unless in anticipation of a challenge to the warrant, in which case the backing must be made explicit (Toulmin, 1958/2003, p. 98).

The description of the Toulmin model above indicates the way in which the loose idea of “argument” has been broken down to a set of rigorous scientific concepts (Vygotsky, 1986), which can be the basis of concept-based instruction (Lantolf & Thorne, 2006; Negueruela, 2003). Contrasted with the loose idea of “support” for a thesis statement, the Toulmin model identifies discrete discourse features that can be taught and the learning assessed. These scientific concepts make the argumentative genre a visible, material artifact that constitutes the rhetorical structure of the text and the driver of the cognitive knowledge-transforming process for discourse content generation (Bereiter & Scardamalia, 1987), with the discourse features as rhetorical problems whose solutions rest in the content problem space.

Having described the Toulmin model, I will review the way in which a text that is based on the model is to be evaluated. This will be the basis upon which the textual analysis concerning Research Question 2 was performed in order to examine the effect of Instruction on argumentative rhetorical structure. To that end, Toulmin, Rieke, and Janik (1984) discussed two features of argumentative discourse: structural soundness and substantive strength. A structurally sound argument is one in which the discourse features are present *and* are well connected to one another. They noted, “A conclusion which is groundless, or an inference which is unwarranted, or a warrant which is baseless is *no* conclusion, inference or warrant” (Toulmin et al., 1984, p. 81, italics in original). To explain “connectedness,” Toulmin et al. invoked the idea of coherence (p. 114) and suggested that the parts of a coherent argument “hang together” (p. 81). They did not elaborate on the idea of coherence; however, to operationalize coherence, I benefited from insights from van Dijk and Kintsch (1983) who posited discourse comprehension happens when the reader can create a *textbase* and relate it to a *situation model* in his or her episodic memory.

Also, I used the idea of schemata (Brown & Yule, 1983; Grabe and Kaplan, 1996), which are structures that aid in the interpretation of experience. If the Toulmin schema represented in the text can be interpreted to follow the elements of the model as the participants were instructed, then coherence is achieved.

Substantive strength, according to Toulmin et al. (1984, pp. 81-82), depends on four criteria: making *qualified* claims, acknowledging *rebuttals*, providing *relevant* support for the claim, and assessing the *amount* of evidence required. Toulmin et al. argued the second two, relevance and amount, are context-specific and are a function of the specialized fields of inquiry such as law, ethics, and management. Therefore, they are not directly applicable to general arguments such as the topics the participants wrote on in the present study. Thus, the first two criteria, i.e., qualification and rebuttals, were the basis, in part, for evaluating substantive strength.

In the present study the following terms pertaining to the Toulmin model were used inter-changeably: data and grounds, opposition and rebuttal, theme and main idea, prompts and cues, discourse elements/features and rhetorical elements/features.

2.1.4. Syllogism as an appropriate lead-in to instruction in the Toulmin Model.

Having described the Toulmin model, I argue below that the basic syllogism, in its general form, undergirds the Toulmin model, and that syllogism, because it is universal, can be (and was) used as an entry point to Instruction[3]. At the most basic level the Toulmin model is an exposition of how to support a claim with reasons and evidence, acknowledging a rebuttal, responding to that rebuttal, and making a tentative conclusion. The overall underlying structure of this model is age-old. Collins and Gentner (1980), for example, noted the following argument form was passed down from the Greeks: "introduction, background, definition of issues, statement of what needs to be proven, arguments for and against the thesis, refutation of opposing arguments, and summation" (p. 61, citing Lanham, 1969). The Toulmin model breaks down this ancient argument form into its elementary constituents, relating it to its individual propositions. At a more basic level, Scanlon (2006) demonstrated the similarity between the

[3] Instruction in syllogism was part of the implemented lesson in Instruction, Session I.

syllogism and the Toulmin model: the major premise, in syllogism, is the warrant in Toulmin, and the minor premise in syllogism, is the data in Toulmin.

The syllogism is an inductive-deductive reasoning process as is the Toulmin model. Both of them rely on both observation or sense perception and a principle or licensing inference to connect the observation to the conclusion. Regarding the question of where the knowledge of premises arise in syllogism, Aristotle (1975, p. 3) in *Posterior Analytics* first defined a demonstration as "scientific deduction", i.e., "a syllogism that produces scientific knowledge ... [that is,] not simply that something is the case, but *why* it is the case, what causes bring it about" (Longeway, 2009, par. 2). Second. Aristotle (1975) argued that "it is not possible to understand through demonstration if we are not aware of the primitive, immediate principles. ... therefore, we have some capacity (pp. 80-81)". On the other hand, the role of sense-perception, defined as "the awareness or apprehension of things" by the five senses (Crane, 2011, par. 1), is to make humans "familiar with the primitives by induction; for perception too instills universals in this way" (Aristotle, 1975, pp. 80-81). In the syllogism, it is the major premise that relies on sense-perception and is inductive (Helmig, 2010). Thus, the Aristotelian syllogism is grounded in both innate capacities and induction that instills those capacities. Aristotle's inductive-deductive syllogism is arguably best characterized by Jonathan Barnes, the translator and commentator of *Posterior Analytics*, when he observed that in the last chapter, Aristotle is standing "Janus-faced, looking in one direction towards empiricism, and in the other towards rationalism" (Aristotle, 1975, p. 248). Similarly, for Toulmin the data is grounded in fact, and the warrant is a principle that connects the fact to the claim. The backing provides further factual grounding for the warrant and so on. This data-warrant-backing cycle can regress infinitely as can the syllogism.

Syllogism is the formal expression of the basic law of inference, which Donaldson (1978) succinctly articulated as "if something is true, something else must also be true" (p. 40). Translated into syllogistic terms, if the premises are true, the conclusions must be true, or if the data is true, the claim must be true. Donaldson presented evidence supporting the claim that even young children are capable of syllogistic reasoning. She further explained that when the person is not able to make proper conclusions from the given premises, there is usually a communication problem that impedes the inferencing process.

Luria (1977), however, claimed that syllogistic thinking is not universal. To support his claim he conducted experiments with peasant subjects in the former Soviet republic of Uzbekistan. When unschooled peasants were presented with the major and minor premises, they failed to produce the conclusions implied by them. From this, Luria concluded that Uzbek peasants were not able to reason as a schooled person would. However, Shalizi (2007) demonstrated that there might have been other explanations for Luria's conclusions. Shalizi noted that the peasants may have been reluctant to give sincere answers to scientists who represented the powers that colonized them. This seems to be a real possibility in light of Luria's attitude toward his subjects. Luria (1977) claimed that the peasants' "development [was] hindered among other things by the religion of Islam," and that, together with development in the areas of economy and literacy, "the removal of the Moslem influence could achieve … a genuine revolution in cognitive activity" (Luria, 1976, p. vi). Second, Shalizi (2007) further argued the peasants may have outsmarted Luria by reasoning syllogistically beyond the conclusion Luria had in mind. Shalizi explained that Luria's subject Nazir-Said, for example, might have actually responded syllogistically to Luria's questions by deleting the major premise and creating an enthymeme. It is plausible, then, that Luria's (1977) subjects' reported failures could have been explained by communication barriers, including an unwillingness to communicate. Also, there seems to be a problem with "the ecological validity" (Cole, Hood, & McDermott, 1997) of Luria's experiment. Cole et al. noted that to assess cognitive performance, tasks should be sampled from the "life space" of the subject, which is "the person and the physical environment as it exists for him" (Cole et al., 1997, p. 52 citing Lewin, 1943). Luria's tasks do not seem to have fulfilled the ecological validity requirement. Therefore, I find the argument against the universality of syllogisms weak, and find elementary syllogistic reasoning to be a property of the mind, and an appropriate assumed source of knowledge to tap into as an introduction to the teaching of Toulmin model[4]. This analysis sought to demonstrate that the Toulmin model and syllogism are both grounded in the world of experience and as such syllogism can be used as a basic entry point into Instruction in Toulmin Model.

[4] I verified this claim with the participants in the study as part of Instruction in Session I.

2.1.5. Some studies on the Toulmin model.

The Toulmin model has been used productively to teach argumentation to minority students. I briefly review two studies (Yeh, 1998) and (Hillocks, 2010) that examined the effectiveness of instruction in the Toulmin model to help minority students with their writing and critical thinking. Noticing a gap in a systematic approach to the teaching of argument, Yeh (1998) designed an instructional technique employing the Toulmin model to teach "pre-writing heuristics." The heuristics were graphically represented as a pyramid with three levels: "the main claim or thesis statement on top, two supporting reasons and a counter-argument on the second level, and explanations of why the reasons support the claim plus an answer to the counter-argument on the third level" (Yeh, 1998, p. 59). In a quasi-experimental study, Yeh tested the instructional efficacy of the pyramid heuristic, together with another heuristic that he called "the bridge." He found that the experimental group's gain scores were significantly higher than those of the comparison group for the dependent variables of "development" and "voice."

Although Yeh's (1998) technique claims to be based on the Toulmin model, it does not differentiate between the data, warrant, and backing as discrete discourse features and rhetorical concepts. This can render the learning of these elements of instruction as "a rule of thumb" (Negueruela, 2003) and unsystematic. The present study, however, sought to make each element a scientific concept (Vygotsky, 1986), a discrete, definable, verifiable discourse feature so that the instruction can be systematic (Lantolf & Thorne, 2006).

To teach critical thinking and argument in writing, Hillocks (2010) used the Toulmin model to design an activity to be "highly interesting … both simple and challenging for which feedback is immediate and clear, that allows for success and implies further effort" (p. 27). His participants were ninth-graders from diverse linguistic and ethnic backgrounds. The activity concerned solving a whodunit. A crime scene was presented with a picture and the description of events prior to the murder. Then, through a series of dialogic interactions between the teacher and the students, they constructed an argument casting doubt on the veracity of a witness's testimony. Hillocks used discourse labels *evidence*, *rule*, *claim* and *qualification* to designate the elements of the model. Rebuttal, however, was not evoked in the argument. He had the students write a report reflecting the "syntax of argument" (p. 31), which he judged to be sound.

Hillocks' (2010) students benefited from what can be characterized as first order and second order mediation (Lantolf & Poehner, 2014), when the teacher and students' deployed interpersonal communication and use of artifacts as problem solving tools. For example, Hillocks used an overhead transparency to display answers to his questions, which would lead them toward the application of the model elements. Hillocks' (2010) technique made an effective use of social artifacts for rhetorical problem solving, that is, how to make a case in writing for whether or not the witness is truthful. However, because of his (over-)emphasis on concrete and material artifacts, it is unclear whether the students were able to abstract away the scientific concepts undergirding the Toulmin model for application in a novel context. In other words, although he did use most of the discourse label features as part of instruction, it is unclear if the students left with a scientific understanding of those concepts, i.e., there is no evidence for "transcendence" (Poehner, 2007). This is a gap the present study seeks to fill. Having reviewed the Toulmin model and two relevant studies, I will next review the studies that informed Instruction by presenting different cognitive models of text production and discourse content generation.

2.2. Relevant Cognitive Research on Writing, Part II

The present study examines the problem of generating the content of discourse in writing (Bereiter & Scardamalia, 1987). The studies reviewed below describe the factors, models and processes that are relevant to the present study. The factors that are reviewed are the composing processes of L2 writers (Zamel, 1983), the role of language proficiency (Cumming 1989), simultaneous attention to language and content (Cumming, 1990), the social nature of writing (Hayes, 1996; 2001), the "unbidden quality" of writing (Galbraith, 1999), the role of the sub-components of the writing process (Chenoweth & Hayes, 2001, 2003; Hayes & Chenoweth, 2006, 2007), and the importance of the executive control (Kellogg, 2006). The section ends by emphasizing the role of memory resources in the generation process (Hayes, 2012b). This review is chronologically organized. Thus, the topics that are reviewed in adjacent paragraphs may not be directly mutually relevant, although they all informed the present study on discourse content generation.

The first major study on discourse content generation in L2 writing was done by Zamel (1983), who studied the composing processes of proficient ESL writers by conducting interviews and studying the notes and drafts that they created. Zamel's study aimed to find out where the ideas that the students' generated came from. Her findings suggested that writing is a process of discovery (or creation) of meaning, which confirmed previous studies (e.g., Zamel, 1982; Sommers, 1980) (She used the terms "discovery" and "creation" interchangeably). Her study foregrounded attention to audience and purpose, despite the common perception that process studies are characteristically asocial. Zamel's study indicated that attention to the final text can result in writer's block because of excessive attention to rules and conventions. Contrary to Scardamalia et al. (1984) whose participants' protocols looked more like monologues than dialogues, Zamel reported that the participants in the study had a conversation with an audience. The former, however, studied children, but Zamel studied adults- a natural developmental difference that Bereiter and Scardamalia (1987) conceded. As further evidence of writing as a discovery process, Zamel reported that the students' notes did not reflect the final text and the writers indicated they did not know where they were going to end. Zamel (1983) noted that proficient writers, "rather than knowing from the outset what it is they will say, … explore their ideas and thoughts on paper" (p. 203). This process of discovery is akin to the knowledge-constituting nature of composing that Galbraith (1999) posited, or the disparity between the experts' verbal protocols and their transcribed texts which Bereiter and Scardamalia (1987) found. Zamel observed, "If students learn that writing is a process through which they can explore and discover their thoughts and ideas, then the product is likely to improve as well" (p.207). Among the pedagogical conclusions Zamel (1982) drew is the use of "invention techniques" (p. 196). Examples of invention techniques are those proposed by Young, Becker, and Pike (1970), reviewed by Spack (1984), and what later developed into the cognitive strategy instruction in writing or CSIW (Englert, Raphael, Anderson, Anthony, & Stevens. 1991; Guzel-Ozmen, 2009; Harris & Pressley, 1991; MacArthur & Lembo, 2009; Paz, 2007; Pressley, McGoldrick, Cariglia-Bull, & Symons, 1995) which informed the present study and whose relevant literature will be discussed below. The use of the Toulmin model together with the techniques of CWIS makes the process of discovery of meaning goal-oriented and scientific.

Empirical research identifying the share of cognitive resources devoted to discourse content generation (as well as the role of language proficiency) was pursued by Cumming (1989,

1999, 1994), who acknowledged the exploratory nature of previous studies (e.g., Raimes, 1987). Using verbal protocol data, Cumming (1989, 1994) set out to evaluate (more than explore) the role of L2 language proficiency and writing expertise in cognitive composing processes of 23 French L1 speakers. The participants were at two ESL proficiency levels, three writing expertise levels, and performed ESL writing tasks in three genres. Thus, his study had three independent variables: L2 proficiency, writing expertise, and task genre, each with different levels. The dependent variables were text quality and composing processes of decision making and problem solving. The protocol analysis indicated that regardless of ESL proficiency, participants at all three writing expertise levels devoted most of their attention to gist (or content) of their writing. Between 74 and 95% of the protocols were coded in the category that represented the "substantive content" of writing (Cumming, 1989 p. 100). Writers' dedicating a high level of attentional resources to content reinforces the need for pedagogy that makes discourse content generation effective and systematic. Cumming found the role of language proficiency in composing processes to be "additive" to writing expertise (Cumming, 1989, p. 121). That is, higher language proficiency helped to enhance the attention that was paid to various aspects of composing, yet the two constructs of language proficiency and writing expertise were found to be "psychologically distinct" (Cumming, 1989 p. 81). This distinction is relevant in that it implies composing strategy instruction, including discourse content generation, may be a component of a composition course regardless of linguistic background.[5]

The relation between language and thought in the form of ideational thinking in written composing was explored by Cumming (1990). Drawing on Cumming's (1989) data, Cumming (1990) found that the "frequency of those thinking episodes that attended to language use and gist concurrently" is significantly related to writing expertise (p. 498). That is, the more expert writers more frequently attended to language and content issues at the same time, as captured in their protocol data, than the novice writers. In such concurrent metalinguistic-ideational

[5] This distinction which Cumming (1989) *confirmed* had already been *explored* by Raimes (1987) who found "little correspondence between language proficiency … and composing strategies" (p. 459). By contrast, Sasaki and Hirose (1996) found that language proficiency did explain L2 writing ability. Later, Sasaki (2000) found that "L2 proficiency appeared to explain part of the difference in strategy use between the experts and the novices" (p. 259). Schoonen et al. (2003), however, found that L1-L2 writing proficiency had the highest correlation (r=0.9) among the variables that they measured. High correlations are interpreted to indicate the same underlying construct for writing proficiency in L1 and L2, which is consistent with Cumming's (1989) finding.

episodes, lexical searches were frequent. This could be interpreted to mean that as the writer was engaged in rhetorical problem-solving (Hayes & Flower, 1980), he or she was discovering meaning (Zamel, 1983) at the same time. Cumming's (1990) finding underscores the correlation between discourse content generation and the language that is being processed. (Cumming's finding regarding the high correlation between simultaneous *mental* attention to content and language during composing was reflected in the *texts* analyzed in Hadidi (1998, p.90) and Hadidi (2010) as indicated by a significant moderate correlation between the propositional content of the texts and essay ratings.) Cumming's finding also seems to bear on the dialectical relationship between content and rhetoric as predicted by Bereiter and Scardamalia's (1987) knowledge-transforming model shown by expert writers. Simultaneous attention to discourse content and language can be knowledge-transformative because it is the actual act of writing that helps reorganize, retrieve, and/or generate new content. These studies, however, seem to have focused on the "solitary individual" during the writing process, Hayes (1996, 2001) shifted the paradigm by incorporating the social aspect of writing in the cognitive domain.

Hayes (1996, 2001) proposed some significant changes to the Hayes and Flower (1980) model. The two most salient features of the new model from the perspective of the present study are the introduction of two new categories: "motivation and affect" and "the social environment" (Hayes, 2001, p. 96). Hayes treated goal-setting from a motivational as well as cognitive standpoint. An audience-aware writer, for example, may write to "satisfy a first audience but not offend a second one" (Hayes, 2001, p. 99). In recognition of the social environment. Hayes (2001) wrote:

> Writing is primarily a *social activity*. We write mostly to communicate with other humans. But writing is social not just because of its communicative purpose. It is also social because it is a *social artifact* and it is carried out in a social setting. What we write, how we write, and whom we write to is *shaped by* social convention and by our *history* of social interaction. The *genres* in which we write were invented by other writers and the phrases we write often *reflect* phrases earlier writers have written. Thus, our *culture* provides the words, images, and forms with which we fashion text. (p. 97, emphasis added)

It is noteworthy that a cognitive psychologists' description of writing encompasses many of the influences one would expect from a sociocultural-analytic perspective: the recognition of writing as a social activity; writing as a social artifact; social conventions shaping writing; the

writer's history; genres and their words being social creations we borrow from others. The last point is reminiscent of Bakhtin's (1981) conceptions of heteroglossia, the existence of multiple linguistic codes representing multifarious cultures within a single language, and hybridity, the conscious double-voicedness of an utterance echoing the voices of different epochs. While Hayes (1996, 2001) does acknowledge the social influences that shape text construction, SCT describes and explains how this happens in a unified theory that dialectically unites cognition and society.

Galbraith (1999) proposed a model of text production which acknowledges and adds to both Hayes and Flower's (1980) rhetorical problem solving and Bereiter and Scardamalia's (1987) knowledge-telling and knowledge-transforming models. Galbraith sought to explain expert writers' reports that writing helps them to think. His argument is that translation is not a problem-solving process but involves automatic text production. He divides the writing process into problem solving during planning and text production during translating. Text production should account for the "unbidden quality" (p. 141) that expert writers report while composing. He calls text production "dispositional spelling out" (p. 142) and offers the following model to explicate it.

Drawing on a semantic network theory, Galbraith (1999) postulated three levels of activation within this network: "(i) activating content, (ii) resolving content into a message, and (iii) resolving a message into a single sentence" (p. 146). He acknowledged a degree of overlap between the three levels. The central component of the model is a semantic network that consists of units that are connected to one another. Once activated, a group of units represents "a message." Depending on the strength of association between the units and the input from the writing topic and the task, different messages are activated. Thus, the unit's pattern of activation depends on two things: (a) the strength of association between the units in the semantic network and (b) the input from the writing topic and task. The connections between the units depend on two types of constraints: positive or excitatory and negative or inhibitory. Through a process of "constraint satisfaction" a message is generated. Each message or idea is activated based on the numerical value for the activation of the units representing that idea. For example, the pattern of activation over the same units for the concept "cat" may be 0.5, 0.7, 0.2, 0.4 and for the concept "dog" 0.1, 0.8, 0.2, 0.6 (p. 145). Galbraith emphasised that, unlike a traditional semantic

network, each unit does not represent a concept, but it is how the same units are activated in different patterns that generate different ideas. This pattern of activation in part depends on the "writer's disposition toward the topic" (p. 145). This seems to suggest that there are an infinite number of activation patterns that are possible within the network and consequently that there is an unlimited number of messages that can be generated.

Galbraith (1999) explained that "the units within the linguistic network correspond to the lexical and syntactic representations making up the writer's linguistic knowledge" (p. 146), which once activated produce propositions that are represented either mentally or are inscribed. This pattern of activation of ideas within the network is turned into propositions as output from the network. Just as the message production depends on the strength of association within the network and constraint satisfaction, so does the activation of the lexical and syntactic units within the network, which lead to generation of linguistic propositions. These linguistic propositions now are available for problem solving and planning, but more importantly feed back into the network and help activate new messages, which in turn lead to new propositions as explained above. Thus, this feedback loop accounts for the automatic nature of text-production during the translation process. The interaction among the topic, task, the semantic network, propositions produced, and the feedback into the network account for a "dispositional dialectic" (p. 152) in which the text produced thus far helps generate further content. Of course, the interaction between the writing processes and the text produced so far was acknowledged as early as Hayes and Flower (1980) model; however, it is Galbraith that offers a model to explain how this interaction happens. It appears then that Galbraith succeeded to put forth a systematic theory of text-production that affirms writers' intuitions about the writing process.

The interaction between the text produced thus far and the composing processes was further explored by Chenoweth and Hayes (2001), who developed the Hayes and Flower (1980) model. Chenoweth and Hayes posited that the content generation process comprised four components: proposer, translator, reviser, and transcriber. They posited that these four interact with other resources and processes such as the text written thus far and long term memory to generate, evaluate, and transcribe text. After reading the task, the proposer calls on the long-term memory to propose pre-linguistic ideas, which are then translated into language that satisfies the requirements of appropriate word order and grammar. The reviser evaluates the language thus

generated and the transcriber converts it into written language. During the writing process, the proposer interacts with the text and the task, which in turn, feed into the proposer and translator. This feedback loop seems to confirm Galbraith's (1999) network model described above. Chenoweth and Hayes noted that in the kind of freewriting that Elbow (1973) described no evaluation takes place; thus the content of the translator becomes immediately transcribed. Chenoweth and Hayes (2001) also investigated the relationship between "linguistic experience" and "language bursts," which is defined as "the average of strings of words proposed between pauses or revision episodes" (p. 80). They found the higher the linguistic experience, the longer the burst length. That is, L2 writers generated fewer words per burst than L1 writers. This confirms Silva's (1993) finding that despite the fact the L1 and L2 composing processes were similar, L2 "transcribing was more laborious, less fluent, and less productive-perhaps reflecting a lack of lexical resources" (Silva, 1993, p. 668). Pedagogically the findings of Chenoweth and Hayes suggest that L2 writers might benefit from assistance to make the generation process more productive, which is the role of Instruction in the present study

The connection between transcribing and generating was studied by Chenoweth and Hayes (2003). Citing Elbow (1994), they invoked the idea of "inner voice" to describe what writers report when they hear in their heads the sentences they plan to write, before they transcribe them. Chenoweth and Hayes referred to this inner voice as "articulatory rehearsal," which they explained by drawing on the verbal component of Baddeley's (e.g., Baddeley, 1986) model of working memory. Verbal memory has two components: a storage system and an articulatory rehearsal process, which" is experienced as speaking to oneself" (Chenoweth & Hayes, 2003, p. 100) .The storage is referred to as "the inner ear" and the rehearsal as "the inner voice." The relationship between the two is such that "it is as if the inner voice speaks to the inner ear to remind it of the material to be remembered" (p. 100). The text that is generated in this process may both trigger translation and generation-translation. Their conclusion that inner voice plays an important role in writing calls for ways to promote and support it as part of a writing pedagogy. Chenoweth and Hayes (2003) found that the more working memory resources are available, the longer the burst length. This suggests that the introduction of external auxiliary means such as artifacts can take some of that load off the working memory and thus facilitate the generation process. The working memory, thus, finds an extension in the material world that facilitates the process.

Once it was confirmed that working memory was involved in the generation process, it was logical to ask which component of the writing process was responsible for generation. Speculating on the source of language bursts, Hayes and Chenoweth (2006) speculated whether it was the proposer, translator, and/or transcriber and they investigated if the transcriber component of their model was involved in producing language bursts, in which new ideas are generated. The task was to "transcribe texts from one computer window to another" (Hayes & Chenoweth, 2006, p. 140). They found no difference between the control and experimental groups in the number or length of language bursts. From this, they concluded that transcription alone is not the source of language burst and that they occur during invention or revision (Hayes & Chenoweth, 2006, p. 145), which they investigated in their next study. Asking if the translation without the proposer was responsible for language bursts, Hayes and Chenoweth (2007) designed a task in which the participants had to translate passive voice sentences into active voice. In this task, the proposer is not active, because the passive voice already contains the ideas to be translated into passive voice. They found that during this task the participants did produce language bursts. This indicates that the act of translating ideas into text is responsible for producing more text, which is also suggested by Galbraith's (1999) model. That is, writing itself can generate more content (which was operationalized in the present study using Eblow's (1973) freewriting, which is reviewed below). While Hayes and colleagues' studies reviewed above focused on the details of the generation process, Kellogg (2008) provided an overview of the writing processes connecting knowledge-telling and knowledge-transforming into a new model: knowledge-constituting.

Kellogg (2008) expanded the earlier cognitive models of writing into what he called "knowledge-crafting." Kellogg demonstrated that, in addition to planning, generating, and reviewing, writing involves holding multiple representations of the text in the working memory, and the monitoring of these processes by an executive control function. Training writers should involve "reducing the demands on the central executive" (p. 3) that monitors these processes and the formation of these representations. There are three types of mental representations that mark the transition from knowledge-telling, through knowledge-transforming, to knowledge-crafting: "author, text, and reader representations" (p. 5).

According to Kellogg (2008), the transition from knowledge-telling, through knowledge-transforming, to knowledge-crafting takes place over a 20-year period with distinct phases. Each phase is distinct from the previous one in two respects: (a) interaction among the three processes of planning, generating, and revising and (b) whether the writer is self- or reader- conscious while producing text. In the knowledge-telling phase, the writer's working memory keeps a representation of what the writer wants to say, or "author representation." During knowledge-transforming, the writer can also maintain a representation of what the text being produced actually says, or "text representation." With knowledge-crafting, the writer can achieve both author and text representation, as well as "reader representation." That is, the writer not only forms mental representations of his or her message for the reader, but also how the reader will *interpret* the text. Then, it appears that in knowledge-crafting, the writer acknowledges that the text being produced starts a life of its own; this recognition feeds back into the composing process to inform it in a way that influences the very construction of the text.

An intermediate developmental stage between knowledge-telling and knowledge-transforming was posited to be knowledge-structuring (Hayes, 2012b). After reanalyzing all the 540 texts in Fuller's (1995) dissertation[6], Hayes concluded that "knowledge-restructuring" accounts for an intermediate stage in children's writing development from grade one to nine. Knowledge-structuring adds an elaboration loop to the knowledge-telling process. This loop asks if the writer wants to expand on a topic, in which case it retrieves relevant content and creates a subtopic. Similarly to knowledge-telling, Hayes considers knowledge-structuring non-rhetorical. That is, "[I]t has no mechanism for adjusting to the readers' needs" (Hayes, 2012, b, p.13). He illustrated the new model by analyzing a sample text from Fuller's dissertation, showing how a sub-topic was expanded upon from the previous topic. Having reviewed the cognitive studies that concern discourse content generation since Hayes and Flower (1980), Hayes (2012b) concluded that "memory limitations constitute a bottle-neck, limiting the writer's fluency" (p. 12), which the Instructional method in the present study aims to examine by introducing mediational means to facilitate the discourse content generation process.

[6] She included *all* the original texts in the manuscript, a practice that is also reflected in this dissertation for the qualitative analysis of the texts.

2.3. Inferring Cognitive Processes from Text

The studies reviewed above concern the online composing process. In the present study, these processes are to be inferred from the texts. Research Question 2 concerns (a) inferring the cognitive processes of knowledge-transforming composing, by examining the characteristics of the texts that the participants produced over the course of the study and (b) analyzing the argumentative rhetorical structure. Thus, to answer part (a), analysis involves two steps: first, conducting a text analysis; and, second, inferring cognitive processes from this analysis. This section provides a snapshot of the studies that attempted to infer cognitive processes from texts and the rhetorical basis of that inference.

The type and amount of information that children process during writing was inferred by Bereiter and Scardamalia (1987, pp. 158-162) by analyzing the texts that they produced after an information integration task. The procedure involved providing participants with four units of information and asking them to combine those units in sentences. At the Level 1 processing capacity, the sentence contained only one unit of information. At Level 2, the sentence contained two units of information connected with a conjunction such as *and*. At Level 3, the same two units were integrated, but with a conjunction such as *so,* which suggested "an appreciation of the cause-effect relationship" (Bereiter & Scardamalia, 1987, p. 160). At Level 4, the child seemed to be able to coordinate all four units of information simultaneously by integrating them into a compound sentence with two independent clauses in a relation of contrast denoted with the conjunction *but.* Thus, these two chunks of information are minimally necessary to "fill the perceived social void and to maintain local coherence" (Bereiter & Scardamalia, 1987, p. 151). A Level-4 text can demonstrate simultaneous coordination of four ideas "to sustain the dialectical process of thesis, antithesis, synthesis, and new antithesis" and the supporting reasons for each (Bereiter & Scardamalia, 1987, p. 174). In their text analysis they observed, however, that the participants sometimes set themselves, say, a Level-2 goal, but performed at Level-1. For example, they began to formulate a conditional sentence and wrote an *if* clause, but they did not include the main clause. From the processing capacity analysis, they concluded that "knowledge-transforming capacity is not fully realized until four ideas can be coordinated simultaneously" (Bereiter & Scardamalia, 1987, p. 156).

Bereiter and Scardamalia's (1987) text analysis illustrated the amount and type of information, e.g., causality, which is managed during composing as inferred from the texts. They

further exemplified the four types of information required for knowledge-transforming as thesis-support-antithesis-support (p. 173). This is consistent with Scardamalia et al.'s (1984) "rise above conflict" criterion for knowledge transforming. Their study is relevant to the present study in that the type of information expected to appear in the participants' text was the elements of the Toulmin model, which includes the thesis, argument for it, rebuttal, and the response to it, which satisfies the "four-scheme integration" (p. 173) as well as traces of the mediational prompts, which overtly indicate what discourse feature was being processed at the time of writing. In fact, the rigorous coding scheme utilized in the present study underscores the discourse feature processed by the student at the time of inscription. In addition the amount of revision and the quality of two subsequent drafts was the basis of inferring knowledge-transforming (as discussed above).

Although Bereiter and Scardamalia (1987) conducted their analysis in the argumentative genre, it was not grounded in a rhetorical theory that explicates the rhetorical elements and their relations. An approach to text analysis that is grounded in rhetorical theory and has a robust discussion of rhetorical relations is Mann and Thomson's (1988) Rhetorical Structure Theory (RST). Mann and Thomson defined RST as a description of text structure in terms of relations between textual elements. Generally, the textual relations fall into two categories: subject matter and presentational: "subject matter relations are those whose intended effect is that the reader *recognizes* the relation in question; presentational relations are those whose intended effect is to *increase some inclination* in the reader" (Mann & Thomson, 1988, p. 257, italics in original). For example, *condition* is a subject matter relation, whereas *motivation* is presentational because its intended effect is to increase desire in the reader.

Mann and Thomson (1988) recognized that their analysis involved issues of judgement on the part of the analyst and thus conceded that the relations posited in RST are "judgments of plausibility rather than certainty" (p. 245). Bateman and Delin (2006) explained the goal of RST to be to "explain the coherence of text by describing how each individual component of a text contributes to the communicative goals of a text as a whole" (p. 589). Bateman and Delin explained that in RST each subcomponent of the text consists of a nucleus and one or more satellites. The satellites are conceptually connected to the nucleus with a set of relations such as sequence, contrast, and purpose. These subcomponents or textual units are graphically represented in a schema which uses horizontal lines to indicate the "span" of each unit, vertical

or oblique lines to locate the nucleus, and arrow-headed arcs to indicate the relation and its direction. Figure 2.2 shows a schema in which the satellite *to get the book* is connected to the nucleus *He went to the library* through the relation of purpose.

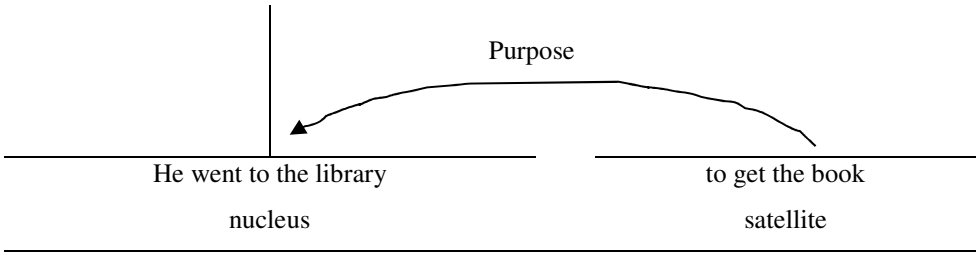

Figure 2.2. Rhetorical Relation of Purpose in Rhetorical Structure Theory

Adapted from Mann and Thomson (1988)

Such schemata can be drawn for the entire text, delineating rhetorical relations among all its units. When one rhetorical unit is related to another such that one is more important than the other, the more important unit is called the nucleus and the one subservient to it is its satellite as shown in Figure 2.2. However, when the relations between the textual units are such that they are all equally important, they are called multinuclear. For example, relations of sequence and contrast exist between multinuclear spans because relative importance of the two units is equal. Figure 2.3 illustrates how the multinuclear relation of sequence is represented.

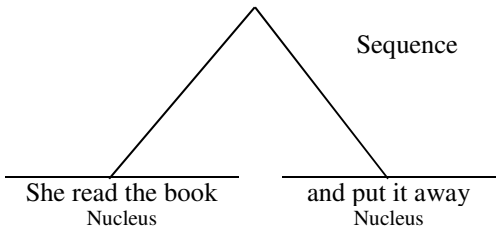

Figure 2.3. Rhetorical Relation of Sequence in Rhetorical Structure Theory

Adapted from Mann and Thomson (1988)

In the present study, to answer part (b) of Research Question 2, I based rhetorical analysis on the Toulmin (1958/ 2003) model of argument which was used to both define the discourse features and the relations among them. Relevant to part (a) of Research Question 2, as is evident in the simple analyses above, RST does not directly map textual structure onto cognitive

processes, yet it does posit certain conceptual relations between textual units which are plausible to have been the basis of text construction. Additionally, it is based on the analyst's world knowledge and intuition. There are other lines of inquiry that draw on RST and seek to fill these gaps for "explanatory texts" (Sanders & van Wijk, 1996; van Wijk & Sanders, 1999; Sanders & Sanders, 2006), and for argumentative texts (van Wijk's, 1999). Because van Wijk (1999) examined the argumentation genre, which is the subject of the present study, it will be reviewed next.

Van Wijk (1999) proposed a model to "trace" conceptual processes through analysis of argumentative texts. Conceptual processes are those involved in "mental decisions" while composing a text. Van Wijk presented his model "based on the assumption that cognitive processing steps leave many traces in the text that can be inferred from writing products" (p. 31). His model graphically represents the relationship, type, and number of ideas attended to during composing. (For relationships and types of ideas he drew on RST and for the number of ideas and processing capacity he used Bereiter and Scardamalia's integration model reviewed above.) Van Wijk represented these textual relationships with a tree-like hierarchical structure that shows the relations among the textual segments, which are a sentence or a clause (See Figure 2.4). Each segment in the text is first identified and the segments related directly to it are subscripted alphabetically. Then, the numbers representing the segments are written on a horizontal line. From each number extends a vertical line, off which subscripted segments branch. They, in turn, are connected to horizontal lines with labels such as topic, support, contra, and conclusion. These labels represent the location of each unit in relation to superordinate textual categories. Van Wijk used Mann and Thomson's (1988) rhetorical relation categories to label each discourse segment. Figure 2.4 shows a hierarchical structure which I constructed based on one of the paragraphs written by a participant in the present study[7]. In Figure 2.4, I applied relations such as elaboration and interpretation from Mann and Thomson to indicate the rhetorical relations between the segments. Next, I coded the same text based on Toulmin model discourse features, which both identifies and establishes the relations between the features.

[7]This text is borrowed from the Findings (Max Session V); however, I decided to demonstrate the model with an actual text written in the present study as opposed to a text borrowed from the literature. This supports the argument that in the present study textual analysis based on the Toulmin model is consistent with van Wijk's approach.

In Figure 2.4, segment 0 contains the topic and an evaluation claim followed by two sentences which list reasons for it. Segment 3 is the elaboration for Segment 2 and is interpreted by Segment 4. Segment 5 lists a third reason, and Segment 6 a fourth, from which circumstance 6a arises. The paragraph ends with a conclusion. Below Figure 2.4, the same paragraph is coded in accordance with the Toulmin (1958/2003) model of argument. The numbers in brackets indicate "conceptual processes" (van Wijk, 1999) and the letters the elements of the Toulmin model.

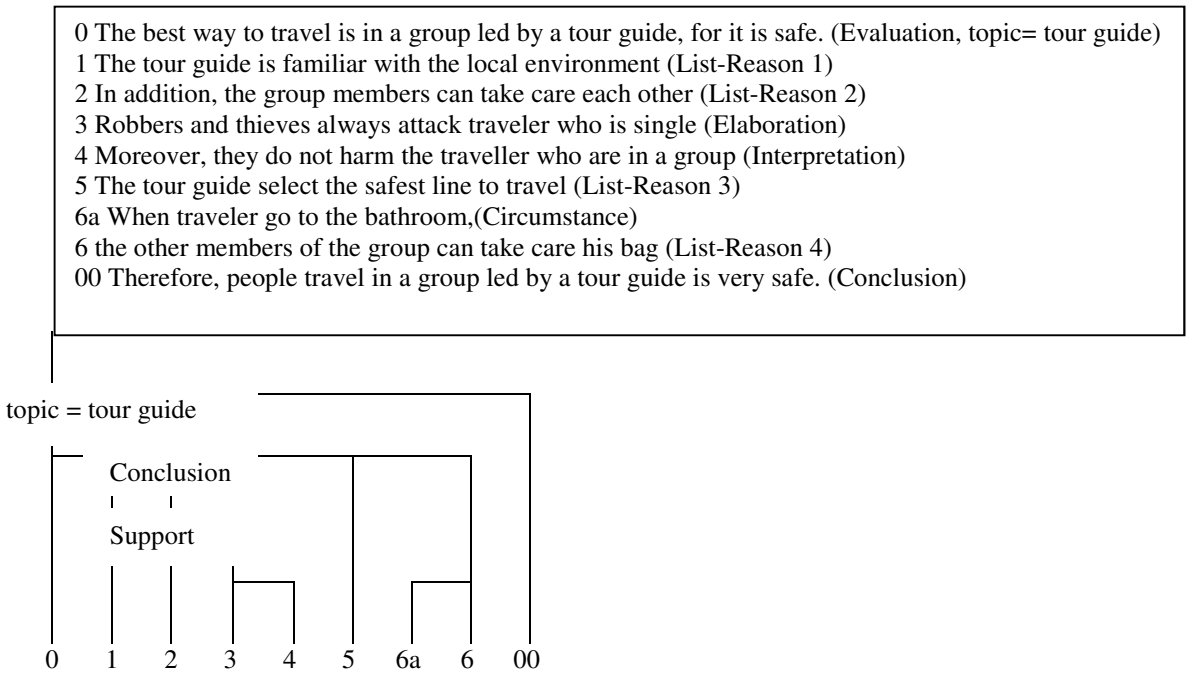

Figure 2.4. Reconstruction of Conceptual Decisions during Text Generation (after van Wijk, 1999)

> *The best way to travel is in a group led by a tour guide, for it is safe (0-C). The tour guide is familiar with the local environment (1-D1). In addition, the group members can take care each other (2-D2). Rabbers [sic robbers] and thieves always attack traveler who is single (3-B). Moreover, they do not harm the traveller who are in a group (4-W). The tour guide select the safest line to travel (5-D3). When traveler go to the bathroom (6a), the other members of the group can take care his bag (6-D4). Therefore, people travel in a group led by a tour guide is very safe (00-C).*

In the above paragraph, the writer makes a Claim (C) supported by two Data items (D1, D2). The Warrant is implicit; thus, the argument is an enthymeme. The writer seems to assume the following warrants: that the guide's familiarity with the area and the collective nature of the group bring safety. For the latter assumed warrant, he provided a Backing (B). Then, he provided

a Warrant (W) for Backing (B) by stating the principle the Backing rests on. The use of conjunctive adverb "moreover" is problematic, since the sentence that follows is not an addition, but a reason. He provided two more Data items (D3 and D4). In D3, it is unclear what he meant by "line" (perhaps route or path). Overall, his support consists of a series of data items, with assumed warrants, supported as enthymemes. His use of Warrant for a Backing is notable because he has intuitively managed to formulate a "recursive syllogism," when the backing, as factual information for the warrant, requires warranting in its own right. I judged this paragraph to be structurally sound.

In the above analysis, the concepts from the previous studies are implicit. The analysis considers the type and amount of information processed by the writer (Bereiter & Scardamalia, 1987), the rhetorical relations among the discourse elements (Mann & Thomson, 1988), and the hierarchy of the discourse features (van Wijk, 1999). For example, in the above analysis it is clear, without having to draw on van Wijk's chart, that the Data is subordinate to the Claim. Such an analysis was conducted for rhetorical structure of arguments.

To infer the cognitive process of knowledge-transforming, in addition to the rhetorical analysis, two other criteria were considered: the traces of the prompts as mediational means, the amount of revision, and the existence and quality of rebuttal and response to rebuttal as the basic "rise above conflict" criterion (Scardamalia, et al., 1984) for reflective thought. These ideas were presented above when discussing knowledge-transforming composing and their operationalization will be discussed in Chapter 4.

This section reviewed studies relevant to inferring cognitive processes and rhetorical structure from text. The next section reviews cognitive studies that informed Instruction in the field of cognitive strategy instruction (in writing).

2.4. Cognitive Strategy Instruction

The instructional component of the present study is in part grounded in educational psychology, specifically cognitive strategy instruction (CSI) (Berthold, Nu¨ckles, and Renkl, 2007; Conley, 2008; Englert et al., 1991; Guzel-Ozmen; 2009; Handsfield & Jimenez, 2009, Handsfield, & Jimenez, 2008; Harris & Pressley, 1991; Lau & Chan, 2007; Olson & Land, 2007; McGoldrick, Cariglia-Bull, & Symons, 1995; Santangelo, Harris & Graham, 2008). Scardamalia

et al. (1984) applied the principles of cognitive strategy instruction such as mastery and coping modelling (Zimmerman & Kitsantas, 2002). The CSI literature often invokes the ideas of Vygotskyan SCT. This section reviews the literature in CSI for the following reasons: to highlight the reference to the principles of SCT (and the possible gaps in theorizing) to pave the way for the next section on SCT, to examine ways in which the problem of discourse content generation in writing was examined, and to demonstrate how the use of mediational means (e.g., cue cards, and agents such as models) were used as part of cognitive strategy instruction. All of these were features of Instruction in the present study, while they were squarely grounded in SCT principles.

After van Dijk and Kintsch (1983) strategies are defined as actions taken to reach goals in an *optimal* fashion (p. 62). Schraw (1998, p. 113, citing Garner, 1987) distinguishes between cognition and metacognition: "cognitive skills are necessary to perform a task, while metacognition is necessary to understand how the task was performed." Flavell (1979) defines metacognitive experiences as "any conscious cognitive or affective experiences that *accompany* and pertain to any intellectual enterprise" (p. 906, emphasis added).

The theoretical basis for cognitive strategy instruction (CSI) was traced by Harris and Pressley (1991) to constructivist ontology and the works of Dewey and Piaget, who viewed the child as an active participant in the environment, one who acts on and interacts with it (p .392). They also related constructivism to Vygotsky's (1978) famous concept of ZPD. They observed that constructivism involves transforming old knowledge to construct new knowledge (p. 392). To implement CSI, they recommended a procedure that involves ascertaining pre-requisite skills are available, describing the strategy and self-instructions to perform it, modelling of the strategy, holding practice sessions with the learner, and independent performance by the learner.

The effectiveness of a cognitive strategy instruction in writing was examined by Englert et al. (1991). Their participants were regular and special education fourth- and fifth-graders. The experimental group was presented with "think-sheets" containing self-instructions that would help the learners develop an "inner language" to use the writing strategies for planning, organizing (both of which are content generation strategies mediated by artifacts), self-editing, peer-editing, and revising. The strategies were represented with the acronym POWER, which stood for "plan, organize, write, edit/editor, and revise" (p. 345). The think-sheets were used to

generate content, self-edit, receive peer feedback and revise. To make the writing process transparent the teacher, modelled the process by thinking aloud. The genre that was investigated was expository and emphasis was attached to teacher-learner dialogue. The results indicated that the experimental group outperformed the comparison groups. Vygotsky's (1986) concept of inner speech was invoked to explain the teacher-student dialogue, which is externally collaborative and then becomes internally collaborative, once internalized

Lack of attention to the social nature of writing, in particular audience and purpose, was identified by Pressley et al. (1995) as the reason why children write poorly. They identified CSI in writing (CSIW) as a possible solution to the problem. They reported Englert et al.'s (1991) CSIW as program which was designed to motivate writers, help them build text-structure schemas, and make the writing process transparent. Pressley et al. explained that Englert et al.'s (1991) program builds audience expectations into the CSIW, which help address the social nature of writing. For example, the "editor think-sheet' prompts the writer to notice that there is an audience who will react to his or her writing, and that reaction will be used to improve the quality of the writing. From an SCT perspective all the think-sheets are social artifacts created by an agent who knows the requirements of the task and provides mediation by proxy. The very act of using the think-sheets mediates the cognitive processes that unfold during text production.

To achieve self-regulation in academic task performance, Schunk and Zimmerman (1997) presented a four-stage regulatory skill development process which is based on the premise that self-regulation has social origins, as posited in Vygotsky's (1978) theory of formation of higher psychological functioning. At the first stage, the learner *observes* a model's behaviour. The second step involves *imitating* the model's behaviour. Third, the learner attains self-control, which entails *internalizing* the behaviour through transfer tasks. In internalization, the learner's attention is directed toward setting process goals. The process goals of the self-control stage direct the writer to create material based on the observations and imitations made so far. In step four, *self-regulation* is achieved when the learner is able to employ the skill *independently* with no or little reliance on the model. An example of the outcome-oriented nature of step four is when the writer is conscious of an audience whose reactions are accommodated in the construction of the developing text.

The effect of observational learning of writing with or without social feedback was studied by Zimmerman and Kitsantas (2002). Of their six groups, they had the two groups (one with social feedback and one without) observe a "coping model" who struggled to solve sentence combining problems. The other two groups (one with social feedback and one without) observed a "mastery model" who flawlessly solved the writing problems. The last two groups (one with social feedback and one without) did not observe a model. They found, on a post-test, that the groups with the coping model outperformed the groups with the mastery model, and the groups with the mastery model outperformed the no-model group. Social feedback had an additive value across all three conditions. Berthold, Nu¨ckles, and Renkl (2007) investigated the use of cue cards (i.e., prompts) as a learning tool. They were interested to find if cognitive and metacognitive prompts support learning in the context of writing learning journals. Learning journals feature student reflections on subject matter instruction. Cognitive prompts were meant to support organization, and elaboration of writing and metacognitive prompts were used as means of self-regulating and monitoring cognitive processes. The following are examples of cognitive prompts for organization and elaboration "How can you best organize the structure of … content? … Which examples can you think of that illustrate, confirm, or conflict with the learning contents?'' (p. 567). For metacognitive strategies of monitoring and self-regulation they offered the following examples: "Which main points haven't I understood yet? …How can I overcome my comprehension problems?" (p. 567). The results indicated that cognitive prompts with or without the metacognitive prompts would enhance learning, yet metacognitive prompts alone would not result in enhanced learning, compared with a control condition that did not receive either kind of prompts.

Santangelo, Harris, and Graham (2008) reported that novice writers have trouble generating content by retrieving information from memory and translating it into text, unlike expert writers who initially generate much content and then discard some of it in the revision process. They reported how they applied self-regulatory strategy development (SRSD) with struggling writers. SRSD is in part inspired by Socratic dialogue and Vygotsky and Luria's work in social psychology. It consists of seven stages: activating prior knowledge for the strategy; discussing the strategy; modelling the strategy in task performance; providing support during task performance; and encouraging independent performance. Although self-regulation is the

goal, there is not a discussion of whether or not “self-regulation” is achieved. Monitoring self-regulation is what seems to be missing in SRSD.

Guzel-Ozmen (2009) described a CSIW procedure in which the text structure is taught, the writing processes of planning and revising are modelled, followed by guided and independent practice. Prompt cards containing unfinished declarative sentences are provided for the learners to define the problem and solution. Although ideas of scaffolded intervention and cognitive writing processes are used, neither SCT nor cognitive writing theory is discussed to explain the theoretical basis for the procedures.

In summary, CSI and CSIW invoke many tenets of SCT such as zone of proximal development, inner speech, and the use of artifacts to enhance cognitive processes of text generation, but they do not sufficiently ground them in SCT by explicating why and how those strategies are effective. The present study applied the tools and principles of CSWI such as modelling, prompt cards, and collaborative dialogue to teach discourse content generation. The next section reviews SCT principles in order to lay the foundation for the application of its concepts in the present study.

2.5. Sociocultural Theory of Mind

The construct of reflective knowledge-transforming composing was first formulated in cognitive writing theory (Bereiter & Scardamalia, 1987; Scardamalia et al., 1984), but the instructional method lends itself best to sociocultural theory of mind (SCT) in order to provide a precise and scientific account of the Instruction provided to effect reflective thought. However, it has been argued that cognitive theory and SCT are incompatible (e.g., Zuengler & Miller, 2006), some of their associated concepts are incommensurate (e.g., Dunn & Lantolf, 1998), and that cognitive theory posits a Cartesian mind-body dualism (e.g., Lantolf & Thorne, 2006), which is in contrast to the dialectical conception of mind-body in SCT. Nonetheless, as indicated above, references to Vygotsky and principles of SCT abound in cognitive writing theory and cognitive strategy instruction. Thus, it is imperative to first demonstrate how cognitive and SCT epistemologies are compatible in the context of the present study and that they are consistent with Vygotsky's pragmatist epistemology (Edwards, 2007; Toulmin, 1999). I first trace the genology of thought from Descartes, to Locke, Kant, Hegel, and Vygotsky, to indicate

Vygotskian SCT cannot be separated from its acknowledgment of innate cognitive faculties. Then, I review SCT's tenets applied in the present study.

The argument for the mind-body dualism arose in Descartes's *Discourse on the Method*, in which after a series of meditations, he concluded that the human is "a substance whose whole essence or nature is simply to think" (Hatfield, 2008). Descartes developed the argument further in *Meditations* to conclude that because matter is extended but mind is not, mind and matter must be distinct substances (Hatfield, 2008)[8]. John Locke rebutted Descartes by claiming that "*where-ever there is Sense, or Perception, there some Idea is actually produced, and present in the Understanding*" (Locke, 1975, p.144, italics in original). In *An Essay on Human Understanding,* Locke claimed "there is nothing in the mind except what was first in the senses" (cited in Durant, 1961, p. 194). Locke argued against innate faculties, and for the proposition that sense-experience was responsible for human understanding and that all knowledge is sense-derived. Immanuel Kant sought to reconcile the two arguments by asking how the mind can *select* from the chaotic multiplicity of "senses only those that lead to understanding" (Durant, 1961, p. 202). To respond, Kant distinguished between *a priori* cognition that exists before experience and *a posteriori* cognition that will "arise from experience"(Kant, 1998, p. 136). Hegel sought to resolve this tension between "universal standards of rationality implicit in Kant's work" and "the different ways of thinking and feeling" in different societies" (Bredo, 2006, p. 22).Vygotsky's dialectical epistemology (Toulmin, 1999) draws on Hegel (as noted by Kozulin in Vygotsky 1986, p. xxv) and recognizes two lines of development: natural and cultural (Vygotsky, 1987).

For a normally developing child, Vygotsky (1987) argued the two lines merge "to form, in essence, a single series of formative socio-biological influences on the personality" (p. 42). Cole et al. (1971, p. 5) cite Boas (1911) who observed that whereas "the existence of a mind absolutely independent of conditions of life is unthinkable, . . . the functions of the human mind are common to the whole humanity." Vygotsky (1987) maintained that the use of cultural tools

[8] Interestingly, Cartesians' conception of mind-body dualism only served pragmatic ends as noted by Chomsky (2006). Chomsky explains that Cartesians realized when "the theory of corporeal body ... is extended to its limits, it is incapable of accounting for facts that are obvious to introspection" (Chomsky, 2006, p. 5). Therefore, the dualism served the purpose of their research program. Chomsky further referred to the Cartesians' program which was to work "within the framework of an 'instituted language,' a language that is a *cultural product*" (Chomsky, 2006, p. 6, emphasis added).

presupposes "the presence of innate intellect, organs, and functions" (p. 42), which are necessary for the socialization of the child; however, when these normative cultural tools are not available, the organism can still compensate for the biological defect with proper cultural mediation. Kozulin and Gindis (2007, p. 336) mentioned Vygotsky's report of the case of a 9-year-old girl (cited by Petrova, 1925) who was able to name a particular *species* of trees, but could not recognize the *genus* tree. Cultural mediation, however, could compensate for this defect. Kozulin and Gindis illustrated the interaction between natural and cultural axes of development in a three by three matrix, in which both axes can have manifest degrees of retarded, normal, or superior development. For example, a naturally retarded development can be compensated for by the use of cultural tools. Conversely, superior natural development, such as, say, memory and attention, can be held back due to lack of proper use of cultural tools mediating the growth of natural abilities. Vygotsky's attention to and emphasis on natural development should make it clear that Vygotsky was not an empiricist in the Lockean sense, but a pragmatist (Edward, 2007). Knox and Stevens (1987 reported that while Vygotsky did not accept "the idea that psychological development comes solely from within the individual's psyche, he also rejected the notion that the human mind is a *tabula rasa"* (italics in original, p.12). They noted that "Vygotsky's theories … combine the two approaches" (Knox & Stevens, 1987, p. 12).

Ozmon and Craver (1986) identified the basic elements of pragmatism as "induction, the importance of human experience, naturalistic humanism, and the relations between science and culture" (p. 98). On the social-individual divide they explained pragmatist George Herbert Mead's application of induction to psychology to posit "that children did not learn to be social; rather they had to be social to learn" (p. 100). This is reminiscent of Vygotsky's (1986) idea of the "social origin of consciousness," as noted by Edwards (2007) who compares Mead and Vygotsky who both argue: "[I]deas and, therefore, minds are socially formed and shape the ways in which we act in and on the world" (p. 77).Vygotsky's dialectical epistemology is the one that can provide "a convincing account of the relationship between 'knowledge' as possession of individuals and knowledge as collective property of 'community of knowers'," Toulmin (1999, p. 54) noted. Toulmin reminded us that Vygotsky (1978) argued that language does not only allow humans to "master practical procedures, but also to internalize the meanings and patterns of thought that are current in our culture and profession" (Toulmin, 1999, p. 58). Thus, it appears

that for Vygotsky, the innate faculties and structures and internal processes that are implicit in cognitive theory are acknowledged in his studies of human cognition.

As reviewed in the cognitive strategy instruction section, the practice of researchers working in the cognitive paradigm often draws on SCT principles; the use of external artifacts, collaborators, and language to monitor and regulate cognitive functioning indicate that in the practice of cognitive educational psychology, mind is in fact viewed as extended and Vygotsky's ideas of mediation, ZPD, and inner speech are often used to pragmatic ends.

Having described the epistemological basis of Vygotsky and SCT, I continue with two caveats. First, a note on the term "sociocultural" in sociocultural theory of mind: Wertsch (1985) noted Vygotsky's analysis of mind in society does not go beyond dyadic interactions. Lantolf (2002) defined the terms social and cultural in the title sociocultural theory as follows: social deals with "the experiences of others in the present" and cultural with "the experiences of others in the past" (p. 104).

Second, looking up the word "culture" in Vygotsky's works' indexes, I did not locate many instances. Noticing the same absence, Cole and Gajdamaschko (2007) took it upon themselves to explain how Vygotsky used the term culture in his theory. They explained that Vygotsky's use of the term culture was both in a core sense and in an evaluative sense. In a core sense, Vygotsky held that "mediation of action through culture is a defining property of human psychological functioning" (p. 198). Much of the educational literature inspired by Vygotsky's writings uses "culture" in this core sense. In an evaluative sense, Vygotsky contrasts "cultural people" with "primitive people" implying "there are people who lack culture" (p. 198).The latter view has its historical antecedent in European thought. Morgan (1877, a 19th century anthropologist cited in Cole & Gajdamaschko (2007), p. 197), for example, asserts that humans have lived in a state of savagery, barbarism, and civilization. In fact, it was Vygotsky's student Leontiev who shifted the emphasis from mediational means to "cultural practices," i.e., activity (Cole & Gajdamaschko, p. 207).

The main thrust of the present study was to make discourse content generation in a specific writing genre a conscious activity for the learner, and sociocultural theory of mind provides the conceptual framework to achieve this goal. Consciousness in this project is

understood as meta-discoursal and meta-cognitive awareness. That is, the writing instruction is conceptualized as a process in which learners are consciously aware of the discourse features they are to generate, and of the cognitive processes of heuristic searches in the memory for the retrieval of the pertinent elements of knowledge and rhetoric. The unit of analysis that Vygotsky (1986) identified for the study of consciousness was word meaning, although it was later reconceptualised as activity by Leontiev. In the following section, the basic sociocultural concepts relevant to the study are reviewed.

2.5.1. Mediation.

Lantolf and Thorne (2006) explained that the relationship between individuals (i.e., the subjects) and the world (the object) can be either direct or indirect (or mediated). Lantolf and Thorne (2006, p. 63) argued, "In our view, there are no uniquely human actions that are not mediated." It is quite conceivable to imagine similar types of direct subject-object relationships among animals. Lantolf and Thorne (2006, p. 63) clarified: "human agency appears once we integrate cultural artifacts and concepts into our mental and material activity." Therefore, according to Lantolf and Thorne, what sets humans apart from animals is that all human action is, one way or another, mediated, whether consciously or non-consciously.

Wertsch (2007) broadly categorized Vygotsky's two conceptualizations of mediation as explicit and implicit mediation. Explicit mediation uses the language of behaviourist-associationist psychology of the time and introduces mediational means as instruments, objects, signs, or generally, social semiotic tools that come in between stimulus-response chains. Vygotsky (1978) maintained that higher psychological functions such as voluntary attention and logical memory are socially mediated. The method of double stimulation, which Vygotsky (1986, p. 103) borrowed from Shakhrov (1930) exemplifies explicit mediation. In double stimulation, an auxiliary sign is placed in front of the subject, and this sign aids with performance on the experiment. Mediation through double-stimulation is consistent with Vygotsky's purpose to study higher mental functions ontogenetically (over a life span) and microgenetically (over an activity) because he was interested in studying how the individual psyche was developed in the society, and how individuals and objects in the society mediate such development.

Wertsch (2007) explained that implicit mediation deals with Vygotsky's psychological tools. Vygotsky (1986) noted that "thought does not express itself in words, but rather realizes itself in them" (p. 251). Then, words are semiotic means which (implicitly) mediate cognition. Word meaning is what Vygotsky uses as his unit of analysis for the study of concept formation and consciousness. Vygotsky was indebted to his teacher Shpet for the formulation of the dialectical relationship between thought and word (Wertsch, 2007; Zinchenko, 2007), which Shpet himself borrows from Humboldt.

The dialectical relationship between thought and language, or more accurately between thinking and speech as realizations of the latter, are the hallmark of implicit mediation. Wertsch (2007, p. 184) echoed Vygotsky (1986) and observed that whereas word is about segmentation and sequencing, meaning is non-partitioned and non-sequential, and word meaning fuses the two processes together. Wertsch (2007) explained "implicit mediation typically involves signs in the form of natural language that have evolved in the service of communication and are then harnessed in other forms of activity" (p. 185). The remaining paragraphs of this section review the mediational role of language from the perspective of linguistic anthropology and its bearing on rhetorical studies.

As with the indirect mediated relationship between the subject and object, Lantolf and Thorne (2006) explained that the historical accumulation and appropriation of "auxiliary means" that humans insert between themselves and the world regulate (i.e., mediate) their mental activity and change their material condition in the world. The auxiliary means are semiotic in nature and primarily include speech, writing and gesture.

The mediational role of language in cognition has been studied over the past century by linguistic anthropologists. Whorf (1941/1995) demonstrated how everyday language use leads to specific ways of perceiving the world and behaving accordingly. He observed when an empty fuel tank is labeled "empty," people's behaviour around it is different from when it would be marked "full." The label empty would lead the passerby to consider it safe to light a cigarette in its proximity, yet this linguistically-mediated perception often proved incorrect to disastrous effects; whereas the word "empty" would not be associated with danger, an empty tank would be even more dangerous than a full one because of the flammable vapours accumulated in it. Whorf's analysis revealed the implicit mediational and constitutive role of cognition by

language. Philips (1999, p. 194) observed in language a "reality creating capacity." One way in which this reality creating capacity is reified is in "the structure of the language itself most specifically in the lexical and morphological semantic structures of all languages [: t]he idea that the language a group speaks entails a culturally distinctive worldview."

Providing grammatical evidence from native North-American languages, Mithun (2004) observed that the structure of a language makes it obligatory to attend to certain aspects of reality. Her analysis indicated that, "Languages differ both in what they allow their speakers to express quickly and easily, and what they require their speakers to specify" (p. 126). Citing an example from the Central Alaskan language, Yup'ik, she notes the utterance "Atakenvitcaaqaat" is in fact one word, and it means, "He is not actually their natural father" (p. 127). The fact that there is a word for this concept makes it easier for the Yup'ik speakers to express the thought. Thus, it seems that the structure of language mediates certain ways of thinking, which once they are habitual, they become cultural ways of thinking.

Inspired by findings in linguistic anthropology, Kaplan (1966) spearheaded a movement in the study of rhetoric known as contrastive rhetoric, or more recently inter-cultural rhetoric (Connor, Nagelhout, & Rozycki, 2008; Li, 2008). Kaplan (1966) made the controversial claim that "*superficially*, the movement of the various paragraphs" (p. 4, emphasis added) in different cultures may be represented graphically as straight and linear (e.g., English), spiral (e.g., Asian), and so on. Kaplan's claim, therefore, implies that culture strongly mediates rhetorical practice. In response to charges of over-simplification, Kaplan (1987) acknowledged what had been dubbed as his "noodles article" had gained some notoriety, and acknowledged he had overstated his claim, yet suggested there is some validity to the notion of cultural thought patterns and that they influence rhetorical patterns. The element of truth in Kaplan's claim seems to give credence to Connor's pursuit of the field of contrastive rhetoric, which she defines "as an area of research in second language acquisition that identifies problems in composition encountered by second language writers and, by referring to the rhetorical strategies of the first language attempts to explain them" (Connor, 1996, p. 5).Thus, Kaplan posited a relationship between culture and rhetoric. Knowing that language and culture mediate cognition, according to the linguistic anthropology studies cited above, then it becomes imperative for the L2 educator to bring the normative ways of thinking in L2 rhetoric into the writing instruction. If Kaplan's claim is true

about the relativity of rhetorical patterns and the thought patterns that mediate them, then creating an L2 rhetorical consciousness to transform knowledge seems be a cause worth pursuing. Sociocultural theory and the robust concept of mediation of cognition by culturally and historically developed semiotic means provides theoretical grounding and empirical evidence for the interaction among L1/L2 languages, culture, and cognition and can be used to design a pedagogy that makes this transformation of consciousness possible.

2.5.2. Concept formation.

This study was designed to help English language learners regulate the generation of discourse content in writing. To that end, instruction involved genre-specific argumentative discourse concepts following the Toulmin (1958/2003) model of argument. The discourse features in the model mediated the content generation process. This goal was achieved by making learners conscious of the discourse schema representing the concepts and the cognitive strategies with which they can generate the discourse features. The strategies took the concepts as tools for the purpose of discourse content generation. Consciousness in the present study is understood as awareness of and attention to the discourse features and cognitive processes of heuristic search in the memory to generate/retrieve the pertinent elements of knowledge and rhetoric. Hence, consciousness in this study is awareness of meta-discourse and metacognition. Metacognition was defined by Sternberg (1980) as "self-knowledge about cognitive processes. For instance, knowing when, where, and how to use a specific strategy . . . a global concept for designating types of knowledge about cognition, such as knowing about comprehension, linguistic, or memory processes" (p. 585). Metacognitive strategies in language use were defined by Cohen (1998) as those that "deal with pre-assessment, and pre-planning, on-line planning and evaluations, and post-evaluation of … language use events" (p. 7). The metacognitive strategies in the present study utilized discourse labels as scientific concepts to mediate the planning of generation of argumentative discourse.

Vygotsky (1986) proposed a method of analysis for the study of formation of scientific concepts. He distinguished scientific concepts from everyday concepts. Scientific concepts are usually mediated by language. To learn a scientific concept, the learner should be able to name it, in contrast to spontaneous concepts, which the individual knows, without being necessary consciously aware of it. In fact, the study of consciousness was Vygotsky's main project, for

which he proposed a unit of analysis: word meaning[9]. Vygotsky used word meaning as a unit of analysis for the scientific study of concept formation on his way to study consciousness. Wertsch (1985, p. 196), however, argued word meaning cannot be a unit of analysis for the study of consciousness itself, but one for how consciousness is mediated. As valid as this criticism may be, it does not detract from the application of word meaning to study scientific concept formation in the present study because it uses word meaning to operationalize concept formation rather than consciousness *per se*. That is, it is the awareness of a discourse concept which is the subject of the present study and not consciousness itself.

The program that Vygotsky (1986) set himself was to show how a study of thought could not be done by ignoring its linguistic aspect. He rejected an associationist account of the relation between word and meaning, which would be analogous to that between a garment and its owner, that the different meanings of a word are not similar to an owner changing clothing (p. 213). Tracing the relationship between the development of children's meaning and external speech, Vygotsky (1986, p. 219) observed that, initially, a child's thought is an "amorphous whole" and finds expression in a single word (the holophrastic phase in the development of children's speech); however, the meaning of this single word could be expressed in a complete sentence. One could imagine when a child says *milk,* she is indeed making a request for milk. Semantically, then, the child's single-word utterance is in fact a complete speech act containing a complete proposition with a subject and predicate: *I want milk*. Thus, the child's utterance contains the predicate, but not the subject. Vygotsky (1986) explained, "Semantically, the child starts from the whole, from a meaningful complex, and only later begins to master the separate semantic units, the meanings of words, and to divide his formerly undifferentiated thought into units" (p. 219). While the child's single word utterance is psychologically a complete sentence, his external speech develops in the opposite direction by first putting together words to make simple sentences, and then constructing more complex sentences. The child's meaning develops from whole to parts, bur her external speech from parts to whole. When the child's thought becomes "more differentiated," the development in external speech helps the child express the thought in a more sophisticated linguistic form. In turn, the more sophisticated external speech can help the child think in an even more differentiated way. Hence, the dialectical relationship

[9] There are similarities between Vygotsky's conceptualisations of word meaning for studying consciousness and Saussure's (1972) sign as the unified duality of sound pattern and concept.

between thought and external speech. The development of one helps the development of the other. Vygotsky (1986) observed that thought "does not merely find expression in speech; it finds its reality and form" (p. 219).

In the present study the dialectical relationship between thought and language is conceptualised according to Bereiter and Scardamalia's (1987) knowledge-transforming model of composing; in order to produce differentiated content beyond the "amorphous ideas" of thesis-support differentiated rhetorical knowledge is required. Such knowledge affords the genesis of differentiated thought in composites beyond amorphous wholes. For example, when differentiated rhetorical knowledge about a discourse features is available, it can afford the genesis of a form that realizes the meaning of the discourse feature that it represents; and once the more sophisticated discourse feature is generated, this new form of thought, can help generate more differentiated meaning. Thus, to generate sophisticated thought, sophisticated discourse is required and vice versa.

On concept formation, Vygotsky's (1987, p. 131) main claim is that concepts cannot be formed without sign operations. The major sign operation that is involved in concept formation is *word meaning*. To explain *word meaning,* Vygotsky (1986) located the relationship between word and meaning in the relationship between language and thought in a way that word meaning is not a linear referring expression- referent relationship as is conceptualized in formal semantics. Zinchenko (2007) succinctly summarized Vygotsky's (1986) explanation about relationship between thought and word. Zinchenko (2007) wrote: "*What is simultaneous in thought is successive in language*" (p. 216, italics in original). Sign operations are situated squarely in the present study.

Concept based instruction or systemic theoretical instruction (Lantolf & Thorne, 2006) was developed by Gal'perin, who was Vygotsky's student. Arievitch and Haenen (2005) explained how Gal'perin proposed a sequential process of instruction whose goal was the "internalization of activity and gradual formation of mental actions" (p. 159). They explained that Gal'perin conceived of action at three levels: material, verbal, and mental." This stepwise process would begin with material orienting action, whose purpose is to orient the participant's thinking toward the goal of the activity, then proceeds with monologic or dialogic verbalization,

and culminate in “pure thought.” The stepwise process of mental action informed Gal’perin’s pedagogy, materializing Vygotsky’s (1978) idea that instruction should lead development.

In the present study, Instruction in the Toulmin (1958/2003) model of argumentative discourse introduced discourse concepts as sign operations with which discourse content is generated. The students learn the word meaning associated with a discourse concept such as claim. This word meaning initiates a sequential sign operation to generate content. The discourse labels allow the simultaneous thoughts to become successive in text production. Through concept-based instruction students would hear themselves from the outside (Gal’perin, 1967, p. 30) through different forms of other- and artifact mediation, which provide the right orientation to the activity and thereby change the nature of activity itself (Gal'perin, 1979).

Concept-based instruction has been used in L2 research by Negueruela (2003) to study grammatical development, by Williams, Abraham, and Negueruela-Azarola (2013) and Garcia (2012) to examine instruction in verbal aspect, by van Compernolle (2011) to study sociopragmatic knowledge, and by Johnson and Golombek (2011) to explain how the use of narratives in a teacher education program affords the verbalization of scientific concepts and making sense of the teaching practice.

Concerning the material level of mental action, Lantolf and Poehner (2014), argued for the use of schemes that orient the mental action. Such schemes “generally take the form of a model, diagram, picture, or some other non-linguistic representation of the relevant concept” (Lantolf & Poehner, 2014, p. 62). Negueruela (2003) referred to such schemes as SCOBAs (scheme for complete orienting basis of action). Lantolf and Poehner echoed Gal’perin who argued against relying on verbal explanations alone to lead the development of concepts because they are linear, and amenable to memorization, whereas a scheme is holistic, and appropriate for a deeper understanding. In the present study, I used a Toulmin scheme (See Figure 2.1and Figure 3.1) to represent abstract argumentative discourse concepts. The scheme is difficult to memorize without deep understanding. It is a tool that serves to orient the learner toward mental action by concretizing the nebulous word meaning *argument*, and representing the relationship between its constituent elements and the mental steps to be taken to generate the argumentative discourse content. It is a “cognitive map … deployed in concrete practice ” (Lantolf & Poehner, 2014, pp. 64-65), which is the orienting basis of mental action to generate argumentative discourse content.

To my knowledge, the present study is the first to use concept-based instruction to teach the discrete features of written argumentative discourse (cf. Ferreia & Lantolf, 2008).

2.5.3. Problem-solving with language: inner speech, private speech and languaging.

As noted above the use of language for (rhetorical) problem-solving is acknowledged in cognitive strategy instruction and was central to Instruction in the present study. Thus, this section reviews SCT's conceptualization of the use of language to perform cognitive tasks. Vygotsky (1986) traced the developmental trajectory of speech in children from social speech directed to others, egocentric speech directed to the self, and inner speech, used for problem solving. Vygotsky (1986) argued that inner speech has its own rules which are different from the rules of social speech. Inner speech is subjectless and predicateful[10], because the subject is already known to the person, it does not appear as part of inner speech syntax. Vygotsky (1986) noted, "Predication is the natural form of inner speech; psychologically, it only consists of predicates only. It is as much a law of inner speech to omit subjects as it is a law of written speech to contain both subjects and predicates" (p. 243). Ontologically, there seems to be a similarity between Hayes and Flower's (1980) conception of propositions (discussed above) and Vygotsky's (1986) inner speech. Hayes and Flower noted that propositions may consist of only a concept and attribute. This renders the proposition without a predicate. They also suggested the writer may not even have a *name* for the concept, attribute, or what comprises the proposition. This nebulous conception of a proposition is akin to inner speech's "tendency toward abbreviation and predication" (Vygotsky's, 1986, p. 243).

Inner speech continues to be used during adulthood both in its silent form or when externalized as private speech. Vygotsky (1986) inferred the structure of inner speech by observing egocentric speech (p. 236). Despite its peculiar syntax, inner speech can become structurally identical to social speech when there is a social need. An example is when a person repeats a sentence to himself in advance of uttering it (Vygotsky, 1986, p. 88). Inner speech is characterized by an influx of sense. Vygotsky (1986) contrasted the sense of a word with its meaning. He noted

[10] I coined the term predicateful to mean featuring/containing a predicate, after similar use of the suffix –ful in variationist sociolinguistics. For example, the varieties of English in which the postvocalic /r/ is not pronounced are r–less, e.g., British Received Pronunciation, and the varieties in which it is pronounced are r-ful (see Labov, 2010, p.44).

> The sense of a word ... is the sum of all the psychological events aroused in our consciousness by the word. It is a dynamic fluid, complex whole, which has several zones of unequal stability. Meaning is only one of the zones of sense the most stable and precise one. (pp. 244-245)

In inner speech, a word is so saturated with sense that many words are needed to express it externally. For an observer to understand egocentric speech, one must know both its subject and its context (Vygotsky, 1986, p. 247).

Inner speech both in its internal and its externalized form are used in problem-solving[11]. Inner speech is internalized egocentric speech (Lantolf & Thorne, 2006, p. 73). Lantolf and Thorne (2006) reported studies by Sokolov (1972) in which there was no audible speech during problem solving activities, yet the speech areas of the brain and the vocal tract were in an "excited state" (p 74). This suggests the use of inner speech during problem solving tasks. When speech is externalized by adults for problem-solving activities, it is referred to as private speech as explained by Lantolf and Thorne (2006), who define private speech as "inner speech [which] is encoded in linguistic form" (p. 75). Using the idea of private speech, Swain (2006a & b) argued for the mediational role of language in cognitive activity, during problem solving. She noted that verbalization "transforms thought" (Swain, 2006b, p. 101). She later introduced the notion of languaging and defined it a "vehicle through which thinking is articulated and transformed into artefactual form" and the "act of using language to mediate cognition- to bring thinking into existence" (Swain, 2010, p. 115). In the original Scardamalia et al. (1984) study, the researchers and participants modelled thinking-aloud while writing in front of class. In the present study, I, as a mastery model (Zimmerman & Kitsantas, 2002), demonstrated oral languaging for rhetorical problem solving in front of class (See Instruction). Oral languaging, externalizes inner speech, makes it private speech for the purpose of rhetorical problem solving. Such use of language does not only express thought, but also generates it. Thus, language is both a tool with which discourse content is generated and is the product of the generation process at the same time. This is a case in point in the mediational role of language rhetorical problem

[11] Interestingly, the mediational role of language is acknowledged in cognitive theory, as well. Chomsky (2004), for example, considers the primary function of language to be to regulate thought. He explained that "the primary function of language, to the extent that you can talk about the function of a biological system . . . [is] to create a symbolic world in which we can plan, interpret, act, [and] think" (p. 108). This conception of the functional use of language to regulate cognition is a feature of cognitive theories that is shared by sociocultural theory of mind.

solving. Having discussed the role of inner speech in problem solving, I will explore Vygotsky's view of writing, which he considered to presume inner speech (Vygotsky, 1978).

2.5.4. Vygotsky and writing.

Vygotsky (1987) described the developmental trajectory of writing as the opposite of speech. Speech is initially external, directed to adults, and social; subsequently, it becomes self-directed, which Vygotsky (1986), following Piaget, called egocentric speech, which then becomes inner speech. Inner speech has a special, truncated, predicative syntax; namely, there is tendency toward predication, because the subject is already known to the person, and the person needs to think in predicates. For Vygotsky (1987), writing is written speech, and it follows inner speech in its ontogenesis. That is, when a school child learns to write, the child has already developed inner speech, from which written speech emerges; Vygotsky (1987) noted "written speech presupposes the existence of inner speech" (p. 204). He argues that by the time the child reaches school age, he or she has learned words and syntax. For written speech, the child has to abstract away from the sound and learn the graphic level of representation. Vygotsky (1978) calls writing "second order symbolism" and adds, "This means that written language consists of a system of signs that designate the sounds and words of spoken language, which in turn, are signs for real entities and relations" (p. 106). This second order symbolism "gradually becomes direct symbolism . . . [when] this intermediate link, spoken language, disappears and written language is converted" (p. 106).

Vygotsky (1987) further highlighted these differences: Although oral speech has a present interlocutor, written speech has to be addressed to an absent audience. Thus, in addition to abstracting away from sound, written speech should abstract from the situation. Written speech to oral speech is like algebra to arithmetic, the latter will have to utilize the former. Motivation is inherent in the situation for oral speech, but in writing the situation should be created or represented in thought. Volition and consciousness are more consequential in written speech than in oral speech. Whereas the child does not need to consciously direct her attention to the words in oral speech, she needs to be conscious of its structure in written speech (Vygotsky, 1987, pp. 202-203).

John-Steiner (2007, p. 141) noted the use of "inner speech-writing" in famous writers' journals. Because of the intensity and truncated nature of the inner speech that guides composing, writers quickly jot down the thoughts that occurred to them in order to expand them later. It is important to note that it is one complex thought that is expressed in a short phrase, and not a simple one. In other words, the abbreviated nature of inner speech allows for verbal thinking to progress fast without regard for formal syntactic constraints.

2.5.5. Knowledge-transforming, knowledge-telling, (focused) freewriting, and inner speech: a synthesis.

In the present study, the goal of Instruction was to enable "knowledge-transforming composing," which entails "knowledge-telling" (Bereiter & Scardamalia, 1987). The latter concerns the *trip* from the content problem space to the rhetorical problem space, but it is the return *trip* from the rhetorical problem space to the content problem space that is the essence of reflection (Scardamalia et al., 1984) in knowledge-transforming. However, because both trips are necessary for knowledge-transforming to be complete, it is also important for Instruction to enable "knowledge-telling" as a component of knowledge-transforming. In order to achieve that goal, one could "enlist speech for writing" (Elbow, 2010, p. 7) in the form of freewriting (Elbow, 1973) and focused freewriting (e.g., Li., 2007) in the design of the instructional sessions.[12] The literature, which is reviewed below, first, explicates the construct of knowledge-telling. Then, it provides support for the claim that in order to enable knowledge-telling (a) freewriting and focused freewriting are appropriate activities, and (b) that they are an effective way to tap into the inner speech, which Vygotsky (1978) maintains to be presumed for writing.

The properties and attributes of knowledge-telling composing were discussed by Bereiter and Scardamalia (1987, p. 5), who characterized it as "the psychology of the natural" and contrasted it with knowledge-transforming as the "psychology of the problematic." They explained that knowledge-telling relies on two types of cues to generate content: discourse topic and discourse type or literary genre (pp. 7-10). Once an item of content is retrieved form long-term memory, it is tested for appropriateness (p. 9). This retrieval process does not require goal-setting, planning, or problem solving (as knowledge-transforming does), yet it must have a

[12] In the present study, freewriting and focused freewriting replaced modelling thought by the students and think-aloud protocols collected from them in the original Scardamalia et al. (1984) study.

"testing function" that ensures writing does not go off topic and remains coherent (p. 344). They observed that knowledge-telling "provides means for generation of text content appropriate to topic and to text type, [but] it does not provide means for finding and organizing content with the reader's needs in mind" (p. 34). Knowledge-telling involves "free association and spreading activation" (p. 7), which is immediately reminiscent of the main property of freewriting (Elbow, 1973).

In his *freewriting* instructional strategy, Elbow (1973) advocated writing non-stop within a set length of time (e.g., 15 minutes) without regard for any mechanical considerations, grammatical, textual, or otherwise, and entirely focusing on generating content. The only rule is to write non-stop. The purpose of freewriting is to help the writer "*generate* words better- more freely, lucidly, and powerfully: not make judgements about words but *generate* them better" (Elbow, 1973, pp. vii-viii, italics added). Elbow noted two distinct writing processes which he characterized as *growing* and *cooking*. He argued that growing and cooking should be separated in time so that they do not interfere with each other's function. Growing is the metaphor for the freewriting phase. Once a piece of writing is generated, it can be the basis for cooking. Revisions and edits to the written text are only done once it has grown large enough so that *cooking* does not get in the way of natural *growing*. Similarly, Wason's (1980) explanation for the reason why writing is difficult is that writers "try to do two incompatible things at the same time: say something and say it in the most acceptable way" (p. 132). Murray (1980) identified exploring and clarifying as two distinct phases in writing. As the writer produces multiple drafts, he or she explores meaning in earlier drafts and then clarifies in later drafts. Britton (1978) used the phrase "shaping at the point of utterance" to refer to "an *inner voice* [that is] capable of dictating to him in the forms of the written language" (p. 24, italics added). The inherent open-ended nature of writing is reported by Kellogg (1994), who quoted famous writers who viewed their writing as an open-ended project, not knowing where they will finish when they start. Galbraith (1999) discussed the "unbidden quality" (p. 141) that expert writers report while composing. Thus, Wason, Murray, Britton, Kellogg, and Galbraith all report a feature of the writing process which is compatible with and confirms Elbow's growing metaphor and the generative power captured in the freewriting process. Freewriting, Elbow argued, creates "momentum" so that one's "larger mind" takes over the writing process (Elbow, 1989).

Whereas freewriting is open-ended and unconstrained, *focused freewriting* incorporates the constraints involving audience and purpose into the process. Focused freewriting is defined as freewriting while focusing on a given subject (Munday & Cartwright, 1990, p. 238). Focused freewriting has been studied in relation to its effect on lecture comprehension (e.g., Hinkle & Hinkle, 1990), critical thinking (e.g., Munday & Cartwright, 1990), and as a technique in developing academic writing (e.g., Fishman, 1997; Li, 2007). Li (2007) conducted classroom research on the role of focused freewriting in developing academic writing skills and collected student evaluations of the technique. She found that focused freewriting "enabled the students to concentrate on thoughts about a specific topic and *generate* insightful thoughts and ideas" (p. 49, italics added). Having discussed free writing and focused freewriting, I will compare and contrast them with knowledge-telling and argue that focused freewriting is an appropriate way in which knowledge-telling can be operationalized during Instruction.

Both freewriting and knowledge-telling involve generation in the form of free association. Neither involves rhetorical problem-solving or goal-setting. Both of them are natural processes because they both enlist speech. Knowledge-telling concerns "think-say," or *what do I say next?* (Scardamalia, et al., 1983) as does freewriting: "Freewriting invites meta-discourse", phrases such as "I don't know what to say next" (Elbow, 1988, p. 68). Neither is concerned with organizing the text with the reader's need in mind. However, they are different in that knowledge-telling relies on topic and genre cues, and it has a testing function for appropriateness to achieve coherence. Also, Knowledge-telling is not necessarily non-stop, nor timed as is freewriting.

Focused freewriting, however, eliminates most of the differences between freewriting and knowledge-telling. Because focused freewriting is based on a topic, the text thus generated should both satisfy topic and genre requirements as knowledge-telling should, and it should be coherent considering the reader's need in mind. In fact, the main attribute that focused freewriting borrows from freewriting is the writing-non-stop requirement. Otherwise, focused freewriting shares many properties of knowledge-telling. In the present study, freewriting activities provided scaffolding for focused freewriting, which was how knowledge-telling was operationalized as a component of the knowledge-transforming process. Having discussed the link between knowledge-telling and focused freewriting, I will argue how (focused) freewriting

taps into inner speech which Vygotsky considered a prerequisite for writing (Vygotsky, 1986; 1978).

As discussed above, writing presumes inner speech, Vygotsky (1978) maintained. Vygotsky considered writing to be written speech (Vygotsky, 1986, p. 82) and conversation with a piece of paper (Vygotsky 1978). He noted that the mental planning that precedes an act of writing is in inner speech (Vygotsky, 1986, p. 243). This act of mental planning might be related to what Murray (1978) calls internal revision, which is the revision of the text to be produced, not the text produced thus far. In internal revision the audience is the self and the purpose is to discover meaning. Elbow (2010) reported that he wrote in his head using "inner speech" (p. 4). He cited Vygotsky who "charts the developmental route in children from outer speech to inner speech to thinking" (Elbow, 2010, p. 4). Thus, it seems that for Elbow freewriting taps into inner speech as defined by Vygotsky. Therefore, invoking Vygotsky to support the application of freewriting in the present study is not without precedent.

2.5.6. Method of double stimulation.

Vygotsky (1986; 1978) applied sign operations in concept formations to develop the method of double-stimulation, which is the corner stone of instruction and assessment in SCT studies, including the present one. Vygotsky (1978) was critical of stimulus-response methods used to study human behaviour. He observed, "Although stimulus-response methodology makes it extremely easy to ascertain subjects' responses, it proves useless when our objective is to discover the means and methods that subjects use to organize their own behaviour" (p. 74).

As an alternative he proposed the method of double-stimulation borrowed from his colleague Lev Shakhrov (1930, cited in Vygotsky, 1986, p. 103). In the method of double-stimulation, in addition to the object of activity, the investigator places an initially neutral object near the participant who is set a problem-solving task; although apparently neutral, the neutral object is drawn to the problem solving process and "takes on the function of a *sign*" (Vygotsky, 1978, p. 74, emphasis added) and it is used to organize the activity (Vygotsky, 1986, p. 103). Vygotsky (1978, p. 52) explained the function of a *sign* by drawing an analogy with a tool. He elaborated, "The sign acts as an instrument of psychological activity in a manner analogous to the role of a tool in labor". Vygotsky further explained that when he used the term "tool" he did

not mean it metaphorically as in the expression "the tongue is the tool of thought" (p. 53), nor literally, which he reported "is the position adopted by Dewy … [who] defines the tongue as the tool of tools, transposing Aristotle's definition of the human hand to speech" (p. 53)[13].

In one example of the method of double stimulation (Shakhrov, 1930, cited in Vygotsky, 1986, p. 103), auxiliary signs (word meanings) aid in the performance of a concept formation task. Shakhrov asked the participants to organize 22 blocks into four categories, each of which was represented with one of four nonsense words, "*lag, bik, mur, cev.,*" which were written under the blocks and were invisible to the participant. Each of the nonsense words represents two of the five attributes of the blocks. For example, *lag* represents tall and large blocks. The participant does not know the basis for categorization, except for an initial hint that the investigator provides. For example, the investigator picks a block and calls it a *lag* and asks the participant to find all the *lags.* The 22 blocks come in 5 colours, 6 shapes, 2 heights, and 2 sizes. To achieve the goal of categorizing the 22 blocks, the nonsense words gradually take on the function of a sign (or word meaning) which denotes the two attributes of the blocks. The nonsense words are originally externally oriented as a sign functioning as the organizing principle for grouping the blocks, yet they gradually develop to become internally oriented to denote concepts associated with the blocks. Signs in this method exemplify the principle of instruction leading development and the development of scientific concepts. The nonsense words come to represent concepts and become meaningful to regulate and organize the task. By learning the meaning of the nonsense words, each "word meaning" came to represent a concept, e.g., tall and large, for which there was no word before this experiment (and experience for the participant). However, the participant manages to microgenetically develop the meanings associated with the names. The method of double stimulation also illustrates the formation of scientific concepts. Vygotsky (1986) noted that "*the development of … scientific concepts [proceeds] downward* to a more elementary and concrete level" (p. 193, italics in original). The scientific concept introduced, in the method of double-stimulation, as a word meaning is initially

[13] On the similarity between *tool* and *sign*, Vygotsky (1978, p. 54) cited Hegel (cited in Marx's *Capital*, 1936), who sates that reason [as a tool] gets objects to act and react upon themselves without directly interfering, yet *mediating the activity*, and thus achieving its intentions. Vygotsky further reports Marx (1936) who maintains that humans use material properties of objects so that they act upon one another so that humans achieve their goals. The Hegel and Marx citations underscore the tool-mediated, goal-oriented nature of human activity, which are central to Vygotsky's theory of socioculturally situated nature of human cognition. He uses the concept of *tool* to explain the function of *signs* which mediate mental functioning and human behaviour.

void of rich personal experience and "sense", yet "scientific concepts, in turn, supply structures for the upward development of the child's spontaneous concepts toward conscious and deliberate use" (Vygotsky, 1986, p. 194). The word representing the scientific concept, (e.g., revolution) is initially almost meaningless to the child, yet the child learns the word; however, it's only later that the child develops and understanding of the concepts through the auxiliary means. The auxiliary means here is the sign, or word meaning, "revolution." The sign helps the child regulate his thinking and understanding of the concept.

Exemplifying double-stimulation, Engeström (2007, p. 366) cited a student's cheat sheet as the "second stimulus" and the exam questions and texts as the "first stimuli." The cheat sheet assists the subject to mediate his or her mental functioning to master the object. Engeström (2007) noted, "The construction, contents, and use of the cheating slip bring into light and objectify the inner psychological process of preparing for the test" (p. 367). Engeström invokes the ideas of agency and intentionality concerning double-stimulation. The student is the agent who intends to give the cheat sheet its mediational function. Similarly, in the Vygotsky example above it is the subject who chooses to give meaning to the nonsense word to mediate his mental functioning, thus exercising his agency in the meaning making process associated with the neutral object transformed into a sign.

In the present study, the Toulmin (1958/2003) model discourse labels, e.g., data and warrant, and various artefacts such as prompts-tables and think-sheets were inserted by the participants into the tasks which were designed both for teaching and data collection process so that they would aid with performance. The method of double stimulation allows a departure from traditional methods of measurement, in which the construct to be assessed has to be unimpeded by any other mediating artifacts. This is consistent with a *praxis* (Lantolf, 2008) model of research. Lantolf (2008) argued that "SLA theory/research and pedagogical practice can and must be brought together into a dialectically unified theory" (p. 19), and that, in *praxis*, "the connection between conceptual knowledge and practical activity" is overcome (p. 22). The use of artifacts in the present study for the purpose of instruction and research follows from Vygotsky's use of auxiliary means in his double-stimulation studies and Lantolf's very definition of what research should be like in the field of second language acquisition.

In the present study representing the elements of the Toulmin (1958/2003) model were signs representing the dialectical unity of word meaning and concept. A label such as Rebuttal is

originally meaningless to the students at the beginning of the Instruction. However, it gradually adopts the function of "auxiliary means" to mediate the process of generating the content associated with the word meaning rebuttal. The same principle of mediation applies to the other discourse labels. They mediate the retrieval and/or generation of textual content associated with them. Prompts constructed from the discourse labels are the "second stimulus" in addition to essay prompts that guide the generation of student essays (see Chapter 4).

The method of double stimulation is "at the heart of Vygotsky's methodology" (Lantolf & Thorne, 2006, p.50). An instantiation of the method of double stimulation is when the auxiliary means are not only artifacts which are drawn into the problem solving activity, but, arguably, human mediators who serve as active collaborator to assist with task performance. The latter is the subject of SCT's method for assessment, dynamic assessment.

2.5.7. Dynamic assessment.

To answer Research Question 3 about the effectiveness of Instruction on knowledge-transforming and argumentative rhetorical structure, dynamic assessment (DA) was applied. DA combines assessment and instruction in one paradigm. One way to assess the development of argumentative rhetorical structure was to administer pre- and posttests, rate the written products based on a rubric, and compare the results, which was the method to answer Research Question 1. This kind of assessment makes a statement about the effectiveness of Instruction for the groups, and not necessarily, for the individuals. Comparing the groups cannot provide insights regarding individual participants' development over time, nor can it explain the abilities that failed to manifest themselves in the posttest, but the participant had demonstrated throughout instruction. The posttest does show the *actual* level of development (Lantolf & Thorne, 2006; Haywood & Lidz, 2007), yet it is possible that a participant did not show any movement from the pre- to posttest, yet still had some knowledge of the construct Instruction sought to foster. Such a participant might need further mediation to materialize such knowledge in his or her performance. This scenario was envisioned by Vygotsky (1978, p. 86) by comparing two school children whose mental age was the same, but one could perform at a higher mental age than the other with mediation. This comparison allowed Vygotsky to formulate the concept of zone of proximal development: the conceptual distance between independent performance and mediated performance. Sociocultural theory of dynamic assessment (DA) provides a framework for

assessing abilities, knowledge, or skills that have not been captured in the independent performance. Lidz (1987) defined dynamic assessment as "an interaction between an examiner-as-intervener and a learner-as-active participant, which seeks to estimate the degree of modifiability of the learner and the means by which positive changes in cognitive functioning can be induced and maintained" (p. 4).

DA is grounded in the following SCT concepts: mediation, zone of proximal development, microgenetic development, method of double-stimulation, and the genetic law of cultural development, which were discussed above. The purpose of dynamic assessment is to simultaneously assess and promote development (Lantolf & Thorne, 2006; Lantolf & Poehner, 2004; Poehner, 2005; Poehner, 2007) and can capture the abilities, knowledge, and skills that are not manifest in independent performance, but can be developed with mediation.

Dynamic assessment emerged as a result of dissatisfaction with psychometric testing, according to Feuerstein, Rand, and Hoffman (1979), who saw a role for considering the cultural background in the assessment process and proposed modifications to the assessment procedure. Feuerstein, Rand, Reime Jensen, Kaniel, and Tzuriel (1987) suggested considering the cultural and developmental context of assessment and "modifying the individual functioning" (p. 38) in order to reflect true potential. When performance on a task did not appear to reflect the expected ability of the subject, Lidz (1987) suggested measures be taken for "the permanent modification of the *performer*" (p. 17, italics added). To modify the learning trajectory of an adolescent with Down syndrome, Kozulin and Gindis (2007) reported on his parents' efforts that provided "cultural scaffolding" that resulted in him becoming "a fluent reader and writer … [with] … highly developed cognitive and learning skills" (p. 243). Interestingly, Haywood and Lidz (2007) argued that although intelligence cannot be modified, the cognitive processes which access that intelligence can be enhanced so that overall performance in a domain or task is improved.

Adopting DA procedures does not mean abandoning other forms of assessment. Haywood and Lidz (2007) considered DA one tool in their assessment toolkit. In their assessment practice they "begin with establishing the individual's zone of actual development within any of the domains addressed by the assessment, [and] only then moving on to developing

zones of proximal development" (p. 35). This practice is in recognition of the utility of a wide repertoire of testing techniques, which arguably enhance the validity of the assessment outcome.

Dynamic assessment can be classified based on whether it is administered to one person or a group (e.g., Poehner, 2009) or the type of procedures involved. On the latter point, Lantolf and Thorne (2006) explicated two main types of DA: interactionist and interventionist. In interactionist DA, the mediator provides graduated assistance in accordance with the learner's needs as they emerge during interaction. In interventionist DA, a regulatory scale is designed before mediation and this scale will be the basis upon which the teacher helps with the development of the learner.

Aljaafreh and Lantolf (1994) were the first to apply interactionist DA in an L2 development context. A tutor provided scaffolded corrective grammatical feedback in writing (on tenses, articles, prepositions, and modals) based on an essay that the student had previously written in class. The goal of the DA was to help the learner move from dependence on the tutor, or other-regulation, to self-regulation. The tutor's interaction with the learner was based on two principles: graduation and contingency; that is, mediator feedback was gradual from implicit to explicit and contingent upon learner need. Based on the interactions that arose between the mediators and the learner, Aljaafreh and Lantolf designed a regulatory scale which was used in future studies to guide the tutor to adjust his feedback from implicit to explicit based on the moment-to-moment (microgenetic) needs of the learner to simultaneously assess and promote development.

Nassaji and Swain (2000) used Aljaafreh and Lantolf's (1994) regulatory scale to investigate the effectiveness of collaborative versus random corrective feedback (CF) on English language article use in writing. Their intervention can be considered an example of interventionist DA since there was a pre-made instrument that they used for the purpose of simultaneous learner development and assessment. They provided negotiated CF to a participant along her ZPP and random CF to another, over four tutorial sessions. The results indicated that providing regulated feedback within the learner's ZPD was more effective than random feedback.

Anton (2009) conducted dynamic assessment of writing ability of L2 learners of Spanish. Having taken an initial assessment, five participants were then placed in a "mediated learning" (p. 582) situation to revise their writing samples. In these mediated learning situations, the

participants were offered a choice of two object-regulated mediational tools, i.e., a dictionary and a grammar reference, and one other-regulated mediational agent, i.e., the examiner. To attempt to revise their initial writing samples, the participants were given the option to seek assistance by using the sources, consulting with the examiner or work independently. Anton counted the number of instances each of the three options was exercised (total, $N = 53$). She also verified whether the participants' revisions improved the quality ($n = 38$), made no difference ($n = 13$), or made it worse ($n = 2$). The results indicated that a vast majority of revisions improved the quality of writing (72%), a smaller proportion made no difference (24%), and only a small number made it worse (4%). She, further, tabulated the number of improved, no-difference, and negative revisions for each of the participants and found that the students who had the highest and lowest scores on the initial writing test also had the fewest number of revisions. She interpreted these findings to suggest that the former was probably of such a high quality that it did not require much revision, and the latter required a different kind of revision than provided. On the assessment side, Anton's study informs the examiner about the amount of mediation each participant requires to improve the quality of his or her writing and the degree to which these revisions are successful. On the learning side, the participant is provided an affordance (van Lier, 2000) to realizing some learning potentials that would have arguably been untapped had it not been for the mediated learning affordance.

On the difference between dynamic assessment and formative assessment, Lantolf and Thorne (2006) point out two differences: while dynamic assessment is always systematic, formative assessment is not necessarily so; second, in cases where formative assessment is systematic, it is geared toward the completion of a task; however, the goal of dynamic assessment is development. In cases where formative assessment does foster development, it may do so in an unsystematic way, whereas dynamic assessment through mediation is always offered within the learner or group's zone of proximal development and is thus systematic (p. 356).

Seeking to examine the diagnostic and developmental role of interactionist DA in ELL's writing instruction, Rahimi, Kushki, and Nassaji (2015) studied the DA sessions which were conducted with three participants. The goal of DA was to "develop conceptual L2 writing skills" (p. 185). They followed the principles of graduation and contingency in DA (Aljaafreh & Lantolf, 1994). That is, mediator feedback was gradual from implicit to explicit and contingent

upon learner need. Their qualitative analysis involved transcribing the DA sessions, dividing them into episodes, and writing a detailed conversation analysis, in which they made an observation in the transcript and explained its meaning. The analysis moved forward *line-by-line* delineating the microgenesis of development. For example, in an episode whose goal was to develop the learner's understanding of the difference between brainstorming and outlining, the conversation analysis proceeded line by line:

> [T]he mediator started with an implicit cue about the problem and asked a question about the difference between brainstorming and outlining (line 1), to which Kambiz gave a short ambiguous answer (line 2). Unsatisfied with the answer, the mediator implicitly rejected Kambiz's answer in line 3 and progressively moved towards becoming more explicit. (Rahimi et al., 2015, p. 195)

The present study adopted a similar method for data collection and analysis to that in Rahimi et al. (2015). Although the latter was published a few years after the data for the present study was collected and analyzed, it reflects common conversation analysis methodological practice for the qualitative study of microgenetic development, one which is used in the present study, too.

Having discussed DA to answer Research Question 2, I will briefly discuss the validity of DA. Over the past 60 years, the focus of validity inquiry in assessment has concerned the degree to which a construct is present (Cronbach & Meehl, 1955), the social consequences of assessment (Moss, 1992), arguments made about score meaning (Kane, 1992; Messick, 1993), a shift toward classroom assessment, seeking to help students to learn (Moss, 2003), and considering fairness when judging the social consequence of assessment (Kane, 2010). Regarding the validity of DA, Poehner (2011) proposed a framework in which DA's micro and macro validity could be discussed based on the actual interactions during the DA session. Lantolf and Poehner (2013) focused on fairness in DA and argued that the evidential basis for validity should be based on a theory of mind, and sociocultural theory is the candidate for this purpose. They also argued that the mediation provided to the learner should depend on the developmental stage he or she is at, and this affects the quality of support provided to the learner. Although the amount of mediation varies from one individual to another, this variation does not compromise the fairness of the assessment process in DA, as different learners might need differential amounts of mediation.

Poehner (2011) introduced two concepts of validity in dynamic assessment: micro-validity justifies the action taken by the mediator within the leaner's ZPD, and macro validity justifies the general inferences made about the learner's ability and learning. Micro-validity concerns explaining why the mediator made certain moves within the learner's ZPD and it is similar to analysis of single items in psychometric measurement, but macro-validity concerns the interaction as a whole and what it *reveals* about learner abilities (assessment) and how it *promotes* learner abilities (development).

The present study draws on both psychometric understandings of validity and those offered by dynamic assessment (e.g., Haywood & Lidz, 2007; Moss, 2003). Because a statement has to be made about groups, in addition to individuals, the validity as a unitary construct and arguments for the validity of inferences should be part of the validity argument. However, because this study concerns classroom assessment, the validity of the findings in the context of the instruction should be part of the validity argument. In that light, the dynamic assessment validity argument as proposed by Poehner will be advanced to explain the validity of DA findings in the present study.

In summary, in dynamic assessment, the mediator provides mediational moves based on a known history of the learner's development prior to the session. That is, the mediator knows the entry point into the ZPD. Then based on this knowledge, the mediator either designs a regulatory scale to intervene with the learners' development, or enters the DA session with the knowledge of the learner's independent performance and provides mediation based on observations of microgenetic development of the learner within the ZPD. The purpose of DA is to understand (i.e., assess) what the learner can do independently, what she can do with mediation, how much mediation she needs, and promote development, all at the same time. DA is predicated on the genetic law of cultural development which holds that higher-mental functioning such as problem-solving appears first inter-psychologically and then intra-psychologically. It is a genetic law because it has to do with development; hence genetic in a Piagetian sense. It is a cultural law because Vygotsky maintained that development moves along a natural axis and a cultural axis (e.g., Kozulin & Gindis, 2007). DA's validity is based on both the micro interactions during the DA session and the macro inferences made about the DA session as a whole.

2.6. Summary

This chapter located the nexus of the problem of discourse content generation in cognitive writing theory at the intersection of cognitive writing theory and SCT. I reviewed the definitions, concepts, and methods presented in Scardamalia et al.'s(1984) study to teach knowledge-transforming. The rest of the chapter reviewed the research that informs the present study in conceptualizing the problem, locating the studies that sought to solve the problem, and reviewing the methods used to answer the research questions. The chapter presented the tenets and principles of SCT as a viable theory that can be productively used in the instruction, assessment, and research components of the present study. To that end, I also sought to provide a succinct and transparent account of the philosophical basis of cognitive theory and SCT to show their compatibility in the context of the present study.

Chapter 3: Instruction

This chapter begins by describing the context of the study and the preparation for it. Next, it summarizes the main theoretical principles that guided the Instruction. Then I will provide an overall description of the goals, content, and structure of instructional sessions. Subsequently, the tools and materials will be described. A description of each session will be presented in chronological order, immediately followed by a discussion of the aspects of implementation that is relevant to the research questions.

3.1. Context of the Study

Instruction involved instruction in reflective knowledge-transforming composing (Scardamalia et al., 1984) using the Toulmin model of argument (Toulmin, 1958/2003). Instruction had to be integrated into an existing English for academic purposes (EAP) program where a sample of the target population was situated. The pre-university EAP program, henceforth, the School, in which this study was conducted, was located at an Ontario university. Instruction and data collection took place in fall 2011.

According to its website and confirmed with the program coordinator, the School EAP program consisted of seven levels, with Level 5 divided into two levels (5b and 5a). Students in Levels 1 through 3 focused on building a foundation for the four skills: reading, writing, listening, and speaking. Levels 4 to 6, including Levels 5b and 5a, focused on critical thinking and study skills, as well as language proficiency, required in college or university contexts. Each of the seven levels took eight weeks to complete. There were 20 instructional hours per week. The class met from 9:00 am to 1:00 pm every day. There were between 12 and 16 students in each class. The students came from diverse linguistic and cultural backgrounds. The result of a placement test, which took over two hours, determined the students' class level. The placement test was followed by the instructor's diagnostic testing during the first week of instruction. This determined if the student had to be placed at a different level. The language proficiency of the graduate of the program at the end of Level 6 was said to be equivalent to a TOEFL iBT score of 83/120 (or IELTS 6.5/9). If the student passed Level 6 with honours or distinction, the equivalent TOEFL iBT scores were 89-95 (IELTS 7) and 96-99 (IELTS 7.5), respectively. Before my Instruction began and obtaining the requisite consent in writing to sit in and observe classes, I visited the site on three occasions, observed ESL classes, reviewed the available curriculum

outlines, and spoke with the teachers and the program director. My observations are described in Preparation below.

The participants in the present study were in Level 4. Some had passed Level 3 and moved on to Level 4, and some were placed in Level 4. The oral and written language proficiency of the students was described in school documents. Relevant to the present study, a Level 3 graduate was described as having no difficulty explaining a process orally or writing paragraphs suitable for different audiences and purposes. Although the essay was also mentioned in the Level 3 curriculum, conversations with the program director and two instructors indicated that the essay was, in fact, introduced in Level 4, which was the level in which Instruction was delivered.

A Level 4 graduate was said to be able to give short 10-minute oral presentations that showed analysis. He or she would also be able to write short papers with thesis statements that were well developed and supporting paragraphs that showed "deeper thinking." The instructors and the program director stated that the students at this level would work on a research paper by the term end, in which they will have to use the APA style for formatting and citations.

3.2. Preparation

In winter of 2012, before starting the main study, I observed three lessons, two by the teacher who would be the teacher of the Experimental Group in the main study, and one by another teacher. There were several objectives for my observation: to become familiar with the site, the teachers, the students' backgrounds and instruction; decide which of the six levels of the program to choose for Instruction; and examine whether and the extent to which any elements of Instruction would be part of the existing implemented curriculum.

Conversations with the program coordinator and two of the teachers indicated that for the type of intervention proposed in the present study a Level 4 class seemed most suitable; upon starting Level 4, students had already been introduced to paragraph writing. The five-paragraph essay was introduced at Level 4. The two types of organizational formats that were presented in Level 4 were comparison and contrast and cause and effect, two expository genres. Although it appeared that a fair amount of material was covered at Level 4, there was no evidence that the

independent variable in this study, i.e., Instruction, was part of the implemented curriculum. In fact, when I asked if argument structure was part of the curriculum, the answer was negative.

To conduct classroom observations, I followed Lynch's(1996) guidelines for making naturalistic observations and formulated general guiding questions for my observations. The questions created a frame to approach the observations with and were not meant to be strictly followed or answered one by one. Below follows a general summary of my observations.

The Level 4 classes that I observed met from Mon. to Fri., 9:00 am to 1:00 pm. There were about 14 students in each class. The students appeared to have diverse L1 backgrounds including Arabic and far Eastern languages. On average, they seemed to be in their twenties. The seating arrangement consisted of rectangular tables arranged in three rows in one class and in a u-shape in the other. This arrangement allowed for pair and group work.

I asked the teachers to inform me of the time they teach writing, and it appeared that they spent about four hours a week on different aspects of writing such as organization, grammar, and style. Both classes worked on outlining and components of the essay such as an "attention-getter" or "hook" and thesis statement. In one of the classes, there was explicit instruction on outlining problem-solution essays. The instructor informed me that the class had not done comparison and contrast and cause-effect essays before. I asked if middle paragraph development, which is the focus of the present study, would be covered in Level 4 and the answer was negative, because paragraph development had been covered in Level 3. Therefore, I concluded that the Level 4 students would likely not be exposed to the kind of argumentative paragraph development based on the reflective thought instructional strategies (Scardamalia, Bereiter & Steinbach, 1994), the Toulmin (1958/2003) model, and classical rhetoric topics (Corbett, 1990; Fulkerson, 1996). Neither teacher seemed to emphasize discourse content generation; the emphasis was on different types of "hooks" in the introduction, "clinchers" in the conclusion, outlining for different expository writing types, and no focus on opinion essays was observed in the way of development of middle paragraph content. As predicted, the students would have to generate the content of the middle paragraphs using their outline and drawing on the readings that their expository texts were based on.

I reviewed the Level 4 curriculum in more depth. In particular, I reviewed its writing Evaluation Form, in order to determine whether or not reflective knowledge-transforming composing, the construct the dependent variable draws upon, and explicit rhetorical argument structure was already incorporated into the curriculum. If that were the case, the inferences drawn from this study would have to be qualified since it would not be the Instruction alone that could be claimed to have brought about change in writing cognitive processes and quality of the texts. My review of the curriculum indicated that knowledge-transforming composing was not part of the curriculum. The following are the highlights of this curriculum review indicating that that the constructs in the Instruction were not part the curriculum. The definition of "process" in the Level 4 Essay Writing Evaluation Form read as follows:

2. "the essay is complete in writing and in the required steps;
3. "The topic is according to the instruction and is specific;
4. "has pre-writing work (with a clear and detailed outline);
5. "is revised thoroughly"

The above definition of writing process contrasts with how it is conceptualized as the on-line cognitive processes of planning, goal setting, generating, and revising in classic writing literature (cf. Hayes & Flower, 1980) and in the present study.

The "Content and Style" criterion of the Evaluation Form aims to achieve some of the outcomes of the Instruction in this study. For example, argument quality is one of the variables measured in this study. One of the Evaluation Form items under this criterion reads, "demonstrates logic and clear sequence of ideas." This is one of the goals, which the present study sought to foster through the Toulmin (1958/2003) model of argument. The clear logic and sequence could be achieved by following the elements of the Toulmin model in a linear order: claim → data → warrant → backing → rebuttal → response to rebuttal → restated claim. My review of the curriculum did not indicate that this model of sequence was presented. Therefore, the question I sought to answer in my classroom observations was whether this specific and concrete sequence of discourse features was explicitly taught by the main teachers. If this were the case, it would be a threat to the validity of any claims suggesting that Instruction, alone, brought about change in composing process and text quality. Also, I would have to observe what

exactly was taught to promote logic and clear sequence of ideas. I investigated this question by observing the EG and CG classes as I was teaching the EG (see Classroom Observations below).

Further, the Evaluation Form reads the essay "uses, examples, facts, statistics, quotations, or details for support." These elements could be supplied by the data, warrant, and backing elements of the Toulmin model. The question to be answered by classroom observation would be whether the main teacher's instruction was designed to assist learners to achieve this goal, and if their on-line writing processes were scaffolded/mediated to retrieve and/or generate these items. Therefore, when observing classes, I paid particular attention to determine whether this mediation is provided in either EG or CG classes.

Reviewing the curriculum, I noticed the discourse feature labels which I use to refer to the different elements of the essay are different from those in the curriculum, e.g., "hook" for "motivator"; "controlling idea" for "main idea." During Instruction, I made a point of highlighting these differences so that the classroom language of the main teacher and mine would clearly refer to the same elements.

Additionally, the curriculum discusses the objective and subjective styles of writing under Writing in an Academic Perspective: Using the Third Person:

> The academic perspective is always **objective.** This means that when you want to speak or write in a formal academic manner, you must present the facts. Your experiences and opinions are no longer useful because they are **subjective**, based on your feelings and emotions- not facts.

This statement confirms my earlier observations that argument is not taught or expected in Level 4 because an argument advances a subjective opinion, which should be supported based on facts (or data in the Toulmin model) whose relevance to the claim is shown with other facts or opinions (or warrants in the Toulmin model). Additionally, the curriculum discourages the use of the first person in academic writing, which I followed in my instruction with some exception. In particular, I allowed its use during freewriting, my languaging, and mediation with prompts. However, learners were instructed to avoid them in their final draft to the extent possible.

Reviewing the curriculum, I felt confident that neither reflective knowledge-transforming composing nor the Toulmin model of argument was part of the School curriculum. I would have to verify this conclusion against the implemented curriculum, for which I made observations of

EG and CG instruction, as I was conducting the Instruction. These observations are presented in Chapter 4. Having described the context and preparation, I will discuss the main theoretical principles guiding Instruction.

3.3. Main Theoretical Principles

As Discussed in Chapter 2, the present study is grounded in both cognitive writing theory (e.g., Hayes & Flower, 1980; Bereiter & Scardamalia; 1987, Hayes, 2012a , 2012 b) and sociocultural theory (SCT) of mind (e.g., Vygotsky, 1978; Vygotsky, 1986; Lantolf & Thorne, 2006; Lantolf & Poehner, 2014). The instructional principles arise either directly from these two theoretical paradigms or are appropriated into them exogenously. The cognitive writing theory principles are knowledge-transforming composing (Bereiter & Scardamalia, 1987), cognitive strategy instruction in writing (Scardamalia et al., 1984), procedural facilitation, and modelling thought (Bereiter & Scardamalia, 1987), Sociocultural theory principles are mediation (Vygotsky, 1986, Lantolf & Thorne, 2006), zone of proximal development (Vygotsky, 1978), genetic law of cultural development (Lantolf, 2002), microgenesis of higher mental processes (Vygotsky, 1986; 1978; Lantolf & Thorne, 2006), concept-based instruction (Negueruela, 2003; Lantolf & Poehner, 2014), private and inner speech (Vygotsky, 1986), languaging (Swain, 2006a, 2006 b) and *praxis* (Lantolf, 2008). The exogenous frameworks that are appropriated are the Toulmin (1958/2003) model of argument and freewriting (Elbow, 2003).

The cognitive writing theory of writing (Bereiter & Scardamalia, 1987) posited that expert writing is a dialectic between a content problem space and a rhetorical problem space. While novice writing is characterized by a one-way trip from the content problem space to the rhetorical problem space; expert composing complements the former by making the return trip from the rhetorical space to the content space. Bereiter and Scardamalia referred to the former as "knowledge-telling" and the latter as "knowledge-transforming." The expert writer who is engaged in knowledge-transforming thinks of a rhetorical problem to solve, then, seeks items of knowledge in the content space to satisfy a solution set. By contrast, knowledge-telling operates in a "think-say" mode, by thinking of what to say first and then seeking linguistic forms to satisfy that intention.

Cognitive strategy instruction in writing breaks down instruction into units that are consistent with the cognitive processes of composing such as planning, generating, and revising

(e.g., Hayes & Flower, 1980). It focuses on strategies that help the writer guide his or her cognitive processes while composing. For example, the use of think-sheets (Englert et al., 1991) or cue cards (Scardamalia, et al, 1984) is a strategy that helps the writer define the rhetorical problem and generate content for it. These two examples fall under the rubric of procedural facilitation, i.e., facilitating the cognitive processes of composing. Modelling thought involves modelling the writing processes by thinking aloud while writing in front of a group. It can be done by a master or a coping model (Zimmerman & Kitsantas, 2002). The mastery model could be a teacher and the coping model a student doing the same.

Sociocultural theory of mind posits that higher mental processes such as logical memory and voluntary attention are mediated by sociocultural tools (Vygotsky, 1978; Wertsch, 2007). These tools not only assist but constitute higher cognitive processes. For example, the use of a prompt inserted into writing mediates the cognitive process of generating content and becomes integral to it. Mediation can be provided with an artefact, such as a think-sheet, or by an individual. The latter is referred to as artefact-regulation and the former as other-regulation (e.g., Lantolf & Thorne, 2006). When mediation is provided, it has to be within the learner's zone of proximal development (ZPD), defined as the conceptual distance between the learner's *actual* independent performance and *potential* mediated performance (Vygotsky, 1978). Thus, the mediational artefacts should be designed to be sensitive to the learner's or group's ZPD (Poehner, 2009). The principle of microgenesis (Lantolf & Thorne, 2006) holds that cognitive development can happen during short periods of time and thus can be properly documented. The concept of ZPD resets upon another fundamental SCT law: the genetic law of cultural development (Lantolf, 2002; Wertsch, 1985): the mental functioning that happens on the external plane between individual minds, or inter-psychologically, will become internalized and occurs intra-psychologically (Vygotsky).

Sociocultural theory advocates concept based instruction (CBI), which is based on Vygotsky's (1986) theory of concept formation. Cognitive development through instruction is enhanced when it is based on scientific concepts which are presented to the learner through a three step process: orientation, materialization, and internalization (Lantolf & Poehner, 2014). By proper use of carefully designed schemes the learners' mental actions are oriented toward the desired pedagogical goals. Such schemes are often called SCOBAs (scheme for completer orienting basis of action). They are material artefacts in the form of diagrams and the like. CBI

is the theoretical framework in which the argumentative discourse features were taught and learned as scientific concepts.

An instance of the genetic law of cultural development is the phenomenon of private speech (Lantolf & Thorne, 2006), which can be used to mediate cognitive functioning during problem solving activities. One such activity is rhetorical problem solving. During ontogenesis, the child's egocentric speech moves inward and becomes inner speech (Vygotsky, 1986), which resurfaces in the form of private speech (Flavell, 1979) for problem-solving. Writing assumes inner speech according to Vygotsky (1978), who referred to writing as written speech. Inner speech has its own rules. Vygotsky characterized it as subjectless speech with predicates only (or as I have called it predicateful speech). Swain (2006a) used the idea of private speech to conceptualise *languaging*. To *language* is to use private speech for individual or collaborative problem-solving. In the present study, I modelled written languaging (e.g., Suzuki, 2012) by talking aloud through my rhetorical problem solving while students were observing.

The final SCT concept used in the present study is *praxis.* Lantolf (2008) defined praxis as the dialectical unity of research and practice, when classroom research methods are inseparable from classroom practice. Praxis is in part informed by Vygotsky's (1978) method of double-stimulation, in which an auxiliary means is inserted into the research process so that it both aids the participant complete the task and measure his or her performance. In the present study, instructional tools, materials, and procedures were used both to mediate knowledge-transforming composing and as a research tool to collect data about the latter. Examples of such materials and processes are freewriting and (focused) freewriting samples. During prompt-mediated focused freewriting tasks, participants were instructed to incorporate the prompts into their writing to mediate rhetorical problems solving for knowledge-transforming. The prompts and freewriting are akin to auxiliary means in Vygotsky (1978), which are simultaneously used to assist and measure performance.

One exogenous theory, which is predicated on the necessity of inner speech for writing is Elbow's (1973) freewriting. Elbow argued that writing is problematic because often people tend do two contradictory things simultaneously: generating and editing. Thus, he advocated generating through freewriting to create the earlier drafts and deferring editing to later drafts. Freewriting is writing non-stop, its only rule, without a topic. I used freewriting and focused freewriting (in that pedagogical order) to operationalize Bereiter and Scardamalia's (1987)

knowledge-telling "think-say" behaviour. Focused freewriting (e.g., Munday & Cartwright, 1990) is writing non-stop on a given topic; thus, audience and rhetorical purpose become important in focused freewriting (see discussion in Chapter 2).

The second exogenous theory is Toulmin's (1958/2003) model of argument. One gap in the original Scardamalia et al. (1984) research was that its knowledge-transforming rhetorical problem solving instructional approach was not grounded in a theory of rhetoric. To overcome that shortcoming, I used Toulmin's argumentative discourse model to define the rhetorical schema to be built and the rhetorical problems to be solved. Toulmin's model divides a complete argument into the following discrete discourse features: claim, data, warrant, backing, rebuttal, qualification. To these I added response to rebuttal to account the "synthesis" in Scardamalia's (1984) tri-partied Hegelian thesis, antithesis, and synthesis. Also whereas the canonical definition of rebuttal is "conditions of exception" to the warrant (Toulmin, 1958/2003, p.93), I introduced it as either a counter-claim or counter-argument. Each of these discourse features were defined, taught, and mediated as scientific concepts that form the basis of SCT's concept based instruction.

3.4. Goals, Content, and Structure of Instructional Sessions

I delivered six instructional sessions to the EG, preceded by one given to both EG and CG. i.e., Session Zero. Broadly, the goal of all sessions given to the EG was to foster knowledge-transforming composing mediated by the artefacts, modelling, and texts made available to the participants. The overall structure comprised orientation through a schema, which was either through presentation of new information or reviewing past information, and materialization of discourse schema through mediated text production.

The overall goal of instruction was to present the argumentative discourse schema based on the Toulmin (1958/2003) model according to the principles of CBI and to mediate the participants' generation of those features in coherent prose. To orient the learners to the goals, instruction tapped into their prior rhetorical knowledge and the knowledge acquired during instruction. I monitored the EG's microgenetic development and designed the content and structure of each subsequent session based on the evidence of development in the previous session.

The schema building was conducted through the use of the central SCOBA in the present study, i.e., the graphic representation of the discourse model that shows the inter-relationship among the discourse features. Exemplar texts were designed to include those features. The students were asked to identify the discourse features based on exemplar texts, mediated by prompts of that feature. Prompts were co-constructed to elicit content for each discourse feature. I first presented a set of prompts constructed in a pilot study. Then, the EG and I co-constructed another set of prompts for use in their class. I modified and refined these prompts over the course of Instruction based on the group's microgenetic development.

Because knowledge-transforming assumes knowledge-telling, I introduced freewriting and focused freewriting (in that order) to facilitate knowledge-telling. To change the cognitive process to knowledge-transforming, I asked the participants' to insert the (respective iteration of) prompts into their writing process (sensitive to learner development, I revised the prompts after each session) . They were instructed to inscribe both the text and corresponding number of the prompts into their writing. Inscribing the prompt text would mediate rhetorical problem solving, because the learners' working memory would have to process the prompt to simultaneously define the rhetorical problem to solve and retrieve the appropriate item of knowledge for it.

Two jigsaw reading tasks were introduced in which the participants were instructed to collaboratively order a set of sentences for an essay, printed on coloured paper for each paragraph, and determine the discourse function of each sentence.

A revision exercise was designed in Session VI so that the learners practised with revision as an component of knowledge-transforming composing (Bereiter & Scardamalia, 1987). The texts were adapted from the student generated texts. The goal was to improve the quality of the arguments.

3.5. Materials and Tools

This section first describes the materials, and, next, the tools used in the study. The following materials were used for Instruction. Generally, they were texts of various kinds and lengths that mediated the *presentation, elicitation*, and *generation* of the discourse features as scientific concepts. They included exemplar texts (paragraphs and essays), listening

comprehension question sheets, writing topic sheets, two colour-coded jig-saw reading texts, freewriting instruction sheets, focused freewriting instruction sheets, and revision task sheets.

The exemplar texts, which were single paragraphs or essays, were written and adapted so that they presented sentences representing the Toulmin model's (1958/2003) discourse features. The texts were accompanied by questions that elicited those discourse features. The same texts were coded for the discourse features and were presented a second time to highlight the sentences representing the discourse features. The coded text was followed by a set of definitions for each discourse feature as a scientific concept. The following was a task and text used in Session I:

Session I, Task 1.1: Read the following paragraph and discover the pattern of argumentative support used in it. Use the following questions to help you discover the argument structure:

1. Underline the topic sentence of the paragraph. The topic sentence is the claim we want to support in the middle paragraphs.
2. Find an idea after the topic sentence that supports it by providing factual data for the topic sentence. Underline it. We will call it data (D) because it provides data for the claim in the topic sentence.
3. Find an idea after the data that justifies it by showing why the data (D) supports the topic sentence. Underline it. We will call it warrant (W) because it shows how the data is linked to the claim.
4. Find an idea after the warrant that supports or backs up (B) the warrant by showing how the warrant provides evidence for the data. We will call it backing (B).
5. Find an idea after the backing that presents what the opposite opinion is. We will call it rebuttal (R).
6. Find an idea after the rebuttal that is a response to the rebuttal. We will call this response to rebuttal (ResR).
7. Find a *word* that qualifies the claim by reducing its force. We will call this word qualification (Q) because it shows that we are not claiming our conclusion is 100% true in all situations.
8. Find a sentence that restates the claim in the paragraph. We call this the reworded topic sentence or the restated claim.

Building a factory in my neighbourhood is a good idea. Factories built near residential areas bring employment to the area because residents prefer employment opportunities that reduce travel time. Indeed, time lost in commuting is a major complaint in many societies. Unless residents are from a high-income social class, who do not like industrial jobs, which is not the case in my area, my neighbours would probably want to work in the factory. For this reason, I would support the building of a factory in my area.

Session I, Task 1.2: Go over the elements of the argument below based on Toulmin (1958/2003). Present the function of each statement in the argument as below:

Building a factory in my neighbourhood is a good idea (C). Factories built near residential areas bring employment to the area (D) because residents prefer employment opportunities that reduce travel time (W). Indeed, time lost in commuting is a major complaint in many societies (B). Unless residents are from a high-income social class who do not like industrial jobs (R), which is not the case in my area (ResR), my neighbours would probably (Q) want to work in the factory. For this reason, I would support the building of a factory in my area (ResC).

This model of argument was explained by Toulmin (1958/2003) as follows:

- **Data:** To support a **claim** (C), one needs to provide **facts** as **foundation** for the claim. He calls such facts the **data** (D).
- **Warrant:** The data do not always clearly show the link to the claim; thus, such **a link** should be provided explicitly, which he calls the **warrant** (W).
- **Backing:** The warrant also needs to be supported. To support the warrant, one needs to provide specific backing (B), which provides more facts and shows how the warrant (W) leads to the claim.
- **Qualification:** Because all warrants do not *necessarily* support the claim, a degree of *probability* is needed to reduce the force of the claim. He calls the degree to which data (D) warrant the claim (C) qualification (Q). Adverbs such as *probably* and *presumably* help qualify the claim.
- **Rebuttal:** An argument also needs to take into account what the opposition might say as a rebuttal (R). The rebuttal shows there might be exceptions to the argument.

An oral presentation, which provided a scientific explanation of the Toulmin model's (1958/2003) discourse features, was followed by listening comprehension questions, presented on a task sheet. The questions elicited the function of each discourse feature. For example, the question for Warrant asked, "What does the warrant do?" and was designed to elicit "It shows how the Data is related/linked to the Claim." The question for Rebuttal asked, "Why does the rebuttal do?" and it was designed to elicit "it acknowledges the opposite opinion."

The writing topic sheets instructed the participants to write a paragraph or essay (depending on the developmental stage during Instruction) following the Toulmin model. Then they presented the topic. The complete set of writing tasks and topics are presented in Appendix A. For example, Session II, Task 4 topic read:

> Write one paragraph following the Toulmin Model on the following topic:
>
> *Do you agree or disagree with the following statement? Grades (marks) encourage students to learn. Use specific reasons and examples to support your opinion.*

The colour-coded jig-saw reading essays contained sentences that represented the discourse features. Each paragraph was printed in a different colour; the sentences within each paragraph were cut up to be sorted within the paragraph, and the paragraphs to be sorted within the essay. Paragraph colour coding facilitated sorting indicating the paragraph to which the sentence belonged, thereby reducing cognitive load,

Freewriting and focused freewriting sheets instructed the participants to freewrite, first without a topic, and next with a topic, each time for ten minutes. The focused freewriting was followed by instructions to write a second draft encouraging revision. As an example, the instructions for freewriting and focused freewriting in Session IV are presented below:

Session IV, Task 2

Write freely for ten minutes about anything that comes to mind. There is no rule, except that you should never stop. If you don't have an idea simply write, "I have no idea, but an idea will come to me soon" or something like that. If you don't know a word, leave a blank space for it, or write it in your language. DO NOT ERASE ANYTHING. Please use a pen. If you need more paper please ask.

Session IV, Task 3

Follow these steps:

1. Freewrite one paragraph for 10 minutes following the Toulmin Model on the following topic. Do not stop writing. If you have no ideas, use the prompts to help you create ideas. Never stop writing. If you don't remember a word, write it in your language, or leave it blank (-------).
2. After freewriting for 10 minutes, write your final draft (one paragraph only). Feel free to change any of the ideas in freewriting. You can also change any sentences, words, etc. to make your paragraph better.

The expression "Never give up" means to keep trying and never stop working for your goals. Do you agree or disagree with the following statement? Use specific reasons and examples to support your opinion.

Additionally, the following tools were used: the Toulmin model schema, a previously co-constructed prompts table (created in a pilot), a blank prompts table containing all the discourse feature labels, various iterations of prompt sheets (co-constructed with the participants) as cognitive tools for knowledge-transforming composing, a seven-sheet think-sheet set for all discourse features.

The Toulmin model schema (See Figure 3.1) was the central artefact used in the present

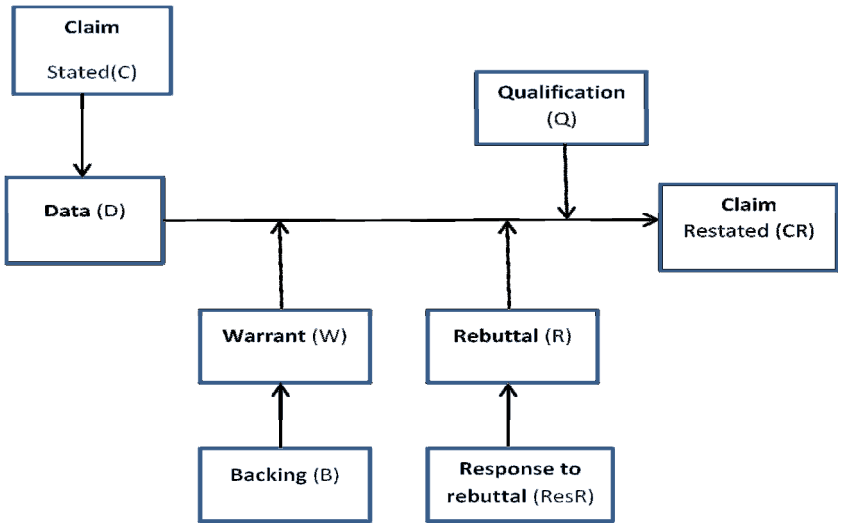

Figure 3.1 Discourse Schema Used in Instruction after Toulmin (1958/2003)

study. It was the basis of the complete mental orientation of the participants (Lantolf & Thorne, 2006) toward the identification and production of the discourse features. When it was presented in Session II, it was used to review the model from Session I. On a handout, the participants viewed the schema during my oral presentation of the model and used it to mediate their writing, subsequently.

A previously co-constructed prompts table (See Table 3.1), in addition to those co-constructed in the present study, was used. This was a model for the generation of a similar table to be co-constructed with the present participants. In addition to being a model, it was also used by the participants, at various stages of Instruction, during their writing process to mediate their content generation through rhetorical problem solving. It was presented as a suggested answer to the prompted co-construction process. Below the table, I added a writing frame, adapted from (Scanlon, 2006), which summarized the inter-connection among the discourse features.

Table 3.1. Previously Co-constructed Prompts Table

Claim (ask this both for intro and body paragraphs)	**Data**	**Warrant**	**Backing**	**Rebuttal**	**Response to Rebuttal**	**Qualification**
-What is my topic? - What is my opinion? - What do I know about the topic? -What are 2 or 3 ways I can support my opinion? -What are my values in relation to the topic?	-what is the evidence for my claim? -How can I support my claim? -What kind of research supports my claim? -What would be the foundation for my claim?	-How is the data related to my claim? -What facts link my data to claim? -How can I relate my data to my claim? -What clarification does my data need? -How do I provide logical support for my data? -What cause-effect relation is there between my data and claim? -The relation between the claim and data is like the relation between X and Y.	-What example can I provide for my warrant? -How can I relate my warrant to my claim? - Are there any statistics about my warrant? -What evidence is there for the warrant?	-What exceptions are there to my data, warrant, or backing? - What is the opposite opinion? - What is another opinion about my claim? -What can weaken my claim, data, warrant, or backing? -What is controversial about the data, warrant, or backing?	-How can I respond to/judge/evaluate the rebuttal? - What are the points that the rebuttal has not covered? -How can I argue to refute the rebuttal? -How can I show the rebuttal in fact supports my claim?	-probably -presumably -likely -potentially -to a certain extent/ to a large extent extent/degree

Use the following frame for your support:
X is the case (C), because _____ (D), [and[14]] since _____ (W), because _____ (B), unless _____ (R), which is not the case because _____ (ResR). Therefore, X is probably (Q) the case. (Adapted from Scanlon, 2006).

[14] The conjunction [and] should have been added, or a period placed after the data (D) sentence and before the warrant (W). See discussion in Qualitative text analysis section.

A blank prompt table containing all the discourse feature labels (Table 3.2) was made available to the participants so that the participants and I co-construct the prompts they would insert into their thinking (Scardamalia et al., 1984) to mediate generating the discourse features. The following task sheet was distributed in Session II.

Table 3.2. Blank Prompts Table Session II, Task 3

What questions can you ask yourself to generate the different parts of the argument? Write the questions in each column.

Claim (ask this both for intro and body paragraphs)	**Data**	**Warrant**	**Backing**	**Rebuttal**	**Response to Rebuttal**	**Qualification**

Various iterations of the prompts were (co-)constructed prior to and during the study and used by the participants in Sessions II to VI to generate the discourse features. The following was co-constructed in Session II during the group-ZPD enacted there. I developed other prompts based on the learners' progress as Instruction continued. The complete set of prompts is presented in Appendix B. The prompts displayed in Figure 3.2 were co-constructed in Session II.

Iterations of Prompts during Five Instructional Sessions

Session / Discourse features	**Claim** (ask this both for intro and body paragraphs) C	**Data** D	**Warrant** W	**Backing** B	**Rebuttal** R	**Response to Rebuttal** RR	**Qualification** Q
ZPD co-constructed for a Paragraph **II**	What's my opinion/main idea? What is my thesis? What is my topic?	How can I explain my opinion? What are the facts the support my opinion? What is the reason for my opinion? What's my evidence for the claim?	How can I make the data related to the claim? How can the data and the claim be related/linked/connected?	What facts lead the reader to understand the warrant? What can I do to make the warrant clearer?	What is the opposite of my opinion? How do people disagree with my view?	What is the opposite of my rebuttal? How can I respond to the rebuttal?	Probably Perhaps Presumably

Figure 3.2. Prompts Co-constructed in Session II

A seven-page think-sheet set containing one discourse feature per page was made available to the participants so that they use it for rhetorical problem solving. Figure 3.3 shows the think-sheet for the warrant. In response to the prompts the participant would write notes or sentences that would satisfy the rhetorical function of the feature. The think-sheet for warrant is displayed below. The complete set of think-sheets is in Appendix C.

Think-sheets: Task 3 Questions to ask yourself in order to generate the different parts of the argument:

Ask yourself these questions to	**Warrant**
-How is the data related to my claim? -What facts link my data to claim? -How can I relate my data to my claim? -What clarification does my data need? -How do I provide logical support for my data? -What cause-effect relation is there between my data and claim? -The relation between the claim and data is like the relation between X and Y.	Freewrite your answers here: Write the final version here:

Figure 3.3. Think-sheet to Generate the Warrant

3.6. Description of Planned and Implemented Instruction

I gave the instruction to the EG for over six weeks, for about 2 hours a week, within their regular 9 am-1 pm class hours. The instruction to the EG is represented with a capital "I," i.e., Instruction. Prior to Instruction, I taught the five-paragraph essay format (adapted to four paragraphs) to both the EG and CG. This opening lesson is referred to as Session Zero. Session Zero instruction ensured a common writing knowledge for both the EG and CG, and is separate from Instruction, which was offered to the EG only.

The proposal for this study envisioned a total of eight instructional sessions in addition to Session Zero. However, due to institutional constraints, this number had to be reduced from eight to six. The rationale for the planned eight sessions was in part based on my teaching experience and in part to close the gap with the number of weeks of instruction in the original Scardamalia et al. (1984) study. They taught six-graders for 1.5 hours per week for a period of 15 weeks. Also in my writing instruction practice, I have observed a minimum of two months is required for a learner to move from one benchmark to another. For example, to move from an IELTS score of 6.0 to 6.5, I advise the candidates to prepare for a minimum of two months. (The latter is my emic empirical observation). Also, because the core of the argument model was the warrant component, additional lessons were planned to develop strategies to generate the warrant. However, the number of instructional sessions, including the one on the warrant, had to be reduced from eight to six because the school term in which this intervention was delivered was an end-of-year session (October to December) and thus the teachers were required to cover as much material as usual in less time. Thus, not enough time was left for my research intervention, which would take away two hours of regular instruction from the EG class. Thus, the extra lessons had to be dispensed with due to timing constraints.

Instructional Sessions Zero to VI (for the EG) were audio and video recorded. Before each session began, I set up a Sony HDR-CX550 video camera in the front corner of the EG classroom so that it captured the majority of the participants. I used two digital Panasonic voice-recorders, an RR-XS 400 and an RR-XR800. One was placed at a central point in the classroom to capture the audio for the entire class. The second was carried in my shirt chest-pocket to capture my interactions with individual participants when I answered questions or we constructed dyads. I did not want to be carrying a recorder that would be visible to the

participants because I considered it a distraction and a potential deterrent for them to want to ask questions. As it turned out, however, the recorder in my pocket would also sometimes pick up the noise associated with the device's movement in my pocket. Because I also had two other audio sources from the other voice recorder and video camera, this did not detract from data quality. To describe the implemented lesson plans, I followed Erickson (2008) and watched the entire video recordings and listened to audio recordings (on the two pocket and desk recorders) of the instruction and took hand-notes, as if I were sitting in class as an observer. I repeated the listening and viewing as many times as required to be able to provide an accurate description of the instruction as implemented.

I delivered the Instruction in seven sessions. Session Zero was given to both EG and CG. Sessions I to VI were given to the EG only. The lesson plans and handouts, containing the tools and materials, are in Appendices D-K. In this section, I first describe each lesson as planned, then immediately afterwards, describe the implemented lesson and any variations and departures from the planned lesson

3.6.1. Session zero.

In Session Zero, the goal was both methodological and pedagogical. Methodologically, I introduced the study to the EG and CG participants, collected informed consent, participants' personal data, and information about their perceptions about the components of the study (See Appendix D) ; pedagogically, I taught the five-paragraph essay model to both groups. The argumentative four/five-paragraph model was the format the pretest was based on, and the genre into which the discourse features (Toulmin, 1958/2003) would be incorporated once Instruction began. Thus, to make an even-playing field, I taught it to both groups. The following is the rationale for instruction in the five paragraph format in the context of the present study and its participants.

To answer the research questions, it was important to control construct irrelevant variation in writing quality. By limiting the generic form of the texts to a standard five-paragraph format, variation due to different and possibly idiosyncratic ways of organizing the text would be limited. Thus, the variation in the quality of texts would less likely represent a construct that was irrelevant to the construct of the present study: i.e., reflective knowledge-transforming

composing at the paragraph level. Hence, the instruction in the five-paragraph theme to both the EG and CG.

The five-paragraph theme has had a well-known controversial history. There are those who advocate for its pedagogical value. Nunnally (1991), for example, compared the five-paragraph theme to the training-wheels on a bicycle, which serve a useful purpose, but suggested that teachers and students should move beyond it so that students are not constrained by its from. It should not be viewed as an end but as a tool. For instance, instead of thinking of *three* ideas to support the thesis, Nunnally proposed they should explore *what* ideas support the thesis. Opposed to the five-paragraph format, Wesley (2000) asserted that it inhibits critical thinking and stunts writing development. In contrast, Johnson, Smagorinsky, and Thompson (2003) adopted an activity-theory perspective to analyse the practices of a teacher who successfully applied the five-paragraph theme. They suggested that although the practitioners are well-advised to move beyond the generic constraints of the five-paragraph theme, the critics should refrain from over-simplifying the circumstances in which this form happens to be the preferred mode of writing instruction.

In the context of the present study and in relation to the participants, I shared Nunnally (1991) and Jonson et al.'s (2003) pedagogical views and for the methodological reasons mentioned above, I instructed both groups in the five-paragraph format. Although the five-paragraph theme was part of the Level 4 curriculum, both groups needed to be instructed in it *prior to* Instruction to create a generic frame within which rhetorical structure and the cognitive processes to generate it could be taught and assessed. Without the generic form of the five-paragraph essay, the participants' resources could have been expended on generating a frame that was irrelevant to the construction of the present study. Hence, Instruction in the five-paragraph format would control for that variability. Having rationalized the content of instruction, I describe Session Zero below.

The time required for Session Zero was two hours. The instructional materials were a pre-reading activity sheet, an adapted text featuring the elements of a standard four-paragraph essay, a sheet with 13 questions that elicited the essay elements such as topic sentence, topic, main idea, thesis blueprint motivator, and clincher; a writing prompt sheet; and a take-home five-paragraph reading passage borrowed from Bailey and Powell (1987, pp. 60-61). The

instructional tool was a four-paragraph essay schema comprising boxes that indicated the location of each element in the four-paragraph essay named above. Both EG and CG main teachers were present during my instruction. The lesson plan and handouts for Session Zero are presented in Appendix E.

In Session Zero, because I had taught the five-paragraph essay (I tend to start with four paragraphs) numerous times before I did not write a detailed lesson plan, and only prepared and adapted the instructional materials and tools. The implemented lesson had five major stages. First, there was an orientation to the content of the four-paragraph model on space exploration. I guided a discussion on space exploration based on the two questions on the pre-reading activity sheet. Second, I instructed the class to read the four-paragraph essay and answer the questions on the question sheet. I elicited the correct answers two questions at a time, in order to make sure the participants were on the right track. I asked for choral and individual repetition (Swain, et al., 2011; Lantolf & Poehner, 2014) of the word "thesis" as entry point into their cognitive-rhetorical development. I asked questions that elicited the composition of thesis/ topic sentence into topic and main idea, the location of thesis, blueprint, and topic sentence in the essay. I also used the board to draw boxes representing the paragraphs and their elements. I defined topic as "what is talked about" and main idea as "what is *claimed* about it. I further discussed the distinction between the topic and main idea. While teaching the element *motivato*r, I stated that "you could do without a *motivator*, but not without a *thesis*." Third, I directed their attention to the four-paragraph schema comprising the boxes that indicated the location of each element. This would materialize in visual form the abstract elements they had just identified. I gave a mini-presentation to recap the four-paragraph format, with pauses for student contributions. Fourth, I assigned the writing topic for the class to collaboratively generate a thesis statement plus blueprint and one body paragraph. I circulated in class and provided mediation as necessary. Fifth, I asked volunteers to read their thesis statements, and I provided feedback, drawing their attention to the fact that the number of ideas in the blueprint corresponded to the number of middle paragraphs. The CG teacher instructed his class to follow the model I taught them to write an essay on "somebody they admire." The class clapped when I concluded the lesson.

3.6.2. Session I.

In Session I, the overall goal was to present the argumentative discourse schema (Toulmin, 1958/2003) so that the EG participants would learn how to generate content based on the principles of concept based instruction (Vygotsky, 1986, Lantolf & Thorne, 2006. Instruction appropriated Scardamalia et al.'s (1984) direct strategy instruction into an SCT framework. The time required was two hours. The materials were exemplar paragraphs containing the Toulmin model (1958/2003) discourse features, accompanied by questions eliciting and defining the discourse features. The lesson plan and handouts for Session I are presented in Appendix F.

There were four major instructional stages in Session I. First, there was orientation. It included discussing the lesson objective, a refresher on the four-paragraph essay, which was presented in Session Zero, discussing and contrasting the general idea of support as opposed to the scientific concept of argument, and alerting the participants to the significance of argumentation in academic discourse. Second, there was an activity that aimed to map the concept of syllogism onto the Toulmin model so that the participants would tap into familiar information to acquire the new discourse knowledge schema. The instruction included drawing the data, warrant, claim diagram (without the other features) on the board. Third, there was a task which presented an exemplar text, defined each discourse feature and required the participant to identify it in the text. This was followed by the same text which was coded for the discourse features, and accompanied further definitions, reinforcing the discourse features as scientific concepts (See Materials and Tools above). At this point, Instruction included drawing the complete model on the board, the model containing the claim, data, warrant, backing, rebuttal, and response to rebuttal (Figure 3.3). Fourth, the participants would write a second paragraph on the same topic, which was collected for text analysis regarding Research Question 2.

The implemented lesson in Session I followed the stages in the planned lesson, except for the syllogism activity, which I modified slightly. I made the process more elaborate to collect data to understand whether or not and how many of the EG participants would be able to solve the syllogism problem. I found that out of a total of 14 participants who were present, seven answered the problem correctly in the first instance. After removing comprehension issues, impeding understanding the problem, the number rose to ten. (The significance of this finding will be discussed in Chapter 9.)

3.6.3. Session II.

In Session II, the overall goal was for the participants to identify and generate the argumentative discourse features in coherent texts. The time required was two hours. The materials were a listening comprehension question sheet for the discourse features, an exemplar paragraph containing the discourse features, accompanied by questions eliciting and defining the discourse features, and a writing topic sheet. Instruction appropriated Scardamalia et al.'s (1984) direct strategy instruction and procedural facilitation into an SCT framework. The tools were the Toulmin model schema, a blank prompt generation table, and a prompt table model (previously co-constructed). See Appendix G for the lesson plan and handouts

There were five major instructional stages in Session II. First, there was orientation, which involved describing the goal as generating content on the spot. It also included a discussion about *fact* and *opinion* to elucidate the difference between and among claim, data, warrant, and backing. I planned to read sentences and elicit if they were *fact* or *opinion*. Second, there was my presentation of the Toulmin model, while the participants looked at the Toulmin schema (Figure 3.3), followed by answering a set of listening comprehension questions and checking the answers. Third, there was a task in which the students would read an exemplar paragraph and identify its discourse features. The answer key, featuring the coded text was provided subsequently. Fourth was the co-construction of the prompts on a blank prompt table (Table 3.2) by the participants and me (these prompts were used in Session III to mediate discourse content generation), followed by the distribution of a previously co-constructed prompt table (Table 3.1). Fifth, the participants would write a single paragraph, mediated by the prompt tables and the Toulmin model schema.

The Session II implemented lesson varied from the planned one in the following significant ways. First, I asked a few participants to read aloud their paragraphs and I provided feedback. In response to one student's writing, I commented "Your data and warrant miss your topic." Second, I ended the session by demonstrating thinking aloud, or modelling thought (Scardamalia, et al., 1984) while rhetorical problem solving. The purpose was to make visible for the participants the cognitive processes of planning, goal setting, and generating. It made the path from private speech to generated text visible for the students. Specifically, I wanted to demonstrate how the prompts that we had just co-constructed could be incorporated into their

thinking while composing. I made a conscious effort to use the discourse feature labels in this protocol, to show how they trigger rhetorical problem solutions. For instance, part of my protocol read: "I want to provide data for this ... so, that's my backing because that is evidence-based."

3.6.4. Session III.

In Session III, the overall goal was for the participants to use “think-sheets” (Englert et al., 1991) as mediational means, or artefacts, to generate argumentative discourse. The think-sheets are auxiliary means that mediate rhetorical problem definition and solution, and thus, mediate knowledge-transforming composing. Instruction continued to appropriate the Scardamalia et al.’s (1984) direct strategy instruction and procedural facilitation into an SCT framework. See Appendix H for the lesson plan and handouts. The time required was two hours. The materials were one exemplar paragraph containing the Toulmin model (1958/2003) discourse features, accompanied by questions eliciting and defining the discourse features, and a writing topic sheet. The tools were the Toulmin model schema, prompts table co-constructed prior to Instruction, and a set of seven think-sheets, one for each discourse feature for content generation in response to prompts.

There were three major instructional stages in Session III. First, there was orientation, which involved reviewing and practising with *fact-opinion* distinction and presenting the Toulmin model. Similarly to Session II, I planned an oral presentation in which I described the function of each discourse feature and gave a definition. Second, there was a task involving discourse feature identification in a paragraph. The task was similar to that in the past two sessions. Third, there was a prompt-mediated writing task utilizing the set containing the seven think-sheets. I planned to review the prompts on the think-sheets, instruct the participants to use the think-sheets to generate the appropriate content for each feature, encourage freewriting (without formally teaching it yet) and revision, and having them transfer their text for each discourse feature to their final draft paragraph. At the end of the writing task, I planned to collect their impression about the prompt-mediated writing process.

The Session III implemented lesson departed from the planned lesson in the following significant way. As the participants were using the think-sheets to complete their writing task, I

interacted with the students in dyads. As I was collecting the think-sheets and paragraphs, I quickly scanned them and alerted the participants to the missing elements. For example, I noticed one student did not include a rebuttal and response to rebuttal and instructed her to generate them before submitting her work. She first produced them orally, and then wrote them down as per my instructions.

3.6.5. Session IV.

In Session IV, two separate lessons were planned. The goal of the first lesson was to expand the application of the discourse schema form a single paragraph to an essay and use mediational means to facilitate discourse feature identification. The goal of the second lesson was for the participants to use freewriting (Elbow, 1973) and focused freewriting (e.g., Munday & Cartwright, 1990) to mediate knowledge-telling (see discussion in Chapter 2). Instruction for the first lesson continued to appropriate Scardamalia et al.'s (1984) direct strategy instruction and Instruction for the second lesson appropriated Scardamalia et al.'s (1984) procedural facilitation and modelling thought (in the form of freewriting and focused freewriting) into an SCT framework . The time required was two hours. The two lesson plans and handouts for Session IV are presented in Appendix I and J.

The materials for the first lesson, in Session IV, were a colour-coded jig-saw reading essay containing six paragraphs introducing *a separate* rebuttal paragraph for the first time. No tools were used for the first lesson. The materials for the second lesson were a freewriting instruction sheet, and a focused freewriting instruction sheet. The tool for the second lesson was a prompt-sheet (with less explicit prompts than in previous sessions).

There were two major stages in the first lesson in Session IV. First, there was orientation, which sought to emphasize the importance of acknowledging and responding to rebuttal, which were generally missing in the participants' Session III writing. I planned an oral presentation to achieve this goal. Second, I planned to assign the jig-saw reading activity to three groups, each with five students. The groups had to put the paragraphs and the sentences within the paragraphs in proper order consistent with the sentences' discourse functions.

In Session IV, there were three major stages in the second lesson. First, there was orientation, which involved introducing freewriting as a method to generate ideas and my

mastery modelling (Zimmerman & Kitsantas, 2002) of freewriting. Second, I planned to have the entire class freewrite for 10 minutes and have a student do coping modelling (Zimmerman & Kitsantas, 2002) of freewriting. Third, I planned focused freewriting mediated by the simplified and less-explicit prompts, modelling it myself on a topic given by the participants, and then having a student model it for the rest of class.

The Session IV implemented lesson featured the following significant variations from the original plan. First, after my "mastery modelling" of freewriting myself, I asked for a volunteer to do "coping modelling" (Zimmerman & Kitsantas, 2002). One student volunteered and preferred to write on the computer projected on the screen (*vs* the board). The class and I watched the emerging text. When Ian paused, I instructed him to say/write: "I don't remember, but something will come to me." I discouraged him from editing as he tried to go back and do so. Second, during the focused freewriting task, I instructed the class to write the prompts down if they do use them. Then, I handed a blank sheet of ruled paper to transfer and revise their freewriting on it. “Feel free to make revisions or edits you want,” I instructed class and asked that they write two prompt-mediated drafts. Third, because the participants were writing a second draft, I decided to seize the moment to present Murray’s (1980) multiple-draft writing system. I drew the table in Figure 3.4 on the board and stated the following, “The writing process I wanted to demonstrate to you is this: Your writing, say, your term paper is not one draft. You write many drafts. At the beginning of the process you explore and discover and at the end you clarify.”

Draft	1st	2nd	3rd	4th
	EXPLO	RATION	CLARIFI	CATION

Figure 3.4. The Writing Process over Multiple Drafts (Adapted from Murray, 1980)

3.6.6. Session V.

In Session V, like Session IV, there were two lessons with similar goals. The overall goal was two-fold: for the participants (a) to identify the discourse features in a multiple-paragraph essay in a jig-saw reading and (b) to continue to use (focused) freewriting for knowledge-transforming composing. (Session IV lesson plan was recycled for part a). The time required was two hours. The materials were similar to those in Session IV. There were only two changes to the

tools: I redesigned the prompt sheet so that they would contain new prompts, especially some to generate the warrant. Also, I created a separate handout that contained the most implicit set of prompts that I adapted from Scanlon (2006): It read “This is my claim (C), because … (D), since … (W), because … (B); however, the opposition argues …, because … (R). A response is … (ResR). Therefore, X is probably (Q) the case (ResC).”

The stages in both lessons in Session V were similar to those in Session IV. In the first lesson, there were the following additions. The orientation included instruction on the difference between freewriting and focused freewriting. I planned to alert them not to transfer their prompts to the final copy and to continue to stress the importance of rebuttal. The lesson plan and handout for Session V are presented in Appendix K. The lesson plan for freewriting was recycled from Session IV (See Appendix J).

Session V implemented lesson varied from the planned one in the following significant ways. First, before starting the jig-saw reading activity, I drew the following schematic representation (Figure 3.5) of the essay to visually display the paragraph's rhetorical functions. This would serve as mental orientation toward the task. To check the answers, I asked the participants to read each paragraph and identify the topic and main idea in the claim as well as other discourse features.

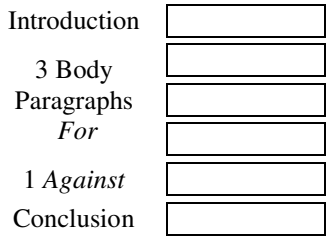

Figure 3.5. The Paragraph Scheme for the Argumentative Essay

Second, In Session V, similarly to Session IV, I did "mastery modelling" (Zimmerman & Kitsantas, 2002) of freewriting on the board. I concluded by stating that freewriting required no planning, that they did not need to worry about grammar. I indicated I had used long sentences, and that they did not need to edit freewriting, and that the only rule is to write non-stop (Elbow, 1973). Third, I asked for a volunteer to do "coping modelling" (Zimmerman & Kitsantas, 2002) of freewriting, and Mohammad completed the task. Fourth, I asked the class to nominate a topic

for me to model focused-freewriting. Ian suggested the following: *Do you agree that people should take a long vacation in winter?* I accepted it and generated a focused freewriting protocol on the board. Similarly to Session II when I modelled thinking-aloud (verbalizing), I consciously used the discourse feature labels to drive the rhetorical problem solving process. For instance, part of my protocol read: "That's my warrant, so I need a backing ... people disagree, I need a rebuttal ... what is my response? ... I need to restate my claim."

3.6.7. Session VI.

In Session VI, the overall goal was to raise awareness and mediate participants' text revision as an element of knowledge-transforming composing (Bereiter & Scardamalia, 1987). The time required was one hour-forty minutes. The materials were two sets of revision task sheets and an essay topic sheet. I designed the revision task sheets using two participants' writing from Session V. The first set was adapted to show the prompts that should have been deleted from the final draft and highlight the warrant that should have been added. The second set contained an implicit rebuttal, but I adapted it to elicit an explicit rebuttal and response to it. The essay topic sheet instructed to write five paragraphs by freewriting for five minutes and using the prompts and my help to write the essay. The lesson plan and handouts for Session VI are presented in Appendix L. Additionally, I conducted a self-assessment of the participants' perceptions of Instruction (See Appendix M)

In Session VI, Two tools were used: (a) a prompt sheet designed to mediate writing an essay, which was a development from those for a single paragraph. It was the final iteration of the prompts, with specific prompts for each paragraph in the essay, and (b) the most implicit prompt (adapted from Scanlon, 2006, and described above) was also made available.

There were four major instructional stages in Session VI. First, there was orientation, which included praise for participants' development to date, announcing three areas of focus for the lesson, i.e., prompt use, warrant, and rebuttal, and giving short reviews of their purpose and application. Second, there was a task, which aimed to mediate the process of deleting prompts from and adding a warrant to a participants' essay, which I had reviewed from Session V. I designed the handouts to make revision for prompts and warrant visible so that they "notice" (Schmidt, 1990) the change. Third, there was a task, whose purpose was to have an explicit

rebuttal added to a participant's paragraph from Session V. For both tasks, I added "writing frames" that mediated the thinking that goes into generating the warrant, rebuttal, and response to rebuttal. Fourth, I planned to assign a prompt-mediated writing task to be completed in 45 minutes in class. This stage included introducing the new and last set of prompts, constructed for the entire essay.

Session VI departed from the plan in the following significant ways. During Task 3, when the participants wrote a complete essay mediated by the last iteration of prompts, I instructed them to transfer the number of the prompts they used to their draft, so that I could use that as evidence of their application in knowledge-transforming composing. Before collecting their essays, I reminded them to write a paragraph by writing the requirement on the board. The rationale for the reminder was that if they had developed a scientific concept of this discourse feature, they should probably attempt it in their writing. Therefore, I tried to pre-empt the possibility that absent-mindedness would contribute to neglecting an item of rhetorical knowledge that they would have developed but simply forgot to apply, thus, controlling for construct irrelevant variance in their writing ability.

3.7. Summary

This chapter began with a presentation of the theoretical principles that informed instruction. Next, I described the goals, content, and structure of the instructional sessions, followed by a description of the materials, tools, and artefacts used in the instruction. Finally, each of the instructional sessions was described, explaining the processes, tasks, and how the materials and tools were used. In the next chapter, I will describe the research method.

Chapter 4: Method

4.1. Introduction

The present study adopted a mixed-methods (MM) approach (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009), with a quasi-experimental quantitative (QUAN) and qualitative (QUAL) strand. The participants in the QUAN strand of the study comprised an experimental group EG (n = 13) and a comparison group (CG) (n = 13). The participants in the QUAL strand were selected from the EG as described in the Participants section below.

The need to have an MM design arises both from the epistemological basis and research questions of the present study, which utilizes the theoretical underpinnings and procedures of both cognitive writing theory and sociocultural theory of mind. MM's philosophy of science is pragmatism, which seeks truth in the outcome or purpose of the research (Teddlie & Tashakkori, 2009). Specifically, I consider what Silva (2005) calls "humble pragmatic rationalism (HPR)" (p. 8) undergirding the MM paradigm of the present study. Silva (2005) advocated a *humble* approach to writing research to recognize the limitations of the researcher's knowledge and a *pragmatic* one to focus on the problem at hand, which requires methods and assumptions aimed at finding a solution in a particular context. Pragmatism has been argued to be Vygotsky's orientation to science (e.g., Edwards, 2007; Toulmin, 1999, see Chapter 2 for a discussion on pragmatism) and the preferred paradigm for the study of second language writing (Silva, 2005). The pragmatic epistemological foundations of MM research provide a suitable context to account for the incommensurability critiques levelled at mixing constructs from cognitive theory and SCT (e.g., Dunn & Lantolf, 1998; Zuengler, & Miller, 2006). Mixed-methods research uses both QUAN and QUAL data collection and analysis tools, in a complementary fashion to answer the research questions. The research questions (see Chapter 1) ask *if* there is a relationship between Instruction in knowledge-transforming composing and writing ability. In addition, they enquire about *how* that relationship unfolds. An MM design is suited to answer such questions.

An MM study seeks to simultaneously confirm and explore the relationship between variables (Teddlie & Tashakkori, 2009, p. 127). In the present study, research question 1 asks if there is a relationship between the independent variable in the study, i.e., Instruction, and the dependent variable, i.e., writing quality, reflected in the test scores. This calls for a quantitative analysis of textual data. Research question 2 asks about the nature of the relationship between the

variables, including cognitive processes, and calls for a qualitative textual analysis. Additionally, an MM design is used to examine both causal effects and causal mechanisms (Teddlie & Tashakkori, 2009, p. 127). Research question 2 seeks to examine a causal effect, i.e., *if* Instruction results in changes in cognitive processes, and, if so, *how* this relationship unfolds. The answer to the *if* and *how* questions is arrived at *simultaneously* through the same text analysis; hence, the need for an MM design. It is conceivable for the answer to research question 1 to yield no effect, yet the answer to research question 2 might lead to some effect. An MM design is best suited to explain such apparent contradictions as was the case in Trend (1979, cited by Teddlie & Tashakkori, 2009, p. 12),

Research question 3 seeks to examine cognitive change through dynamic assessment, which is grounded in a different assessment paradigm than that used to answer research question 1. An MM design allows this mixing of paradigms because its philosophy of science is pragmatism. Teddlie and Tashakkori (2009) identified pragmatism as MM's philosophy of science and noted that, "Pragmatism views knowledge as being both constructed and based on the reality of the world one experiences" (p. 74). In dynamic assessment, the learner is simultaneously assessed and instructed (e.g., Lantolf & Thorne, 2006). Thus, knowledge gained about the learner's abilities by the assessor and knowledge acquired by the learner are constructed in the immediate context of assessment. An MM design allows for a "context-bound" inferencing process (Teddlie & Tashakkori, 2009, p. 13).

Research question 4 aims to examine the effectiveness of Instruction from the point of view of the participants. It might be the case that a participant's quantitative scores analysis in research question 1 shows no change, yet he or she expressed satisfaction with Instruction in the interview or survey in research question 1, or visa-versa. An MM design allows for this interdependence of research questions. This is an example of a "sequential mixed design," for which Teddlie and Tashakkori (2009) offer this definition, "In these designs, mixing occurs across chronological phases (QUAL, QUAN) of the study, questions or procedures of one strand emerge or depend on the previous strand, and research questions are related to one another and may evolve as the study unfolds" (p. 151). In summary, to answer the research questions in the present study, I seek not only to find if the Instruction was effective, but why and how. Thus, a mixed-methods approach is best suited to this purpose (e.g., Onwuegbuzie, & Leech, 2006).

4.2. Study Design

Irrespective of the research questions, at the beginning of the study, I conducted a survey with both EG and CG to gauge the significance of the study and their interest in its main construct. As described and rationalized above, the present study had an MM design with a QUAN and QUAL strand. The QUAN component entailed the collection and statistical analysis of participants' essays and surveys. The QUAL component consisted of qualitative text analysis, dynamic assessment, and semi-structured interviews. Below I briefly describe each component, why that was necessary to answer the research questions, and when the data was collected.

To answer Research Question 1, the QUAN strand of the study had a 2 X 2 factorial quasi-experimental design with two independent variables (IVs), each with two levels. One IV was Group with two levels, Experimental Group (EG, n = 13) and Comparison Group (CG, n = 13), representing Instruction to EG and no Instruction to CG. They were both intact classes at the School. The other IV was Time with two levels: pre- and post, representing the times at which measurement was taken at the pretest and posttest.

The EG was taught both by its main teacher (9:00 am to 1:00 pm) and the researcher, for about two hours per week for six weeks. The CG was only taught the regular Level 4 instruction by the main teacher (9 am to 1:00 pm). I administered both groups a pretest essay before Instruction and a posttest essay after Instruction. Both groups are described in the Participants section below. Table 4.1 shows the study design.

Table 4.1. Study Design

	Time		
Group	Pretest		Posttest
EG	T_1	X	T_2
CG	T_1	O	T_2

Note: EG= Experimental Group; CG=Comparison Group
T_1= Time 1; T_2= Time 2; X= Treatment, i.e., Instruction;
O= No treatment; i.e., regular School Curriculum

To answer research question 2, I conducted a textual analysis of a purposive sample (n = 4) (Teddlie & Tashakkori, 2009) of EG texts produced during Instruction[15]. As described in

[15] To answer Research Question 2 regarding cognitive processes, I originally planned and collected think-aloud protocols before the pre-test and after the post-test. I evaluated the arguments for and against their use (Bowels, 2010; Dobrin, 1986; Ericsson & Simon, 1993; Janssen, van Waes, & van den Bergh, 1996). I also evaluated SCT

Chapter 2, cognitive processes could be inferred from the text produced by the participants (Bereiter & Scardamalia, 1987; Mann & Thomson; 1988; Van Wijk 1999). Research Question 3 explicitly calls for dynamic assessment. Therefore, I conducted dynamic assessment sessions with a purposive sub-sample (n = 2) of the participants whose texts were analyzed. The rationale for dynamic assessment was to examine the cognitive processes and text structure which were not manifest in the final texts, but for which there was evidence when the learner was assisted during the writing process. To answer research question 4, I conducted a survey with the EG and interviewed the same purposive sample (n = 4) as that for question 2. The interviews, dynamic assessment, and the survey were all conducted after the posttest. Since all four research questions examine the effect of Instruction on writing processes and quality, I made classroom observations of the EG and CG, as they were taught by their main teachers.

4.3. Classroom Observations of EG and CG

During the period that I was conducting the Instruction to the EG (and in addition to the classroom observations I did as part of preparation), I sat in a number of EG and CG classes as a silent observer while they were taught by their respective main teachers. Three EG and four CG classes were observed. The purpose of observations was to ascertain if any components of my Instruction, which were designed to foster the construct of reflective knowledge-transforming, was replicated by the main teacher of either group. Knowledge-transforming was operationalized through instruction in argument structure. If argument structure were taught to either class, that would contribute to the variance in the posttest scores measuring reflective knowledge-transforming in the essays.

I asked the teachers in advance to inform me of the sessions in which they taught writing. I observed those sessions and made descriptive and evaluative field notes (Lynch, 1996). I paid particular attention to any element of their instruction that might be relevant to the construct being investigated in the present study. I made no audio or video recording of the sessions, and only took field notes, as I decided to have as an unobtrusive a presence as possible. All sessions

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considerations with respect to the use of verbal protocols as data (Smagorinsky, 1998; Smagorinsky, 2001; Swain, 2006b); however, I had to abandon them because the participants were not able to produce fluent protocols, due to their low oral proficiency, and that the context of the study did not allow for the students' sufficiently practising thinking aloud prior to data collection, unlike in previous studies (e.g., Raimes, 1987).

were two-hour sessions running from 9:00 to 11:00 am, except for one that ran from 11:20 am to 1:00 pm.

All the seven sessions, which were taught by the main teachers of CG and EG, focused on developing the three essays/papers required for the course: a comparison and contrast essay, a cause-effect essay, and a research paper. All three were expository in tone and personal opinions were discouraged, except for "the basic essay," which they were taught but wrote no hand-in essay assignments on.

I observed three EG classes. For the comparison and contrast essay, the EG was taught the" block" and "point-by-point style." They were taught how to write a thesis statement in which they claim the items being compared are similar, different, or one is better than the other. Ad-hoc idea generation was practised by the instructor and class, who created an outline for a comparison between Adidas and Nike. The teacher elicited ideas form class and added his own. My conclusion was that the ideas generated in this class were pre-linguistic "think-say" type (Bereiter & Scardamalia, 1987). The ideas were not generated through freewriting, written languaging, nor mediated by prompts in any systematic way. Nor was there any explicit instruction to relate the three genres to discourse content generation while composing. The only systematic idea generation activity observed was by the EG teacher, which I observed during preliminary work and described above, in which thematic ideas were introduced to the class to generate the "hook" in the introduction and to "leave something memorable" in the conclusion.

In the cause-effect lesson, the EG teacher explained four ways in which this genre is organized: from multiple causes to a single effect, from one cause to multiple effects, from multiple causes to multiple effects, and causal chains. The topic was global warming. In the research paper lesson, the EG teacher required that the students write a "balanced" comparison and contrast essay. This may appear akin to the element of my Instruction, in which a Rebuttal paragraph reconciles opposite views. However, the fact that the EG teacher discouraged the students from writing an "opinion essay," the EG teacher's term for an argumentative essay, suggests the constructs presented by the main teacher and me were different. This indicated that the variance observed in the posttest for the construct of knowledge-transforming would very likely be due to my Instruction.

I observed four CG classes. The CG teacher presented the comparison and contrast by way of exemplar texts, as did the EG teacher. The students analysed the texts and inferred the pattern. He explicitly taught the relevant conjunctive adverbs "on the other hand," "despite," and "however." The CG did some unstructured brainstorming for the comparison of living in the city and the country. They wrote the advantages of each in a separate column on the board. Interestingly, the CG was assigned a homework writing topic in which they were required to write a summary and make an *argument* with respect to it.

In the next class, the CG teacher engaged the class in an on-line text production activity that is supported by process pedagogy to generate ideas. He projected a Microsoft Word page on the screen and started co-constructing a five-paragraph essay on the topic of "living in the city or the country." The CG teacher elicited a thesis, blueprint, and topic sentence for the first paragraph. Then he went to the board and elicited ideas to support living in the city and wrote them down. He next provided a handout of make-shift "facts" about the disadvantages of living in the country. When I asked the CG teacher on why he provided this "fact sheet," he responded that students found it difficult to step "outside of their box," to provide facts for the opposite opinion. Then, it seems that he was scaffolding the process of generating the opposite opinion. The CG teacher gave the following template to provide "a concrete example for each side": "Point-example; however, point-example." Then, it appears that some serious scaffolding was happening. To what extent this scaffolding was mediated within the ZPD, or whether it had any theoretical justification was an interesting empirical question I did not have occasion to ask. This observation suggests the CG was made aware of acknowledging the opposite opinion as a rhetorical move.

To teach the cause-effect organization, The CG teacher used a topic a student had given a presentation on, i.e., the Chinese famine of 1958-1962, and wrote a three-part causal chain on the board. He gave another familiar cause-effect example. The students were provided with two exemplar texts, one with causes and one with the effects of global warming and were told that in Level 4 they should focus only on causes or effects. The class did a brainstorming activity on causes and effects of studying abroad. Interestingly, in the four classes, the CG teacher instructed the class "not to get lost in grammar, but get the ideas first," which is consistent with my Instruction on foregrounding meaning for knowledge-transforming.

Comparing the EGF and CG, I concluded that both groups covered the Level 4 writing curriculum, but the approaches were different. Although both teachers made many exemplar texts available to the students, the CG emphasised the process of idea generation more than the EG. Whereas the EG did do outlining for idea generation, the CG did more collective brainstorming. Neither group used language as a mediational means to generate discourse content in writing, which was the point of my Instruction. There was certainly no sentence-by-sentence discourse schema taught, nor were prompts or freewriting used for discourse content production. Given the above, it can be safely concluded that the posttest variance would in large part be a result of Instruction in reflective knowledge-transforming composing.

4.4.Participants

Twenty-six participants completed the study, 13 in the EG and 13 in the CG. The age of the participants across the EG and CG were between 18 and 48. Their L1's were Japanese, Chinese, Russian, Arabic, Korean, and Persian. Some had taken an IELTS proficiency test and scored between 4 and 5.5 out of 9. Tables 4.2 and 4.3 display the participants' profiles. The tables include the information pertaining to the participants who were present in Session Zero and during Instruction, but later dropped out of the program. The reason to include their information is that they are referred to in describing Instruction and that they completed the initial survey.

The descriptive statistics and participants' information collected at the beginning of Instruction are displayed in Tables 4.2 and 4.3. The statistics are based on the participants who took the survey and completed the course. The EG was a younger group (M = 20.5, SD = 1.83) than the CG (M = 24.5, SD = 7.85). The EG had stayed in Canada longer (M = 34 months, SD = 18.2) than the CG (M = 7.6 months, SD = 7.75). The number of years they reported that they spent in English does not appear to be a reliable measure because they seem to have interpreted it differently depending on their country of origin. The EG has fewer students who had been to university (n = 6) than the CG (n = 9). The EG had more female students (n = 7) than the CG (n = 6). They both had similar L1 representation, except that the EG had no Persian speakers, while the CG had one. The EG had fewer participants who assessed their writing ability as good (n = 3) than the CG (n = 7). Neither group had participants who assessed their writing ability as very good.

Table 4.2. Experimental Group Participant Profile

pseudonym	age	Gender	Country of Origin	L1	Months in Canada	Years Studying English	Education	Field of study	Self –Assessment of Writing Ability
Chelsea	19	F	Japan	Japanese	2	7	undergrad	Intercultural communication	Good
Ellen	21	F	China	Chinese	24	6[1]	High School	NA	Fair
Ian	25	M	Russia	Russian	13	1	Graduate[2]	Law	Fair
Jay*	19	M	China	Chinese	2	6[1]	High School	NA	Fair
Max*	22	M	China	Chinese	1/3	6[1]	Graduate[2]	News	Fair
Mohammad*	19	M	Saudi Arabia	Arabic	2	2	Undergrad	Translation	Good
Natalie *	20	F	China	Chinese	12	7[1]	High School	NA	Fair
Sibley	21	F	Korea	Korean	6	9[1]	Undergrad	mass (xxx) communication	Fair
Wanda	22	F	Saudi Arabia	Arabic	6	1/2	Graduate[2]	Clothes and fabric	Good
Zena	19	F	Saudi Arabia	Arabic	8	7[1]	High School	NA	Fair
Zak	20	M	China	Chinese	1/4	7[1]	High School	NA	Fair
Peter	Did not do survey. Absent the first day								
Alexandra	19	F	China	Chinese	23	10[1]	High School	NA	fair
Linda (dropped)	20	F	China	Chinese	24	7[1]	High School	NA	no answer
Majid (dropped)	NA	M	Saudi Arabia	Arabic	Did not do survey. Absent the first day				
*M***	20.5	NA	NA	NA	34	5.7	NA	NA	NA
Mdn	20	NA	NA	NA	32.3	6.5	NA	NA	NA
SD	1.83	NA	NA	NA	18.2	3	NA	NA	NA

Notes. 1. It appears participants interpreted the number of years to refer to some kind of formal exposure to English, without necessarily being able to communicate on a par with the number of years. 2. It seems the participants interpreted "graduate" to mean graduated from an undergraduate program, i.e., holding a bachelor's degree. * Participants included in the QUAL phase. ** n = 12 the participants who took the survey in Session Zero. NA: Not Available/Applicable. *** My best estimate of illegible text.

Table 4.3. Comparison Group Participant Profile

pseudonym	age	Gender	Country of Origin	L1	Months in Canada	Years Studying English	Education	Field of study	Self –Assessment of Writing ability
Abdullah	20	M	Saudi Arabia	Arabic	12	1	High School	NA	Good
Alya	25	F	Saudi Arabia	Arabic	12	1	Graduate[2]	Accounting	Good
Frank	18	M	Kazakhstan	Russian	0	12[1]	High School	NA	Good
Lia	20	F	China	Chinese	10	4	High School	NA	Fair
Mona	19	F	China	Chinese	9	10[1]	High School	NA	Good
Nick	48	M	China	Chinese	28	30[1]	Graduate[2]	Economics	Good
Niaz	24	F	Iran	Persian	3	1	Graduate[2]	Urban Planning	Good
Nina	22	F	China	Chinese	1/4	12[1]	Graduate[2]	Electronic Information Engineering	Fair
Rob	28	M	South Korea	Korean	12	12[1]	Graduate[2]	Law	Fair
Jane	26	F	Korea	Korean	3	6[1]	Graduate[2]	Korean Literature	Poor
Yuri	20	M	Japan	Japanese	2	7[1]	Undergrad	Intercultural Communication	Fair
Yule	28	M	China	Chinese	1/3	20[1]	Undergrad	Psychology	Fair
Akbar	20	M	Saudi Arabia	Arabic	7	2	Undergrad	Language and Translation	Good
Fatah (dropped)	21	M	Saudi Arabia	Arabic	8	4	Undergrad	English Translation	Good
Sam (dropped)	19	M	Saudi Arabia	Arabic	8	8	Undergrad	Language and Translation	Good
*M**	24.5	NA	NA	NA	7.6	9.1	NA	NA	NA
Mdn	22	NA	NA	NA	7	7	NA	NA	NA
SD	7.85	NA	NA	NA	7.75	8.51	NA	NA	NA

Notes. 1. It appears participants interpreted the number of years to refer to some kind of formal exposure to English, without necessarily being able to communicate on a par with the number of years. 2. It seems the participants interpreted "graduate" to mean graduated from an undergraduate program, i.e., holding a bachelor's degree. NA: Not Available/Applicable. **n* = 13 the number of participants who completed the study

To answer Research Question 2, a sample of four participants was selected from the EG. The selection criteria were as follows; two types of participants were selected: those whose cognitive and rhetorical development was noticeable over the short six weeks, as well as those who did not show much development. Development was judged by their pre-posttest essay score comparisons, which I assessed "impressionistically" (cf. Heaton, 1988, p. 147; Cohen, 1980, p. 36, Hughes, 2003, p. 94) before the essay rating process had begun, as well as my observations during Instruction. Interestingly, four raters who did the formal assessment of the pretest and posttest essays generally agreed with my impressionistic assessment. Table 4.4 represents five independent assessments for overall writing quality with a multiple-trait (MT) rubric, argument quality with the same rubric, and argument quality with a primary-trait (PT) rubric. (See below and Appendices N, O, and P.)

In addition, I sought to analyze the texts of those students who attended an interview and dynamic assessment session so that I would be able to present a more complete assessment of their development including the rhetorical-cognitive microgenesis unfolding in the dynamic assessment sessions. The participants who were available for an interview and dynamic assessment and fell into the high-development category were Max and Mohammad and those who were available and belonged to the low-development category were Jay and Natalie.

To answer Research Question 3, I selected a subsample of two participants. The two learners represent the most and least amount of cognitive and rhetorical development after Instruction, Mohammad and Jay, respectively. Interestingly, four separate raters who separately assessed their essays analytically and holistically generally agreed with my assessment (See Findings Table 4.4).To answer Research Question 4, the same sample of participants as that for Question 2 and the same selection criteria were used.

Table 4.4: Multiple-trait (MT) and Primary-trait (PT) Scores in Argument for Participants in the Qualitative Strand

		Pre-test				Post-test			
Group	**Participant**	**Total MT/9** R1,R2	**Arg-MT/9** R1,R2	**Arg-PT/5** R3,R4	**Impressionistic total/9** (Ali)	**Total MT/9** R1,R2	**Arg-MT/9** R1,R2	**Arg-PT/5** R3,R4	**Impressionistic total/9** (Ali)
EG	Max	5.75	6.75	3.1	5	6.85	6.75	3.9	7
	Jay*	5.15	4.5	2.1	5	5.25	4.25	2.6	5
	Mohammad*	4.5	4.5	2.3	5	5.5	5.5	3.75	6.5
	Natalie	5.25	4.5	3.35	5	5.5	5.5	3.1	5.5

Note. * Dynamic assessment participants. R1: Rater 1; R2: Rater 2; R3: Rater 3, R4: Rater 4

4.5. Data Collection Tools

In this section, I describe the data collection tools for each research question. For question 1, I designed two rubrics to answer the two parts of the question regarding general writing quality and argument quality. For question 2, I briefly describe the writing tasks and prompts which were used by the participants to produce texts from which evidence for cognitive processes could be inferred. For question 3, I describe a piece of technology, the smart pen, which was used to record both the oral interaction and emerging text during the dynamic assessment. For question 4, I designed a questionnaire and interview questions that were used to collect the participants' emic perspectives about Instruction.

4.5.1. Tools for Research Question 1: rubric design.

Two rubrics were adapted and designed, one measuring overall writing quality and the other argumentative discourse quality. In the process, general rubric design principles were followed (cf. Hughes, 2003; Stevens & Levi, 2005). Overall writing quality was measured with a multiple-trait (MT) rubric, which was adapted from two sources: ELTS (Hamp-Lyons, 1991, pp. 149-151) and IELTS (2012), each of which has nine bands (see Appendix N). The argumentative discourse quality was measured with a primary-trait (PT) rubric, with five bands (see Appendix P: The PT rubric measures argumentative discourse quality, reflecting knowledge-transforming composing operationalized through the Toulmin (1058/2003) model of argument). These rubrics were the instruments with which Research Question 1 was answered: whether instruction resulted in improved writing quality in general and argument quality in

particular. The MT rubric consists of the following traits: Communicative Quality, Linguistic Accuracy, Linguistic Appropriacy, Organization, and Argumentation. The Argument trait of the MT and the entire PT rubric had to be redesigned to be sensitive to change in the ability which Instruction sought to foster. They were designed and adapted from Cumming, Kantor, Baba, Eouanzoui, and James (2006) and Connor and Mbaye (2002), reflecting the Toulmin (1958/2003) model elements: thesis, claim, data, warrant, backing, opposition, i.e., rebuttal, and response to opposition. Below I explain the design and adaption of the three rubrics.

The multiple-trait rubric was designed to measure overall writing quality, to answer the first part of research question 1. To design the MT rubric, the ELTS rubric was appropriated. Below, I advance an argument as to why I chose ELTS as a basis for MT rubric design. Although the ELTS rubric is an older rubric than IELTS (2012), it was considered an appropriate choice to measure overall writing quality in this study for three main reasons. First, this rubric has a separate trait for argument quality as a component of the larger construct of writing quality. In the present study, argument quality is the operationalization of knowledge-transforming. Therefore, a rubric that would conceptualize argument as an element of writing quality had to be used. Because argument was the main feature of Instruction, the ELTS Argument trait was redesigned to reflect the Toulmin model elements, as described below.

Second, the rubric suitable for this study had to emphasize discourse content over language, because Instruction almost exclusively focused on discourse content. As outlined in the literature review, content in this study specifically refers to content generated for argumentative discourse. Instruction in knowledge-transforming composing was designed to help learners generate genre-specific content. ELTS is more oriented toward content than form. No grammar or vocabulary was part of Instruction to the extent that it was designed to foster knowledge-transforming. Occasional language questions were asked by the students, which I answered as long as they did not interfere with the goal of the study. This was in order to maintain a natural instructional setting consistent with a *praxis* research model (Lantolf, 2008). Compared with the 1991 version of ELTS, ILETS rubric (2012) has the following traits: Task Response, Coherence and Cohesion, Lexical Resource, Grammatical Range and Accuracy. Of the four traits of IELTS (2012), two of them (Lexical Resource and Grammatical Range and Accuracy) are directly language-related, in addition to Cohesion. Then, over 50% of the writing

quality construct in IELTS (2012) is linguistic. By contrast, the ELTS rubric has only two traits which are directly linguistic (Linguistic Accuracy and Linguist Appropriacy) and three of the five traits (Communicative Quality, Organization, Argumentation) are directly related to discourse content, without emphasizing language.

Third, the choice of ELTS is supported by the theoretical models of communicative language ability (e.g., Canale & Swain, 1980; Chapelle, Grabe, & Berns, 1993, Hulstijn, 2011), which attach particular emphasis to meaning over linguistic form. In this study, writing is viewed as a communicative event (Hymes, 1972). Weigle (2002) mentions the link between linguistic resources and the mental processes of language production, which underpin this communicative event. In this study, linguistic resources are used only as mediational means in the form of prompts and languaging, and not as ends in and of themselves. Thus, the language taught was only a psychological tool (Vygotsky, 1978) for the mental processes of writing, specifically planning and generating (Hayes & Flower, 1980). In his model, Hayes (1996, 2001) similarly did not foreground the language in the cognitive process model in a formal way. In fact, in the present study, participants were encouraged to explicitly edit their drafts to delete the traces of the prompts, the linguistic mediational means which were meant as thinking tools and found their way into the final product. Thus, any language the students learned in this study was meant to help produce content, and was irrelevant to their overall language use. The Canale (1983) model of communicative language ability highlights discourse as a separate component of the model[16], which views language use beyond the sentence (Hymes, 1972), as was the case in the Instruction in the present study. The ELTS inclusion of Argument as the discourse genre being discussed is consistent with this view of language ability. At the same time, ELTS retains a core Linguistic Accuracy feature, without which language production would not be possible (Hulstijn, 2011). Drawing on Chomsky (1965), Hulstijn (2011) made a similar distinction between language perception and language production in his model of "basic language cognition

[16] Canale (1983) developed the Canale and Swain model (1980) by essentially doing two things, as observed by Fulcher and Davidson (2007) and Bachman (1990). The Canale model has a separate component for discourse and it added enhancement strategies to the model.

(BLC),"[17] which he contrasts with Cummins (1980) construct of basic interpersonal communication skills (BICS). Along with Hulstijn, this study accepts the argument that strategic and metalinguistic strategies are necessary for communicative language ability, but without a core linguistic competence they cannot exist (Hulstijn, 2011, p. 238).Last, Bachman and Palmer's model (2010) identifies an "externally interactive" and "non-reciprocal" mode of language use, which the reader-oriented ELTS descriptors seem to capture. For band 9 of Communicative Quality, the ELTS descriptor reads: "The writing displays an ability to communicate in a way that gives the reader full satisfaction." The descriptors, thus, capture whether and the extent to which the text interacted with the external reader/rater while this interaction was non-reciprocal since the rater could not interact with the absent writer. For these reasons, the older ELTS rubric seemed to be a more robust instrument to measure overall writing quality.

Deciding on ELTS as the core rubric, I still incorporated the elements of IELTS (2012) which I judged to give the descriptors more discriminatory power and make them better able to represent the construct of communicative competence, as the measure of overall writing quality examined in research question 1, as represented in the literature. They are indicated in italics in the rubric (see Appendix N). Further minor adjustments were made to the rubric as the raters started rating to reflect the empirical observations they made about the discourse features in the essays. They are indicated in bold.

During benchmarking and the rating process (see below), the raters and I made minor modifications to the rubrics so that they reflected how the raters interpreted the descriptors, and to ensure they consistently applied the same criteria moving forward. The following are examples of some of the changes made to the MT rubric during rating.

The Communicative Quality descriptor is worded with descriptors such as "The writing displays an ability to communicate with few difficulties for the reader." We decided to quantify the level of difficulty, which starts at band 7 and goes down to band 6. That is, band 7, one to two difficulties, band 6, two to three, and band 5, 3 three to four.

[17] Chomsky (1965) argued that the study of linguistic performance requires paying attention to a set of other factors than language as an abstraction (i.e., linguistic competence) which makes such an enterprise similar to "an empirical investigation of other complex phenomena" (p. 4).

Regarding Organization, the raters were asked to consider the use of transitions, as well as coherence and cohesion, as part of organization. Cohesion was explained as a property of surface text (Halliday & Hassan, 1976) and coherence that of the text as a whole. (Widdowson (1978) demonstrated that a text can be coherent without the overt use of cohesive ties.)

Concerning Linguistic Appropriacy, the raters and I decided to quantify appropriacy in terms of the number of times instances of colloquialism were observed: band 9, no colloquialism; band 8, almost no colloquialism; band 7, very few colloquialisms; band 6, occasional colloquialisms; band 5, several colloquialism; band 4, frequent colloquialism; band 3, ridden with colloquialisms

The Argument component of the ELTS rubric had to be redesigned to be sensitive to the Toulmin model discourse features, which were the subject of Instruction (See Appendix O). The rubric was designed based on multiple sources: Connor and Mbaye (2002), Cumming et al. (2006), ELTS, and Toulmin (1958/2003). Connor and Mbaye (2002) perceive a gap in the existing writing assessment tools. They argue that the assessment rubrics pay more attention to the linguistic than the rhetorical features of writing and when they use the phrase "rhetorical features of writing" it is almost synonymous with "organization" (p. 264). To redress the problem, they adopt the Canale and Swain (1980) model of language proficiency to design their rubric to measure rhetorical knowledge, required to generate argumentative discourse content. Along similar lines, the rubric for the present study was designed to be sensitive to the change in rhetorical knowledge manifest in argumentative writing ability observed over course of Instruction in student essays. It was written to have the discriminatory power to differentiate between different levels of ability to generative content for argumentative discourse. The Argument trait descriptors were written so that they would separately measure the following discourse features: thesis, claim, data, warrant, backing, opposition and response to opposition.

The rubric consists of 9 level descriptors that would reflect two dimensions: whether or not a feature exists and the degree to which it is present. The former dimension is binary in nature and is, in particular, employed to capture the existence of Opposition and Response to Opposition. These two discourse features were theorized to be most representative of the construct of knowledge-transforming because they would indicate whether the writer was able to rise above rhetorical conflict and reconcile an anti-thesis with a thesis (Scardamalia, et al., 1984).

Because all seven model elements were assessed simultaneously in the Argument trait of the MT rubric, I had to judge which band would be appropriate for the binary distinctions.

Each level of the MT rubric Argument trait has four dimensions: the *general* quality of the argument as a whole, the quality of each specific argument *element*, the *clarity* of the connection between elements, and the *acceptability* of the connections. Level 9 descriptors read as follows:

- There is a main argument that is always relevant, clear, and complete.
- Thesis, claims, data, warrants, backings, opposition, and response to opposition are always relevant, clear, and complete.
- The connection between all argument elements is always clear.
- The reader readily accepts the link among the argument elements.

During the rating process (see below), it was decided that certain elements of the rubric should appear from a certain band up. For example, Opposition and Response to Opposition was originally a feature of a band 6 essay and higher; however, the raters and I decided the boundary should be between levels 5 and 6 and it should be described probabilistically with *maybe present* at level 5 and *is present* at level six. This was so, because raters were not always certain how to interpret certain grammatical constructions such as concession clauses with "although" which may have been intended as Opposition by the learner. The band 6 descriptor after the modification reads as follows:

- There is a main argument that is almost relevant, clear, and complete.
- Thesis, claims, data, warrants are almost relevant and clear, but opposition and response to opposition are maybe both absent, and backings *may be* absent or unclear.
- The connection between all argument elements is almost clear.
- The reader almost accepts the link among the argument elements.

Each descriptor was formulated using adjectives describing rhetorical quality, and frequency adverbs indicating the degree to which they were present. The following paragraphs describe the design of the PT rubric.

The Primary-trait (PT) rubric (see Appendix P:) was designed from scratch to measure change in argument quality only, featuring Toulmin (1958/2003, Toulmin et al., 1984) model discourse features to answer the second part of research question 1.Because the MT rubric already had a redesigned argument feature, it was used as a basis to design the PT rubric, while continuing to incorporate features from Cumming at el. (2006) and Connor and Mbaye (2002)

rubrics. It consisted of the following elements (or sub-traits): Thesis, Claim, Data, Warrant, Backing, Opposition, i.e., Rebuttal, and Response to Opposition. To design the PT rubric, two modifications had to be made to the Argument trait in the MT rubric: The number of bands had to be reduced from 9 to 5, and the descriptor language had to be rewritten. These changes were necessary for the following reasons.

Similarly to the MT Argument trait, the PT rubric was designed to reflect both the presence and absence of the elements of the argument model (a binary distinction) and the degree to which they were present (a qualitative evaluation). The latter was indicated with adverbs of frequency. This combined binary-qualitative feature of the MT rubric was necessary because the elements were being evaluated simultaneously. By contrast, when the MT scoring was used, each element was evaluated one at a time. This would make the transfer of the descriptors from the MT to PT rubric a challenge in some ways. The following examples are of such challenges.

In the MT rubric Bands 8 and 7 have similar descriptors, except for the Backing. What distinguishes a band 8 from a 7 is the presence or absence of backings. However, in the PT rubric the backings are evaluated separately under a different subtrait. This would create an imbalance if the same number of bands as in MT rubric were to be transferred to the PT rubric.

Also, The Opposition and Response to Opposition have no differentiation below band 5 in MT rubric, because band 5 was the cut-off, based on which the presence or absence of "the rise above conflict" (Scardamalia et al., 1984) feature was measured. For the MT Argument trait, an essay would be evaluated above or below band 5 based on presence or absence of Opposition and Response to Opposition. However, this binary distinction was not possible in the PT rubric because at the lowest level in the PT rubric, the feature was naturally absent and at the highest level it was fully realized.

To resolve the above conflicts, Barkaoui (2012, April, personal communication) and I decided that the PT rubric did not need to have the same number of levels as MT rubric. He stated, "Two measures can assess the same construct at different degrees of specificity." The different degrees of specificity here refers to a detailed break-down of the argument trait to its elements. He used a magnifier analogy to suggest that more details in the PT rubric would be acceptable. We decided it would be difficult or almost impossible for raters to locate the quality of the argument on a 9-band scale. Therefore, the PT rubric was designed with five bands.

4.5.2. Tools for Research Question 2: writing tasks and prompts.

As explained in Chapter 3, I used some of the tools both for Instruction and data collection. This simultaneous use of the tools for both purposes is consistent with a *praxis* model of research-instruction, which posits the dialectical unity of instruction and research (Lantolf, 2008, Lantolf & Poehner, 2014; Vygotsky, 1978). In the six instructional sessions, there were two sets of tools; writing tasks and the mediational prompts. The writing tasks were of three types: essay topics, instructions to freewrite, and instructions to do focused freewriting. The tasks are presented in Appendix A. The prompts mediated the participants' writing processes to make the return trip from the rhetorical problem space to the content problem space (Scardamalia, et al.. 1984), and thus drive the content generation process. They were discourse content generation tools that were co-constructed in accordance with the Toulmin model (1958/2003) discourse features. They were gradually adapted from Session I to Session VI to reflect the mediational needs of the participants. They are presented in Appendix B.

As I mentioned, I used two types of freewriting: general freewriting (Elbow, 1973) and focused freewriting (e.g., Munday & Cartwright, 1990). The former entailed writing non-stop without a topic and without any rules, for a given period of time. The latter involved writing non-stop on an assigned topic, which required solving rhetorical problems, for a given length of time. There were two reasons to have the two forms of freewriting: pedagogical and methodological. Pedagogically, "modelling thought" in the original study (Scardamalia et al., 1984) had to be substituted in the present study with an activity that was appropriate for the lower oral proficiency level of the students because they were not able to generate fluent verbal protocols during class activities. Therefore, instead of instructing them to think aloud while composing in front of the class, I asked them to think-aloud on paper in writing without speaking a word, tapping into their inner speech, which Vygotsky (1978) considered a prerequisite for writing, and the inner voice that Chenoweth and Hayes (2003) considered important in the writing process. The participants' oral proficiency, which takes up cognitive resources from the phonological competent of the working memory (Kellogg, 1994, 1996, 1999; Levy & Marek, 1999) would be controlled for, when they do freewriting.

Methodologically, the original plan was to investigate knowledge-transforming composing behaviour by collecting think-aloud protocols before and after the instruction.

However, the protocols that were collected did not reveal meaningful results because, in large part, the participants were not able to produce fluent protocols. Instead, I used the longitudinal freewriting data for evidence of knowledge-transforming behaviour.

Freewriting of the first type (Elbow, 1973) does not involve problem solving because there is not a topic and there are no rules except to write non-stop. It does, however, provide evidence for private speech (Vygotsky, 1986) because freewriting, as Elbow defined it, has no audience except the self and it draws on the intrapsychological process of giving inner speech linguistic form. Focused freewriting, on the other hand, involves private speech to solve rhetorical problems triggered by a topic. It is a rule-governed and goal-oriented activity. The writing has to be coherent, considering a rhetorical purpose, and audience, mediated by the rhetorical prompts made available to the students. Therefore, it has the elements of a semiotically-mediated activity in SCT.

4.5.3. Tools for Research Question 3: electronic equipment.

To record dynamic assessment sessions, I used two devices: a Livescribe 2 GB echo™ smartpen and a digital voice recorder. The smartpen is a piece of technology that captures the physical act of writing by hand as well as all the sounds in the environment when the participant writes on a specially designed paper, which has a built-in coordinate grid that synchronises the audio with the location of the inscription on the paper. The paper comes in bound notebooks. Smartpens have been used in educational research (e.g., Boyle, 2012; Kang, 2011; Knox, Herrington, & Quin, 2011; Moore, Van Schaack, & Groves, 2010; Obonyo, Troy, Baldwin, & Clarke, 2011).

During the interactions in the dynamic assessment dyads, the smartpen records both the participant's emerging text and the ambient sounds including the participant's and the mediator's voice. The data is stored in a pencast, which can be played back using a portable document folder (PDF) reader, which plays back the real time production of text and talk. At playback with a mouse click, the user can select any point on the PDF window to have the audio played back and the inscription shown synchronously with it. One problem with the pencast software is that could not be converted to a file format recognizable to transcription programs such as Audacity 1.3 or ELAN.

As a back-up and to be able to navigate and transcribe the audio file, I also used a digital voice- recorder which records the audio in an MP3 format. For transcription, I used Audacity 1.3 Beta (Unicode), which plays back the MP3 file. Audacity visually shows the amplitude and wavelengths of all the sounds in a diagram. The wave diagram feature facilitates the transcription process by indicating the periods of silence with a flat line as well as the periods of talk. It is precise to the 1/100 of a second. Audacity is freely available and is developed by Richard Ash, Michael Chinen, James Cook, Roger Damenberg, and Al Diamond. The interviews and dynamic assessment dyads were recorded with both the smartpen and the digital voice recorder, and transcribed in Microsoft Word.

4.5.4. Tools for Research question 4: questionnaire and interview questions.

To examine the participants' experience of Instruction, I designed a questionnaire (See Appendix M) given on EG in Session VI, and a set of interview questions, which I administered to four EG (See Appendix Q) participants. The questionnaire was a Likert-scale with "sliding" descriptors ranging from 1, not useful to 6, very useful. Questions tapped into the elements of Instruction: argumentative discourse schema, (focused) freewriting, mastery and coping modelling of thought, prompts as mediational tools, generating content, and the effect of instruction on cognition. Each level of the scale was treated as a score on a continuous scale, and the number of responses for that level was the frequency of that score

The interview questions (See Appendix Q) had a general section, which I asked all the four participants, and a specific section, which was designed for each of the four participants, individually. The specific part was informed by the observations made of that particular students' development over the course of Instruction. Max, for example, who demonstrated much development, had a specific question which asked *what* elements of the Instruction helped him generate ideas. Jay, however, whose development was minimal, was asked if he had used the elements of the model in his posttest. It was possible that absence of evidence for rhetorical development in Jay's writing might not have been due to lack of knowledge/learning, but because of performance challenges. These specific questions provided a depth of insight which could only be gleaned by hearing the students' emic perspectives of Instruction.

In addition to the tools described above, I also designed a questionnaire that examined the participants' perceptions of the importance of the different components of Instruction (see

Appendix M.) It was added to the end of the questionnaire that collected participants' personal information. It was administered in Session Zero both to the EG and CG. The questions asked about the importance of language knowledge and the ability to generate ideas and in writing. The purpose of this questionnaire was to collect confirmatory data that could be used to empirically support the arguments made about the significance of the study. If this population of students found the components of the study important, it could inform arguments about the significance of the study.

4.6. Data Collection Procedures

In this section, I describe the data collection tools for each research question. For question 1, I describe the rating process; for question 2, the administration of the writing tasks; for question 3, how dynamic assessment was conducted; and for question 4, the administration of the questionnaires and interviews.

4.6.1. Procedures for Research Question 1: pretest-posttest essays and the rating process.

The EG and CG were administered a pretest and posttest essay in their classrooms. The time limit was 45 minutes. The pretest was given after Session Zero, when I taught the five-paragraph format. The posttest was given after Session VI, when the Instruction to EG ended. Both tests were handwritten on paper, which I provided. I also supplied black pens to ensure better readability of their handwriting. Students were instructed to return both their rough and final drafts.

The topics were selected from the list of TOEFL topics published by ETS. These topics required writing in the genre that was the focus of the study, i.e., argumentation. The rhetorical demand did not assume any prior knowledge of the topic or any research background. Further, they were studied and found to be comparable in view of their associated score meaning (Golub-Smith, Reese, & Steinhaus, 1993). Therefore, the fact that different topics were assigned for the pretest and posttest would not contribute to the score variance[18]. The pretest topic was:

[18] In retrospect, although Weigel (2011) also found "no significant differences across prompts for any rater" (p. 31), it would have been better practice to counter-balance the topics. A point to be considered in future studies.

It has recently been announced that a company is planning to build a factory near your community. Do you support or oppose the plan. Support your answer with specific reasons and details.

One of the EG participants, Wanda, missed the pretest session. I administered the pretest to her individually on a different topic, to avoid any possible effect of topic familiarity Although studies (e.g., Powers & Fowles, 1997, 1998) have found that disclosing topics can be inconsequential for score meaning, I considered it better assessment practice to have a different topic. Wanda's pretest topic was:

It has recently been announced that a shopping mall is going to be built in your community. Do you support or oppose the plan. Support your answer with specific reasons and details.

The posttest topic was:

Do you agree or disagree with the following statement? The best way to travel is in a group led by a tour guide. Use specific reasons and examples to support your answer.

A CG participant, Akbar, missed the posttest session. I administered the following topic to him individually. Akbar's posttest topic was:

It is better for children to grow up in the countryside than in a big city. Do you agree or disagree? Use specific reasons and examples to develop your essay.

The rating process involved two pairs of raters ($n = 4$) marking the essays. The score for each trait was the average assigned by the two raters ($n = 2$). Selection criteria for the raters were familiarity with and educational experience in academic discourse. I selected three of the four raters, Mary, Jen, and David, from among my colleagues, based on my knowledge of their ESL education and writing instruction experience. The fourth, Monica, responded to a call for research aides that I asked David to distribute in an Ontario college. The raters' profiles are summarized in Table 4.5. The raters were paid a nominal fee for their time, travel, and food. The raters' ESL teaching and writing instruction experience ranged from three to 12 years. Mary, Jen, and Monica had completed a Master of Arts program and David's was in progress. Their degrees were in English, Applied Linguistics, and English Language Teaching. Jen was completing a Ph.D. in Applied Linguistics. Their self-assessment of their rating skills was either competent (*n*

= 3) or expert (n = 1). David was an IELTS examiner and Jen a CLBPT (Canadian Language Benchmark Placement Test) assessor.

Table 4.5. Raters' Profiles

pseudonym	ESL Teaching (Years)	ESL Writing Teaching	Current Roles	L1[19]	Home Lang.	Work Lang.	Postgrad Studies completed	Postgrad Studies in progress	Prof. Certificate	Received Training in assessment	Received Training in writing	Self-assessment of rating skills	Rating experience	Provided training in assessment
Mary	5	5	program coordinator and writing instructor	EMT	Eng	Eng	M.A. English	n/a	n/a	N	N	Expert	Y	N
Jen	9	3	Teacher – postsec. communication	EMT	Eng	Eng	MA Applied Ling	PhD	TESL Ontario	Y	N	Competent	CLBPT assessor	N
David	10	5	Professor, ESL (Sheridan College)	EMT	Eng.	Eng.		MA Applied Ling	TESL Ontario	Y	Y	Competent	6 years IELTS Examiner	Y
Monica	12	4	LINC professor-Sheridan College (partial load)	EMT	Eng	Eng	MA English Language Teaching	n/a	TESL-Ontario CELTA	Testing Principles MA course Rating calibration workshops	N	Competent	N	N

L1= first language, Home Lan.= Home Language; Work Lang.= Work Language; Prof. Certificate: Professional Certificate; Eng.= English, EMT: English-Mother-Tongue, Admin.= Administrator; Eng=English, CLBPT=Canadian Language Benchmark Placement Test (Table adapted from Barkaoui, 2008)

There were 52 essays that had to be rated based on a multiple-trait and primary-trait rubric. Half of them (n = 26) belonged to the experimental group (EG) and the other half (n = 26) to the comparison group (CG). Half of each group's essays were collected either at the pretest or posttest. Table 4.6 displays the distribution of essays.

Due to the fact that some students withdrew or were excused from the course (for administrative reasons), there was one essay from the EG and two essays form CG that did not have a posttest counterpart. These essays were used in the bench marking session. The rating process for the multiple-trait rating of the 52 essays took six 8- hour days for the multiple-trait rating, and three 8-hour days for the primary trait.

Table 4.6. Distribution of Essays Rated

		Times		
		Pretest	Posttest	Total
Groups	EG	13	13	26
	CG	13	13	26
	Total	26	26	

The raters were distributed as per Table 4.7. Mary and Jen did the multiple-trait and David and Monica did the primary-trait rating.

Table 4.7. Distribution of Raters across the Rating Types and Days

Rating type	Raters	Completion time (days)
Multiple-trait	Mary and Jen	6
Primary trait	David and Monica	3

Each set of rating sessions began with training and benchmarking. In advance of the training, I provided the raters with a document, explaining the Toulmin (1958/2003) model with exemplar texts. For multiple-rating, each essay was read once for each trait separately. The entire 52-essay set was read for one trait at a time before reading it for the next trait. In addition, the rating took place on separate days. This made it less likely that the raters' decisions for each trait would be influenced by their rating of the previous trait. For primary-trait rating, each essay was read once for all the traits, since assessing each trait depended upon the existence and quality of the other traits (A. Cumming, personal communication, January 3, 2012). For example, to assess the Warrant, the rater had to identify and assess the quality of the Data and Claim.

At the training session, I explained the purpose of rating to the raters; the raters studied the rubric, and I answered raters' questions. During benchmarking and actual rating, I supervised the process to ensure inter-rater consistency: raters were handed two copies of a chart with the participants' names to enter the scores on. They entered the score on both copies. As they were rating, I would immediately enter the scores in an Excel spreadsheet, while they continued working and entering marks on the other copy. Upon entering the scores from both raters for a particular student, I compared them to ensure inter-rater consistency. If the difference between the two raters' scores was more than one point, I would ask them to discuss their scores,

rationalize them, and arrive at a score that is no more than one point apart. They would state their reasons for moving the score up or down.

The pre- and posttest essays for the EG and CG were randomly distributed between the two raters, such that the raters did not know which topic corresponded to pre- or the posttest, nor which student belonged to which group. They were not privy to the research or questions, either. During the multiple-trait marking, the raters, Mary and Jen, read each essay one trait at a time so that their assessment of one trait would not influence that of other traits. Then, each essay was read five times by each rater for each trait, during multiple-trait marking. Generally raters read for different traits on separate days, at least a week apart, so their impressions of one essay was unlikely to have influenced their rating of the same essay for a different trait. By contrast, for primary-trait rating, the raters, Monica and David, marked the Toulmin model elements all together because the discourse features are all logically related (Cumming, Jan 2012, personal communication). For instance, to identify the Warrant, the rater needed to locate and assess the Data, and for the Backing, the Warrant. To rate the Response to Opposition, Opposition itself needed to be read, and so on. The descriptive and inferential statistics for the scores are reported in Chapter 5.

4.6.2. Procedures for Research question 2: administering the writing tasks.

Consistent with a *praxis* model of research (e.g., Lantolf, 2008), this study used the same instructional materials as research tools. (See Chapter 3 for examples.) I collected writing samples from EG (and analysed those belonging to the four EG students described in the Participants section above), during the six Instructional sessions as outlined in the Chapter 3. As the participants wrote, they used the prompts to mediate the writing process. The prompts evolved from session to session to reflect the students' mediational means. (See Appendix B and Chapter 3.) I also made myself available to provide mediation if required. The following writing samples were collected. In session I, the students wrote a single paragraph mediated by the graphic representation of the Toulmin model, an exemplar text, and the first set of prompts created prior to the study. In session II, the students wrote a single paragraph mediated by the same means as in Session I, except that that they had two sets of prompts: a newly co-constructed set, in addition to the old one. In Session III, the students wrote a single paragraph mediated by the think-sheets, one sheet per discourse feature. They continued to use the Toulmin

chart as well as the co-constructed prompts table. In Session IV, the students were introduced to freewriting and focused freewriting. For focused freewriting, they wrote two drafts, and were instructed to write down the prompts they used to generate each discourse feature (similar to Scardamalia et al.'s (1984) instruction to their participants to insert the cues card into their thinking aloud episodes) as well as the corresponding number. Participants were instructed to delete the prompts in the revised draft. Doing so constituted knowledge-transforming composing (e.g., Bereiter & Scardamalia, 1987). In Session V, the procedures were the same as those in Session IV, except that the students used a new set of prompts. They were also assigned an essay to write for homework and submit in the next session. In Session VI, the students wrote an essay in class. The process was mediated by the final iteration of the prompts.

4.6.3. Procedures for Research question 3: conducting the dynamic assessment.

Dynamic assessment was conducted after the posttest with two EG participants to simultaneously assess and promote development. (Promoting development entails a degree of instruction, which is distinct for Instruction in Sessions Zero to VI.) During the dynamic assessment session, the following principles were followed. Mediation would begin at the most implicit level (e.g., Aljaafreh & Lantolf, 1994), and would gradually become more explicit upon need. The development of scientific concepts, such as word meanings of discourse feature labels, proceeded from the abstract "downward" to the concrete (Vygotsky, 1986, p. 193); thus, discourse feature labels played a crucial role as "word meanings" (Vygotsky, 1986, p. 159) to continue the development of the scientific concepts of the Toulmin (1958/2003) model of argument. The schematic representation of the discourse model was used as part of artifact mediation (e.g., Lantolf & Thorne, 2006). An example of implicit mediation was asking the participant to produce the discourse feature label for the bridge between the data and warrant. An example of explicit mediation is the mediator naming the discourse feature for the learner, after he failed to produce the label.

I began each dynamic assessment session by sharing with the participant my impressionistic assessment of their writing development and showing him his posttest essay as a basis to improve it and identify the discourse features in it. Then, based on the goals of the DA, which I had decided on in advance, I began to enact a ZPD with the learner based on an entry level performance, for which there was evidence in the posttest essay. In the dyads created

during the ZPD, the learner and I dialogued toward achieving the goals. The goals were usually three-fold: to identify the discourse label for a missing element of the model (e.g., Rebuttal); to generate the text that would represent that missing element; and to revise the text so that it was clear and coherent, which are all evidence for mediated knowledge-transforming composing: mediated rhetorical problem definition and solution.

Identifying the discourse label was the first step in rhetorical problem definition, and generating the text for it would constitute the return trip from the rhetorical problem space to the content problem space. If the learner demonstrated awareness of the discourse feature by naming it and was able to execute the routine, it would suggest reflective knowledge-transforming composing behaviour, similar to how Scardamalia, et al. (1984) operationalized it with their cue cards, designed for different rhetorical categories.

The ZPD moves were microgenetically enacted to be accountable for the cognitive and emotional states (Swain, 2013) that the mediator inferred from the process. The microgenetic mediation was offered at two levels: meta-discourse and text. Meta-discoursally, I helped the participants to reproduce the components of the model by graphically representing the model in a diagram on pencast paper, or as part of a collaborative dyad co-constructed between the participant and me.

4.6.4. Procedures for Research question 4: administering the questionnaires and interview.

The first of the two questionnaires described above was administered in Session Zero to both EG and CG and the second to the EG only in Session VI. I scheduled the interviews after the posttest with the four EG participants (whose texts were analyzed and two of whom attended DA sessions). The interview was conducted in a semi-structured fashion, with a set of questions pre-designed for each participant and a set of general questions for all four. (See Appendix Q.) I modified the questions, upon need, as the interview progressed. As part of the interview, I reported to the participants my general impressionistic assessment of their writing for the pre- and posttest and how much they had improved (if that was the case). Then, I conducted the dynamic assessment.

4.7. Data Analysis

In this section, I describe the data analyses for each research question. For question 1, I performed non-parametric statistical testing; for question 2, I did textual analysis identifying the discourse features, comparing revisions across drafts, and looking for evidence of the use of mediational means; for question 3, I conducted dynamic assessments, taking the posttest performance as the entry point into the learner ZPD, and seeking to enable or improve knowledge-transforming composing ability. For question 4, I administered surveys and interviewed four participants to solicit their perceptions of Instruction.

4.7.1. Data analysis for Research Question 1, statistical score analysis.

Research Question 1 concerned two effects: overall writing quality, measured based on a model of communicative competence (i.e., Bachman, 1990; Bachman & Palmer, 2010; Canale, 1983; Canale & Swain, 1980); and argumentative discourse quality, measured based on the existence and quality of the elements of the Toulmin (1958/2003; Toulmin et al., 1984) model of argument. The existence and quality of argumentative discourse would constitute indirect evidence for knowledge-transforming (Scardamalia, et al., 1984; Bereiter & Scardamalia, 1987) composing behavior.

There were five dependent variables (DVs) for overall writing quality: Communicative Quality, Organization, Linguistic Accuracy, Linguistic Appropriacy, and Argument. They were measured with a multiple-trait (MT) rubric. There were seven dependent variables for argumentative discourse quality: Thesis, Claims, Data, Warrant, Backing, Rebuttal, and Response to Rebuttal. They were measured with a primary-trait (PT) rubric.

Because the study had a total of 12 dependent variables, measured at the pretest and posttest, a repeated measures multivariate analysis of variance (MANOVA) would be ideal to both measure the change over time and account for the interaction between Time and Group independent variables. However, because of the small sample size (N =13 x 2), it would be unadvisable to conduct a *parametric* MANOVA. Instead, non-parametric testing is appropriate for small sample sizes (N<100) for the following reasons. If parametric tests were to be used there would be no way to know the population parameters of small samples (StatSoft, Inc. 2013). That is, the parameters of the population from which the sample is assumed to be taken cannot be

known given the small sample size. Therefore, the assumptions of homogeneity of variance and normality of distribution (Field, 2005; Howell, 2010), which should be satisfied for a parametric test such as MANOVA, cannot be verified.

Instead of a MANOVA, non-parametric within-group and between-group testing of the means were conducted. Related Mann-Whitney and independent Wilcoxon Signs-Rank tests (Field, 2005) were used for the within-group and between group comparisons, respectively. The calculations were conducted with SPSS. The effect size *r* was calculated with the following formula (Field, 2005, p. 532, citing Rosenthal, 1991) for non-parametric tests:

$$r = \frac{Z}{\sqrt{N}}$$

Where Z is the *z*-score and N is the number of observations (not necessarily the sample size). For example, in the related-group comparison where measurements are taken of the same participant more than once, *N* equals the sample size multiplied by the number observations. For instance, for the independent groups Mann-Whitney test in the present study *N* equals 26 (2 x 13), and for the related groups Wilcoxon signed-rank test *N* still equals 26 because the same 13 participants are observed (measured) twice. According to Brown (2008) citing Tabachnich and Fidell (2001) if there is not enough power (less than 0.8), represented by the effect size, significant results may not be detected. To interpret the effect-size, Field (2005, p. 32) cites Cohen (1998; 1992) who considers effect sizes of $r = .10$, $r = .30$, and $r = .50$, weak, medium, and large, accounting for 1%, 9%, and 25% of total variance, respectively[20].

[20] During Instruction of the EG, I made an error which at first might appear to have affected the statistical score analysis results; however, further analysis and reference to literature indicated that the error was not consequential. The problem arose in Session V, when I mistakenly assigned an essay topic for homework ([HW5]), which would later be assigned for the posttest. Six of the students from the EG submitted the HW5 essay. However, when I reviewed the literature and analysed the data statistically and qualitatively, no significant differences were found between HW5 and posttest essay scores. Therefore the six students' posttest scores were used with confidence in the statistical analyses described in this section. See Appendix R for details of the analyses. Multi-tasking, wearing multiple hats as a researcher, instructor, and audio-visual technician, got the better of me at this point, leading to this error. However, it did not seem to have affected the results in a consequential way.

4.7.2. Data analysis for Research Question 2, text analysis for rhetorical structure and to infer the cognitive processes of knowledge-transforming.

Research Question 2 has two parts: the effect of Instruction on rhetorical structure quality and the effect of Instruction on knowledge-transforming composing. For both questions text analyses were performed to identify the presence or absence of discourse features and their quality.

Rhetorical development was analyzed by looking for evidence of structural soundness and substantive strength. As discussed in Chapter 2, presence and coherence of the discourse features were the criteria to judge soundness, and presence and coherence of rebuttals, responses to rebuttals, and qualification were the markers of strength (Toulmin et al, 1984). The texts include the pretest essay, the seven texts they wrote during Instruction and the posttest essay. Inferring process from text required identifying the ideas that were processed (Bereiter & Scardamalia, 1987), and the rhetorical (Mann & Thomson, 1988) and hierarchical (van Wijk, 1999) text structure. Knowledge-transforming was inferred based on (a) how the participants applied the mediational means, i.e., exemplar texts and prompts at different stages (of co-construction) to mediate their writing process; (b) the presence and amount of revision they made; and (c) the presence, absence, and quality of the rebuttal and response to rebuttal they provided as indicators of the "rise above conflict" criterion (Scardamalia et al, 1984).

Specifically, knowledge-transforming was inferred based on prompt-responsivity. The traces of the prompts, or their respective numbers, in the first or second draft was considered evidence of knowledge-transforming composing. Prompts were designed or co-constructed to send cues from the rhetorical problem space to the content-problem space for the generation and/or retrieval of content. Scardamalia et al. (1984) considered this "return trip" the essence of knowledge-transforming. The rhetorical problem identification and formulation is mediated by the prompts; for example, the prompts indicate the need for and the position of the warrant, and formulate the language to generate that item. The reason the prompts help solve a rhetorical problem, and not exclusively a content problem, is that they are grounded in a theory of rhetoric, i.e., Toulmin (1957/2003), which indicates what discourse feature is required and where. A higher degree of prompts responsivity means generating more than one sentence or idea in

response to the prompt. A low degree of responsivity means generating only one sentence or idea in response to the prompt.

The amount of revision from the first draft to the next was considered evidence of knowledge-transforming. Bereiter and Scardamalia (1987) differentiated between expert and novice composing according to the amount of revision they do. When the revised text resembles the unrevised one, that would be characteristic of knowledge-telling, but when the former is a selection of the latter, that indicates expert composing. They consider "substantive modification of previously written text," which goes beyond simple lexical edits, indicative of knowledge-transforming (p. 22). Two types of Knowledge-transforming revision are identified: expansion knowledge-transforming (EK-Tr) and concision knowledge-transforming (CK-Tr). EK-Tr is the process in which composing expands from a short note in the form of a word, phrase, or sentence, to more expansive discourse of at least two sentences. This usually happens in the revision process, when revising the text produced thus far, leads to the generation of more text. CK-Tr is a process in which a large set of notes is narrowed down to a concise sentence. This also usually happens during the revision process, when the writer deleted previously written text and/or expresses it more concisely.

The text analysis method was devised for the argumentative genre based on the Toulmin (1958/2003) model and the operationalization of knowledge-transforming composing (Bereiter & Scardamalia, 1987). The following are the steps in the procedure:

- I first transcribed the students' hand-written texts. If a word or phrase was not clear, I wrote my best guess in brackets next to it. If there was doubt, I placed a question mark inside the bracket. Next, I looked for the existence of discourse features and coded them accordingly: Thesis (T), Blueprint (BP), Claim (C), Data (D), Warrant (W), Backing (B), Rebuttal (R) and Response to Rebuttal (RR), Qualification (Q), Restated Claim (ResC).
- For the prompt-mediated writing tasks, I also transcribed and underlined the actual prompt which the student was instructed to copy in his or her text, as well as the number associated with that prompt if the student also copied that number. I placed the prompt numbers in parentheses, e.g., (3), before the prompt.

- I labeled a sentence S1, S2, etc. if its discourse feature was unidentified, but was subject to qualitative analysis.
- If a prompt was deleted in the second draft as per task instructions, I considered it evidence for concision knowledge-transforming (CK-Tr). I indicated it with a strike-through.
- If significant text was added in the second draft, I indicated it in bold and considered it evidence for expansion knowledge-transforming (EK-Tr)

1. To analyze for structural soundness, I wrote an explanation as to why each feature should be interpreted as such, for example, why a sentence identified as data should be interpreted as such.
2. I also explained how the elements "hung together" (Toulmin et al., 1984) in each paragraph's micro-structure (Fulkerson, 1996). I considered coherence to judge structural soundness. For coherence, I drew on the notions of *textbase* and situation model (van Dijk & Kintsch, 1983). As the reader, I had to be able to parse the text to create a textbase and interpret it in the local context of students' history during Instruction to create a situation model.
3. To analyze for substantive strength, I wrote a commentary based on the existence and quality of rebuttal and response to rebuttal and qualification. I considered coherence in my assessment as above.
4. The analysis primarily focused on the middle paragraphs. From the introduction paragraph, only the thesis and blueprint were analyzed to have an indication of the claims to appear in middle paragraphs. From the conclusion paragraph, only the restated thesis was analyzed for evidence of qualification.
5. If qualification, rebuttal, or response to rebuttal occurred in the introductory or concluding paragraph, I acknowledged them in view of substantive strength.
6. To analyze for knowledge-transforming behaviour, I followed these procedures.
    a. For the analysis of texts generated based on a model textual schema (In Sessions I and II), I paid attention to how the model text features mediated the generation of the students' texts.
    b. For the analysis of tasks mediated with prompts (Session III to VI) I noted

- the amount of text generated in response to each prompt (e.g., Session III, Task 3). The more the amount of text, the higher prompt responsivity, and the more salient knowledge-transforming behaviour.
- the revision done to the texts just produced to formulate a complete sentence
- Revision from the final sentence to the final text

c. For the analysis of tasks that consisted of two drafts, I noted
   - prompt use (the wording of the prompt and its inscribed number)
   - the prompt to be deleted in the second draft as evidence of concision knowledge-transforming.
   - The amount of new text generated in the second draft as evidence of expansion knowledge-transforming.

b. For the analysis of texts consisting of only one draft (pretest essay, Session V homework, Session VI, and posttest essay, I noted the use of rebuttal and response to rebuttal as indicators of the "rise above conflict" in knowledge-transforming behaviour (Scardamalia, et al., 1984).

4.7.3. Data analysis for Research Question 3: dynamic assessment.

I transcribed the DA sessions by playing them on Audacity 1.3 Beta (Unicode), compared them with the smartpen Pencast® replay, and typed them in a Word document. I followed the transcription conventions by Thornborrow (2002) (see Appendix S). After the transcription, I wrote a conversation analysis of each dyad reflecting the principles of dynamic assessment applied during DA, based on the textual evidence, and recollections of my thoughts and motives during the DA session.

The transcripts are organized into units called discourse generation episodes (DGE). Inspired by Swain and Lapkin's (1996) concept of language-related episodes, in which learners attempt to solve language-related problems while thinking aloud. I broadly define a DGE as a collaborative dyad enacted within the learner's ZPD, one in which the learner succeeded to produce either a discourse feature label (e.g., Rebuttal), or generate or revise a specific piece of discourse for the label (e.g., the text for Rebuttal). The motivation for having the DGE as the unit of analysis was to divide the discourse into goal-oriented semiotic activities. DGE as a unit of

analysis also facilitates writing the DA report and providing evidence for the validity arguments the DA report should entail.

In the conversation analysis of each DGE, I started by describing the goal of the episode (e.g., identifying the Warrant). Then, I described the mediational moves made and the responses observed. For example, I described one mediational move in which I began to draw the Toulmin model diagram on the pencast paper and asked the learner to supply the discourse feature labels. I described the mediation as implicit if the learner was immediately responsive to my *wh*-question designed to have him supply the label. I described the mediation as explicit, if I had to provide orthographic cues, at different levels of specificity, to aid the learner in the discourse feature label retrieval process. If I had to supply the label myself, the mediation was described as most explicit. Similar procedures for data analysis were followed by Rahimi et al. (2015).

4.7.4. Data analysis for Research Question 4: analyzing the questionnaires and interview data.

To analyze the interview data, I followed Creswell (2007). Creswell described a procedure based on Moustakas (1994) and demonstrated it by citing Anderson and Spencer (2002) who followed a three-step process: to analyze the data they, first, identified "significant statements"; second, they formulated meanings based on the significant statements; and, third, they identified the themes that emerged from the formulations. Creswell explained that, "significant statements … [are] sentences … or quotes that provide an understanding of how the participants experienced the phenomenon" (p. 61).

To operationalize the three -step procedure, I transcribed parts of two interviews that I judged to be relevant to each question on the questionnaire (e.g., Max's) and were difficult to interpret without transcription (e.g., Natalie's), listened to all four interviews and took note of "the significant statements" that were relevant to the questions. Next, I rewrote the statements interpreting the meanings that would emerge from the significant statements. Then, I listed the thematic categories that would emerge. Finally, I wrote a report in which I identified one theme at a time and the evidence for it.

I report the questions that yielded significant statements, the meanings that they yielded, and the themes that emerged from them. If a question, which was on the questionnaire, was not asked, not answered, did not yield a significant statement or no answer at all, it is not reported

here. Some questions were not asked in the same order as that in the set of questions or not at all because the participant already provided the answers in response to other questions or in other parts of the interview. For this reason, this report does not repeat all the questions that were designed prior to the interview.

4.8. Summary

This chapter described the context of the study, the design, the participants, the data collection tools, procedures, and analyses. The data, tools, procedures, and analyses for each research question are summarized in Table 4.8. The following chapters report the findings of the study.

Table 4.8. Summary of Data Collection Tools and Procedures for each Research Question

	Research Questions	Data and Timing	Tools and procedures	Analyses
1	Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in improved writing quality, in general, and argument quality, in particular, as reflected in their scores? If so how?	-Pretest and posttest essays administered to both EG and CG. -Pretest given after Session Zero, before Instruction. -Posttest given two days after Instruction.	-Essay ratting processes involved two pairs of raters. The first pair used a multiple-trait rubric to assess general writing quality. The second pair used a primary-trait rubric to assess argument quality.	Statistical score analysis making comparisons between and within groups before and after Instruction
2	Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in a change in their cognitive writing processes and argumentative rhetorical structure as reflected in the characteristics of their texts? If so, how?	-Pretest and posttest essays as well as texts generated during Instruction by a sub-sample of four EG participants. -Texts were generated during six weeks of Instruction.	-Toulmin model schema -Various iterations of prompt tables (co-) constructed before and during Instruction. -Think-sheets -Procedures included instructions to do freewriting and focused freewriting.	-Textual analysis for rhetorical structure of argumentative discourse features. -Textual analysis to infer knowledge-transforming from comparison of first and second drafts, revision behaviour and the quality and presence of Rebuttal and Response to Rebuttal
3	Does the teaching of reflective processes for knowledge-transforming composing to pre-university ELLs result in a change in their cognitive writing processes and argumentative rhetorical structure as reflected in the dynamic assessment of their writing ability? If so, how?	-Transcripts of dynamic assessment (DA) sessions with a subsample of two EG participants. DA conducted a week after Session VI.	-Smartpen and pencast paper -Digital voice recorder -Dialogic interaction between the mediator and the participant based on the principles of dynamic assessment: graduation, need, and contingency	Conversation analysis of the transcripts (line by line) to assess the mediation provided and the learning that ensued.
4	What are the perceptions and experiences of the participants of the Instruction?	-Questionnaire administered to both EG and CG for the importance of the components of the study in Session Zero. -Questionnaire administered to EG only in Session VI. - Interviewed the same subsample of students as RQ 2 a week after Session VI. -Audio recordings and transcriptions of parts of interview.	-Digital voice recorder - Reported back to each student my impressionist assessment of their posttest essay. -Asked general and specific questions (to each participant) about various aspects of Instruction.	Analysis of the transcripts and audio data to identify significant statements, formulate meanings, and identify themes

Chapter 5: The Effect of Instruction Reflected in Scores

This chapter presents the results of statistical analyses conducted to answer Research Question 1: the effect of Instruction on general writing quality and argumentative discourse quality reflected in scores. There were five dependent variables (DVs) for overall writing quality: Communicative Quality, Organization, Linguistic Accuracy, Linguistic Appropriacy, and Argument, and seven dependent variables for argumentative discourse quality: Thesis, Claims, Data, Warrant, Backing, Opposition (i.e., Rebuttal), and Response to Opposition. The results indicated statistically significant pretest-posttest gains for the EG in the following categories: Argument, Rebuttal and Response to Rebuttal. The descriptive statistics for overall writing quality are presented in Tables 5.1 and 5.2.

Table 5.1. Descriptive Statistics for Measures of Overall Writing Quality

		Pretest (n = 13)					Posttest (n = 13)				
Group	Measure	*M*	*SD*	*Mdn*	*Min*	*Max*	*M*	*SD*	*Mdn*	*Min*	*Max*
EG	Communicative Quality	5.54	0.65	5.50	4.50	6.50	6.17	0.74	6.00	5.25	8.00
	Organization	5.04	0.82	5.00	3.50	6.50	5.58	0.93	6.00	3.75	7.00
	Linguistic Accuracy	5.46	0.72	4.75	4.00	6.75	5.12	0.57	5.25	4.00	6.00
	Linguistic Appropriacy	4.73	0.39	5.50	4.25	5.50	5.52	0.75	5.25	4.75	7.50
	Argument	4.79	0.68	4.75	4.00	6.75	5.79	0.83	6.00	4.25	6.75
	Total Average Score	5.11	0.34	5.15	4.60	5.75	5.63	0.50	5.45	5.20	6.85
CG	Communicative Quality	5.85	0.93	6.00	3.75	7.00	6.06	1.21	6.00	3.75	8.00
	Organization	5.50	1.13	5.50	3.50	7.25	5.87	0.89	6.25	4.25	7.00
	Linguistic Accuracy	5.58	1.08	4.75	4.50	8.00	4.92	1.08	5.00	2.00	6.00
	Linguistic Appropriacy	4.75	0.76	5.25	3.75	6.25	5.56	0.40	5.50	5.00	6.25
	Argument	4.62	0.77	5.25	3.50	6.25	5.02	0.54	5.00	4.25	6.00
	Total Average Score	5.26	0.65	5.40	4.00	6.30	5.48	0.64	5.65	4.05	6.35

Note. Scores are out of a total of 9 possible points on a continuous scale. EG= Experimental Group; CG=Comparison Group

Table 5.2 Descriptive Statistics for Measures of Argumentative Discourse Quality

		Pretest (n = 13)					Posttest (n = 13)				
Group	Measure	*M*	*SD*	*Mdn*	*Min*	*Max*	*M*	*SD*	*Mdn*	*Min*	*Max*
EG	Thesis	3.67	0.95	3.75	2.00	5.00	4.06	0.78	4.50	2.50	5.00
	Claims	3.25	0.23	3.25	3.00	3.75	3.31	0.42	3.50	2.50	3.75
	Data	3.17	0.90	3.50	1.50	4.50	3.23	0.70	3.25	2.25	4.50
	Warrant	3.23	0.86	3.25	1.50	4.50	3.12	0.70	3.00	2.00	4.50
	Backing	2.90	1.00	3.25	1.00	4.50	2.88	0.73	2.50	2.00	4.50
	Opposition	1.42	0.82	1.00	1.00	3.25	2.69	1.25	2.75	1.00	4.25
	Response to Opposition	1.33	0.66	1.00	1.00	3.00	2.65	1.43	2.50	1.00	4.75
	Total Average Score	2.71	0.46	2.54	2.07	3.36	3.13	0.64	3.11	2.11	3.89
CG	Thesis	4.02	0.60	4.00	3.00	5.00	4.23	0.61	4.25	3.25	5.00
	Claims	3.54	0.64	3.50	2.75	4.75	3.54	0.58	3.25	2.75	4.50
	Data	3.29	0.61	3.00	2.50	4.75	3.63	0.43	3.50	3.00	4.50
	Warrant	3.12	0.79	3.00	2.00	4.75	3.21	0.79	3.50	1.00	4.00
	Backing	2.77	0.90	2.50	1.50	4.75	2.96	0.87	3.25	1.00	4.00
	Opposition	1.27	0.97	1.00	1.00	4.50	1.46	0.89	1.00	1.00	4.00
	Response to Opposition	1.23	0.83	1.00	1.00	4.00	1.17	0.37	1.00	1.00	2.25
	Total Average Score	2.75	0.52	2.61	2.21	3.93	2.89	0.41	2.86	2.43	3.50

Note. Scores are out of a total of 5 possible points on a continuous scale. EG= Experimental Group; CG=Comparison Group

5.1. Investigating the Effect of Instruction

To determine between-group differences in pretest, that is, if the EG and CG pretest scores were significantly different and if the groups belonged to two different populations of students, I conducted an independent groups Mann-Whitney test on the pretest scores. The results indicated that the groups were not significantly different at the pretest for any of the five categories of overall writing quality, nor any of the seven categories of argumentative discourse quality. The results are displayed in Table 5.3. Therefore, the results suggest that the two groups could be treated as belonging to the same population and were similar for the statistical comparison of the groups.

Table 5.3 Mann-Whitney Independent Groups EG-CG comparison at Pretest (*N*= 26)

	Mdn CG	*Mdn EG*	*U*	*Z*	*p*
Communicative Quality	6.00	5.50	109.50	1.29	.20
Organization	5.50	5.00	108.00	1.21	.24
Linguistic Accuracy	4.75	4.75	81.50	-.15	.88
Linguistic Appropriacy	5.25	5.50	78.50	-.31	.76
Argument	5.25	4.75	76.00	-.44	.68
Pretest Total (MT)	5.40	5.15	105.50	1.08	.29
Thesis	4.00	3.75	103.55	.98	.34
Claims	3.50	3.25	104.00	1.02	.34
Data	3.00	3.50	91.00	.34	.76
Warrant	3.00	3.25	72.50	-.62	.54
Backing	2.50	3.25	75.00	-.49	.65
Opposition	1.00	1.00	73.00	-.94	.58
Response to opposition	1.00	1.00	73.00	-.94	.58
Total (PT)	2.61	2.54	89.000	.23	.84

To determine between-group differences in the posttest, that is, if the two groups were significantly different with respect to overall writing quality and if they now belonged to two different populations, I conducted another independent groups Mann-Whitney test, and the results indicated that the EG ($Mdn = 6$)[21] was significantly different in the Argument trait of overall writing quality from the CG ($Mdn = 5$), $U = 37.50$, $p = .01$, $r = .67$, which indicates a strong effect size. The remaining four traits of the overall writing quality were not significantly different. The results appear in Table 5.4.

To determine if the two groups were significantly different with respect to argumentative discourse quality, I conducted another independent groups Mann-Whitney test, and the results indicated that The EG ($Mdn = 2.75$) was significantly different on the Opposition sub-trait from the CG ($Mdn = 1$), $U = 33.50$, $p = .01$, $r = .76$, which indicates a strong effect size. The EG ($Mdn = 2.5$) was also significantly different on the Response to Opposition sub-trait from the CG ($Mdn = 1$) $U = 29.5$, $p = .00$, $r = .84$, which indicates a strong effect size. The other five sub-traits of argumentative discourse quality were not significantly different. The results are reported in Table 5.4.

[21] In non-parametric comparisons, instead of means, medians are used (Field, 2005)

Table 5.4 Mann-Whitney Independent Groups EG-CG comparison at Posttest ($N = 26$)

	Mdn CG	*Mdn* EG	*U*	*Z*	*p*	*r*
Communicative Quality	6.00	6.00	83.00	-.08	.96	NA
Organization	6.25	6.00	102.50	.93	.36	NA
Linguistic Accuracy	5.00	5.25	81.50	-.15	.88	NA
Linguistic Appropriacy	5.50	5.25	102.00	.91	.39	NA
Argument	5.00	6.00	37.50	-2.42	.01*	-0.48
Posttest Total (MT)	5.65	5.45	88.50	.21	.84	NA
Thesis	4.25	4.50	91.50	.36	.724	NA
Claims	3.25	3.50	99.00	.75	.48	NA
Data	3.50	3.25	118.00	1.73	.09	NA
Warrant	3.50	3.00	100.00	.80	.45	NA
Backing	3.25	2.50	101.50	.88	.39	NA
Opposition	1.00	2.75	33.50	-2.73	.01*	-0.54
Response to opposition	1.00	2.50	29.50	-3.02	.00*	-0.59
Total (PT)	2.86	3.11	63.50	-1.08	.28	

Notes. MT: Multiple-trait rating scale (rubric) measuring overall writing quality, PT Primary-trait rating scale (rubric) measuring argumentative discourse quality. NA: effect size for non-significant results is not reported.

To determine pretest-to-posttest within-group differences for EG, that is, if the EG had significantly improved its overall writing quality over the course of instruction, I conducted a related samples Wilcoxon Signed Rank test. The results indicated that three scores for three traits had significantly increased since the pretest: Argument significantly increased at the posttest (*Mdn* = 6.00) from the pretest (*Mdn* = 4.45), $T = 77.00$, $p = .00$, $r = .59$; Linguistic Accuracy significantly increased at the posttest (*Mdn* = 5.25) from the pretest (*Mdn* = 4.75), T = 57.00, p = .03, r = .42; and Communicative Quality significantly increased at the posttest (*Mdn* = 6.00) from the pretest (*Mdn* = 5.50), $T = 66.00$, $p = .00$, $r = .42$. The other two traits of Organization and Linguistic Appropriacy did not change significantly for the EG. The results are summarized in Table 5.5.

To determine if the EG had significantly improved its argumentative discourse quality over the course of instruction, I conducted a related samples Wilcoxon Signed Rank test. The results indicated that the scores for two traits had significantly increased since the pretest: Opposition significantly increased at the posttest (*Mdn* = 2.75) from the pretest (*Mdn* = 1.00), $T = 61.50$, $p = .01$, $r = .50$; and Response to Opposition significantly increased at the posttest (*Mdn* = 2.50) from the pretest (*Mdn* = 1.00), $T = 2.00$, $p = .01$, $r = -.51$. The other five traits of argumentative discourse quality did not change significantly for the EG. The results are summarized in Table 5.5.

Table 5.5. Related Samples Wilcoxon Signed Rank EG change from Pretest to Posttest (n = 13)

Measure	*Mdn* pre	*Mdn* post	*T*	*Z*	*p*	*r*
Communicative Quality	5.50	6.00	66.00	2.14	.03*	0.42
Organization	5.00	6.00	60.50	1.69	.09	NA
Linguistic Accuracy	4.75	5.25	57.00	2.16	.03*	0.42
Linguistic Appropriacy	5.50	5.25	35.50	.22	.82	NA
Argument	4.75	6.00	77.00	2.99	.00*	0.59
Pretest Total (MT)	5.15	5.45				
Primary-trait						
Thesis	3.75	4.50	56.00	1.34	.18	NA
Claims	3.25	3.50	27.00	.54	.59	NA
Data	3.50	3.25	47.00	.10	.92	NA
Warrant	3.25	3.00	40.00	-.39	.70	-NA
Backing	3.25	2.50	43.00	-.18	.86	NA
Opposition	1.00	2.75	61.50	2.54	.01*	0.50
Response to opposition	1.00	2.50	2.00	-2.60	.01**	-0.51
Total (PT)	2.54	3.11				

Notes. MT: Multiple-trait rating scale (rubric) measuring overall writing quality, PT Primary-trait rating scale (rubric) measuring argumentative discourse quality. NA: effect size for non-significant results is not reported.

To determine pretest-to-posttest within-group differences for CG, that is, if the CG had significantly improved its overall writing quality over the course of instruction, I conducted a related samples Wilcoxon Signed Rank test. The results indicated that none of the five traits of overall writing quality had significantly changed from pre to posttest. The results are displayed in Table 5.6.

To determine if the CG had significantly improved its argumentative discourse quality over the course of instruction, I conducted a related samples Wilcoxon Signed Rank test. The results indicated that none of the seven sub-traits of argumentative discourse quality had significantly changed at the posttest since the pretest. The results are displayed in Table 5.6.

Table 5.6 Related Samples Wilcoxon Signed Rank CC change from Pretest to Posttest (n = 13)

Measure	*Mdn* pre	*Mdn* post	*T*	*Z*	*p*
Communicative Quality	6.00	6.00	36.50	.92	.36
Organization	5.50	6.25	62.50	1.19	.23
Linguistic Accuracy	4.75	5.00	53.00	1.10	.27
Linguistic Appropriacy	5.25	5.50	36.00	.27	.79
Argument	5.25	5.00	59.50	1.62	.17
Pretest Total (MT)	5.40	5.65		1.13	
Thesis	4.00	4.25	61.50		.26
Claims	3.50	3.25	35.50	.22	.82
Data	3.00	3.50	54.50	1.93	.05
Warrant	3.00	3.50	43.50	.35	.72
Backing	2.50	3.25	49.00	.79	.43
Opposition	1.00	1.00	7.00	.73	.46
Response to opposition	1.00	1.00	3.00	.00	1.00
Total (PT)	2.61	2.86			

Notes. MT: Multiple-trait rating scale (rubric) measuring overall writing quality, PT Primary-trait rating scale (rubric) measuring argumentative discourse quality. NA: effect size for non-significant results is not reported

5.2. Summary of Findings

This chapter answered Research Question 1 regarding change from the pretest to the posttest in both argumentative and overall writing quality. The findings suggest positive answers to both parts of the question with some qualification.

The statistical analysis in this chapter indicated that the EG and CG were not significantly different from each other before Instruction began. However, after Instruction, the EG scores were significantly higher than those of the CG in argumentative discourse quality at the posttest. The measure that suggests this finding is the Argument trait of the multiple-trait rating scale which was significantly higher for the EG; a closer examination of the nature of the change using the primary-trait measures reveals that the EG improved significantly in the subtraits of Opposition and Response to Opposition. With respect to the other five sub-traits of the construct of argumentative discourse quality (i.e., Thesis, Claims, Data, Warrant, and Backing) EG and CG were not significantly different.

A pretest-posttest comparison revealed that the EG scores at the posttest were significantly higher than those at the pretest for the same three variables, i.e., MT Argument and

PT Opposition and Response to Opposition. In addition, the EG's scores also significantly increased in Communicative Quality and Linguistic Accuracy over the course of Instruction. However, because the two groups were not significantly different at the posttest with respect to these two overall writing quality traits, Instruction cannot be claimed to be the causal factor for the difference in Communicative Quality and Linguistic Accuracy.

Chapter 6: Effect of Instruction on Characteristics of Texts

This chapter reports the findings concerning Research Question 2: if and how Instruction resulted in a change in the participants' cognitive writing processes and argumentative rhetorical structure as reflected in the characteristics of their texts. To answer the question, I studied four EG participants' cognitive and rhetorical development over the course of Instruction based on the texts they produced in this period. The participants were Max, Natalie, Jay, and Mohammad. Max and Mohammad represent the higher-achieving and Natalie and Jay, the lower-achieving participants (see Section 4.4 for their selection criteria). Their complete profile is displayed in Table 4.2 and their summative assessment scores in Table 4.4. They were between 19 and 22 years old. Max, Jay, and Natalie were native speakers of Chinese and Mohammad of Arabic. Max, Natalie, and Jay self-assessed their writing to be *fair*. Mohammad self-assessed his writing ability to be *good*. Their pretest and posttest scores for Argument, out of a total of five, measured analytically with the primary-trait rubric (see Appendix P) were as follows: Max, (3.1 -- 3.9); Natalie, (3.35 -- 3.1); Jay, (2.1 -- 2.6); and Mohammad (2.3 -- 3.75). The writing topics for each session are presented in Appendix A.

Cognitive development is inferred from the texts by looking for evidence of knowledge-transforming composing (Bereiter & Scardamalia, 1987). The texts that were analyzed included the pretest essay, the seven texts the participants wrote during Instruction and the posttest essay. Inferring process from text required identifying the rhetorical (Mann & Thomson, 1988) and hierarchical (van Wijk, 1999) text structure. Knowledge-transforming is inferred based on (a) how the participants applied the mediational means, i.e., exemplar texts and prompts at different stages (of co-construction) to mediate their writing process; these artifacts mediate the return trip from the rhetorical problem space to the content problem space as theorized by Scardamalia, et al. (1984); (b) the presence and amount of revision they made, specifically whether they expanded the text from the first draft to the second (expansion knowledge-transforming) or they revised the text produced thus far to make it concise (concision knowledge-transforming). As Bereiter and Scardamalia (1987) noted "knowledge transforming process … often reveals itself in substantive modifications of previously written text" (p. 22); and (c) the presence, absence, and quality of the rebuttal and response to rebuttal that they provided as indicators of the "rise above conflict" criterion (Scardamalia et al., 1984). In the pretest essay, Session V Homework

"[HW5]," Session VI, and posttest essay, this is inferred through the latter only, i.e., (c). In these four essays, because only one draft was available, generally neither prompt use nor revision behaviour could be observed. For these four essays, the reader is referred to the rhetorical analysis section to see the evidence for rebuttal and response to rebuttal. Rhetorical development is analyzed by looking for evidence of structural soundness (presence and coherence of the discourse features) and substantive strength (presence and coherence of rebuttals, responses, and qualification) as discussed by Toulmin et al. (1984).

Generally, the findings indicate that Max's knowledge-transforming behaviour became more systematic and his texts' rhetorical structure became more structurally sound and substantively strong. Natalie's cognitive and rhetorical development was impeded by a lack of core linguistic proficiency (Hulstijn, 2011), which required the reader to make many bridging inferences (van Dijk & Kintsch, 1983) to process the texts. Rising above that linguistic processing problem, the reader was able to perceive the cognitive and rhetorical development that was evident in her texts. Jay's development seemed rather flat, with little evidence of change from the pretest to the posttest, except for his positive response to prompt mediation in Session V and his generation of a rebuttal and response to rebuttal on that single occasion. Mohammad's rhetorical and cognitive development was most noticeable in that he moved from no acknowledgement of rebuttal and response to it in the pretest to that in the post test. Mohammad's texts demonstrated improved knowledge-transforming behaviour and rhetorical structure.

This section is organized by first presenting an analysis of the rhetorical development as reflected in the texts produced by each participant. Then, it follows with the analysis of cognitive development for the same participant. This order is chosen because a larger set of student texts is relevant for the analysis of rhetorical development, but a smaller set is relevant for the analysis of cognitive development. For example, for the rhetorical analysis of the following texts, the entirety of the texts was the subject of analysis: the pretest essay, Session V homework, i.e., "[HW5]," Session VI, and posttest essay. However, for the analysis of cognitive development, only two features of the same texts were relevant: Rebuttal and Response to Rebuttal.

Tables 6.1 to 6.4 summarize each participant's rhetorical and cognitive development at the end of the section pertaining to that participant. While all the participants' texts are presented

for the rhetorical analysis section, only the relevant ones are reproduced under cognitive analysis. Some texts are duplicated in both sections to facilitate cross-referencing. The chapter concludes with a summary of the findings for the four participants. In the transcription of the handwritten texts, bold typeface indicates revisions and additions in the second draft. Underlines indicate the prompts transferred to the second draft.

6.1. Max's Rhetorical Development

This section traces Max's rhetorical development from the pretest essay to posttest essay, including the tasks in Sessions I to VI. In the pretest essay, Max's argument (coded and displayed below) contains Claims, Data, Rebuttal, and Response to Rebuttal. Where his argument is enthymematic (i.e., without a warrant *but* coherent), it is structurally sound despite the lack of an expressed warrant; however, at times the lack of a connection between his Data and Claim cause coherence problems. Therefore, missing warrants compromise his arguments' structural soundness. The substantive strength of his pretest essay derives from a rare acknowledgement of Rebuttal and Response to it (usually absent in other participants' pretest essays), although it suffers from unwarranted and/or unclear assertions. Max's pretest essay is coded and analyzed below.

Paragraph 1 *A factory will be build near our house. In my opinion, It has detrimental influence upon our routine lifes (T).*

Paragraph 2 *We must consider that the factory will generate a lot of pollution (C). The first one is noisy. People can not listen to music (D1), can not listen on day (D2), even if people talk to each other yet they have to speak loudly (D3).*

Paragraph 3 *-The second one is air pollution (C). People will live in a full of toxic air environment that is harmful to their healthy (D1). The last one is water pollution (D2). The factory will flood a numerous polluted water into the near river. We can not yet drink the safe water. We will live in a bad environment because the factory will generate a lot of pollution.*

Paragraph 4 *- Another consideration is that our community no longer safe and stable (C). Many strangers will walk through our community (D1). Even though the company will invest a lot money in building a dormitory apartment to supply for the workers.*

Paragraph 5 *-On the other hand, will live in tension and anxiety (C).*

Paragraph 6 *However, the factory will generate employment opportunities for us (R), but if we overly dependent on the factory, we will face more risk. When the behalf [?] generate a gap between the factory and our community, we will face a difficult choice (RR).*

Paragraph 7 *In my conclusion, I disagree that a factory will be built near our community because I don't think it will be beneficial to us.* (Max, Pretest)

In paragraph 1, Max made his position clear in the thesis (T), but did not offer a blueprint for the points he intended to argue. In Paragraph 2, Max started with a clear Claim (C). He first discussed the idea of noise pollution, and provided three Data items consecutively (D1, D2, and D3). He did not provide a warrant to show how these Data were plausible. For example, it is not clear how the noise from the factory can become a barrier to conversation, unless he stated in a warrant that, for instance, he assumed the factory machinery were within the immediate proximity of residences. His assumption should have been expressed explicitly in a warrant to avoid a coherence problem.

In paragraph 3, Max's Claim (C) concerns air pollution. He provided one Data item (D1), toxic air, yet he needed to warrant this Data by stating that his assumption about the factory, that, for example, unless appropriate filters are installed, the factory discharge is toxic. His next Data item concerns water pollution (D2) and is presented in a chain of reasoning: the factory pollutes the water, so we cannot drink it. There is an implicit assumption, i.e., warrant, that the factory discharge is necessarily pollutive. This assumption could have been made explicit with a warrant.

In paragraph 4, Max made another Claim about lack of safety (C). The Data he provided is presence of strangers in the neighbourhood (D1). A warrant is needed here to explain what he assumes about strangers and why strangers compromise safety. His next sentence about building a dormitory seems unrelated to the Claim about strangers, and it poses another warrant problem. In paragraph 5, Max made a claim about anxiety. He did not proceed with an argument.

In paragraph 6, Max, interestingly, provided a Rebuttal, a counter-claim, regarding employment opportunities, as an advantage of building the factory (R). It is one of those rare instances in the pretest essay that a participant acknowledged the Rebuttal. Additionally, it is placed at the proper location in the essay, i.e., after the main argument. He immediately responded to the Rebuttal (RR), which is another rare rhetorical move at this early developmental stage, by claiming that "if we overly dependent on the factory, we will fact more risk." No data is provided for this claim. His last sentence about "a gap between the factory and our community" is unclear, posing a coherence problem, but could be interpreted as a warrant. The use of the words "the behalf" and "a gap" renders part of his Response to Rebuttal incoherent. In paragraph 7, he reworded his thesis.

In Session I, Max's paragraph (coded and displayed below) had all the discourse features, although their quality was not good, especially the Rebuttal and Response to Rebuttal were vacuous; therefore, it was minimally structurally sound and substantively strong. He maintained Rebuttal, Response to Rebuttal, and Qualification slots from the exemplar. Unlike in the pretest essay, he did include an explicit Warrant for his Data. The Warrant establishes the connection between the Data on "increased local income" and the support for building the factory (C). Max also provided a factual Backing for the Warrant. Max supported the Warrant (W) concerning business with the factory by providing "imagined facts" in the form of the Backing (B), by exemplifying the types of things that can be sold to the factory. These "facts" are dubious compromising the quality of the Backing. The content of Max's Rebuttal and Response to Rebuttal are implausible and thus not strong. Overall, this paragraph is a developing step toward structural soundness and substantive strength.

> Building a factory in my community is a good idea C). Factories built near residential *areas increase local residents' income* (D) because *factory residents can do business with the factory* (W). *they can afford the necessities of life such as cigarette, drink, food, so they will earn money in these trade for example* (B). *although some don't like do business, people who don't like money* (R) *my neighbours would probably* (Q) *want to do business with the factory* (RR). For this reason, I would support the building of factory in my area (RC). (Max, Session I)

In Session II, Max's paragraph (coded and displayed below) had the discourse features connected in a structurally sound manner. Unlike, Session I, he now did not simply copy phrases from the exemplar in Task 2, but generated original sentences. Thus, he could be seen as developing toward appropriation of the features. Because he has a Rebuttal and a Response to it in a concession clause in correct grammatical form, his paragraph is judged as substantively strong.

> *Grades can promote students' performance (C). No matter the scores are high or low students can understand their [students?] merit and stortage [shortage?] (D/W). When the students understand their situation of learning, they will be learning efficiently (W), because they can advocate a lot time to remove their shortage of knowledge (B). Although some argue that some students feel frustrated when they get a low scores (R), Most the will endeavor to improve their marks (RR). Therefore, students will probably get a higher marks in the next testing.* (Max, Session II)

Max produced a clear Claim with the topic "grades" and theme "promote students' performance." He followed his Claim with a chain of Data (D), Warrant (W), and Backing (B) similar to the model, but he did not simply repeat the same phrases from the exemplar, but made his own. The clause that follows the initial Data/Warrant sentence is clearly a Warrant (W): "When the students understand their situation of learning, they will be learning efficiently." This

clause (W) relates the idea of the previous sentence (D), i.e., understanding strengths and weaknesses, to the Claim (C), i.e., that grades improve performance. It does so by acting as a bridge: understanding through grades improves performance. His Backing (B), which is similar to a warrant, and may be argued not to be sufficiently factual, is nevertheless relevant and effective. He argued the reason for efficiency was the possibility that grades afforded for addressing shortages. There is an effective, single-sentence, Rebuttal counter-claim in a concession clause, consistent with their exemplar, with the Response to Rebuttal following: "Most the will endeavor to improve their marks" This is an improvement in substantive strength over the vacuous Rebuttal and Response to Rebuttal, which he produced in Session I.

In Session III, Max's argument (coded and presented below) included all the discourse features. Importantly, he also generated a Backing which occurred less frequently in other participants' essays. His argument is both structurally sound and substantively strong. The important features indicative of substantive strength, i.e., Rebuttal, Response to Rebuttal, and Qualification, i.e., "probably" were present in Max's paragraph.

> *Parents should not make important decisions for their older teenage children (C), for older teenage children have to get accustomed to an independent life in few years later (D). Parents make decisions for their children is harmful to their children's future life (W). People can not make decisions independently is dangerous because they only follow blindly to what other say (B).* ***Although someone suggest that parents make important decisions for their older teenage children can relieve their children's stress (R).*** *However, their children will face more and more pressure in the future. At that time, they also need to* make decisions by themselves (RR). Therefore, older teenage children should **probably** (Q) make important decisions by themselves (ResC). (Max, Session III)

His Claim and Data are connected with the conjunction *for*, to signal reason, in an elegant compound sentence. His Data, which was formulated from seven responses to the Data prompt, lays the foundation for a plausible argument. His Warrant implies an antecedent-consequent relation between Data and Warrant. That is, if children do not decide independently, it will be harmful, a classic formulation for warrant. His Backing establishes the reason for the "harm" stated in the Warrant. The Backing may be deemed insufficiently factual, however. His Rebuttal starts with an incorrect conjunction "although"; nonetheless, the proposition entailed in it is relevant to his main argument. The Response to Rebuttal sufficiently addresses it. Therefore, except for a relatively weaker Backing, Max's overall argument is both structurally sound and substantively strong.

In Session IV, Max's argument (coded and displayed below) has all the features except for fact-based data. It is coherent, but it relies on abstract Warrants (W1 and W2) instead of concrete data. This defies the explicit definition of data. The grammatical inaccuracies of the essay do not generally impede interpreting the argument. Thus, I judged it to be structurally sound. The presence of Rebuttal, Response to Rebuttal, although somewhat incoherent, and Qualification indicate minimal substantive strength. The Rebuttal consists of both a counter-claim and the Warrant (W) for it. The Response to Rebuttal is an assertion that misses a required warrant, which if present would improve the substantive strength. Qualification is present.

> *People [who] do not give up, [and] just keep doing, they will be successful (C). People [who] persist to do one thing that [sic* ~~*that*~~*] they will be increasingly familiar [with] what they are doing (W1). Therefore, when they master the various skills of what they are doing, they always can become a successful man (W2). Because they do one thing in a field for a long time, they know the rules, master the best method, and have a stable interpersonal relationship (B). These factors will be beneficial to success.* ***Whereas someone support [sic argues] that people [who]never give up to [sic*** ~~***to***~~***] do one work that migh be harmful to their future (R) because they probably doing what is not suitable for them (W). However, as long as keep a long time to do one thing, they truly understand whether this job is suitable [for] them (RR) .Therefore, people persist to do one thing, they will presumably (Q) be successful (ResC).*** (Max, Session IV, Second Draft)

Max's Claim (C) has a clear topic, "never give up," and theme "successful." Instead of data, he provided a principle that he believed in (W1), which is another way of expressing the proverb *practice makes perfect*. This is an example of an ethical claim in which the distinction between data and warrant is unclear (Toulmin et al., 1984) and Max intuitively realized this. From the Warrant (W1), concerning *practice*, he concluded another Warrant (W2) about mastery and success. Although the truth of Warrant 2 is obvious, he supported Warrant 2 with factual Backing (B). He generated a Rebuttal (R) and the reason for it in the form of a Warrant (W). Then he responded to it. His Rebuttal is grammatically inaccurate and causes reading strain, yet it seems to argue that never giving up can be harmful to one's future; the idea in his Response (RR) is vague. It is not clear whether the person who never gives up will find out if the job is suitable for him, or he will find something suitable in it anyway and thus will continue. Therefore, a warrant for the Response to the Rebuttal is critically absent. He concluded the paragraph with a Restated Claim with Qualification "presumably." Overall, Max's paragraph is structurally sound, but its substantive strength is compromised by the coherence problem in the Response to Rebuttal.

In Session V, Max's argument (coded and displayed below) included all the discourse features. Max's argument is generally structurally sound. His essay is also substantively strong as it contains a coherent Rebuttal, Response, and Qualification.

> *(1) I disagree that businesses should do anything they can to make a profit because (2) (C)some illegal business can contribute to the big profits such as* ***drugs trade (D1) guns trade (D2) and animals trade (D3).*** *(4) These business is harmful for human being (W).* ***Businessman*** *can acquire much profits from the drugs and guns trade.* ***Due to these trades,*** *thousands of people* ***were murdered or addicted to the drugs (B). However, (7)****some people may agree [sic disagree]. They may say the characteristic of business is to* ***earn money (R). In contrast businessmen*** *can only earn money by law and ethic code (RR). Therefore, businesses should not presumably (Q) do anything they can make a profit.* (Max, Session V. Second Draft)

Max has a clear, barring the use of the word "anything," Claim (C) with both a topic and a theme. He provided three Data items (D1-D3) in his second sentence. He asserted his Warrant (W), which effectively links his Data (D1-D3) to his Claim (C). He provided Backing (B) to support his Warrant (W) about harm by demonstrating how harm is inflicted. He rebutted his argument (R) by asserting the opposite view that "the characteristic of business is to earn money." He offered a Response (RR), by highlighting the requirements of law and ethics in order to make money. The argument is structurally sound; however, Max could improve its structural soundness by clarifying that he intended the word "anything" in the topic to mean anything illegal or unethical. He used "anything" literally and categorically, which might be idiosyncratic, cultural, or L2 related. Another valid, interpretation of "anything" could be "anything legal and ethical." On the other hand, it might not be reasonable to expect him to notice this nuance and manifest it rhetorically, in the confines of this class activity at his rhetorical developmental level. Overall, Max's argument is generally structurally sound and substantively strong.

For his Session V Homework (coded and displayed below), Max's extended argument was complete with all the features including Backing. This made his argument structurally sound. It was also substantively strong because it also contained a coherent Rebuttal, Response to Rebuttal, and Qualification.

Paragraph 1 *Nowadays, people increasingly like traveling in the vacation. The best way to travel is in a group led by a tour guide (T) because this method is safe, knowledgeable, and economical (BP).*

Paragraph 2 *The best way to travel is in a group led by a tour guide, for it is safe (C). The tour guide is familiar with the local environment (D1). In addition, the group members can take care each other (D2). Rabbers [sic robbers] and thieves always attack traveler who is single*

(B). Moreover, they do not harm the traveller who are in a group (W). The tour guide select the safest line to travel (D3). When traveler go to the bathroom, the other members of the group can take care his bag (D4). Therefore, people travel in a group led by a tour guide is very safe

Paragraph 3 *Another reason why the best way to travel is in a group led by a tour guide is that people can acquire knowledge (C). The tour guide receive professional training before they get a job (D). As a result, traveler can acquire knowledge about the tourist attractions from the tour guide (W). Introducing the knowledge to the travellers is the tour guide basic work (B). Furthermore, the tour guide familiar with the local attractions (D/B). Therefore, the tourist can benefit from this travel this is in a group led by a tour guide.*

Paragraph 4 *The best way to travel is in a group led by a tour guide because it is economical (C). It is more economical and less time consuming that traveler travel in a group because almost every attraction has discount to tour groups (D). Hence, tourists can spend lesser money to visit attractions (W).*

Paragraph 5 *In the other hand, some people indicate that travelling in a group makes tourist feel restricted (R). Actually, traveler can have a free activity on the last day (RR). Overall, group tour probably (Q) is the best way to travel.*

Paragraph 6 *In conclusion, the best way to travel is in a group led by a tour guide because it is safe, knowledgeable, and economical (ResT). Although there are many ways to travel, the group tour is the best way for tourists. In the future, increasingly people will choose this way to travel.* (Max, Session V homework)

In paragraph 1, Max's Thesis (T) is clear with three Blueprint items (BP). In paragraph 2, Max's Claim (C) is complete with both a topic and a theme. He provided two Data items (D1, D2) enthymematically. He seems to assume the following warrants: that the guide's familiarity with the area and the collective nature of the group bring safety. For the latter assumed warrant, he provided a Backing (B). Then, he provided a Warrant (W) for Backing (B) by stating the principle the Backing rests on: "Moreover, they do not harm the traveller who are in a group." The use of conjunctive adverb "moreover" is problematic, since the sentence that follows is not an addition, but a reason. He provided two more Data items (D3 and D4). In D3, it is unclear what he meant by "line," perhaps "route" or "path." Overall, his support consists of a series of Data items, with assumed warrants, supported as enthymemes. His use of Warrant for a Backing is notable because he has intuitively managed to formulate a "recursive syllogism," when the backing, as factual information for the warrant, requires warranting in its own right. I judged this paragraph to be structurally sound.

In paragraph 3, Max's Claim (C) also has a clear topic and theme, followed by a Data (D). The next sentence contains the Warrant (W), yet it incorrectly starts with "as a result" and not "because." The general formula taught in class was "C because of D, since W, as B." The

reason the sentence with “as a result” qualifies as a Warrant is that it can be reworded with “because” as follows: “travelers can acquire knowledge about the tourist attractions because the tour guide is knowledgeable.” (Confusing discourse markers was a common problem with this group of participants. Also, see the discussion in Mohammad Session V homework.) Next, he supported the Warrant (W) with a Backing (B), the fact that it is the tour guide’s “basic work” to inform the tourists. He added another fact (D/B) which could be either Data for the Claim (C) or Backing for the Warrant (W). I judged this paragraph to be structurally sound.

In paragraph 4, Max’s Claim (C) also has a clear topic and theme. His next sentence simply repeats the Claim, but adds one Data item, “discount” (D). He added an appropriate Warrant. Although the paragraph is short, it is a complete C-D-W argument. For this reason it is structurally sound. In paragraph 5, Max generated a Rebuttal (R), and responded (RR) with a Data item, “free activity on the last day,” which is an enthymeme. Max could strengthen his argument by adding a warrant explaining how the free activity would resolve the restriction. His use of qualification (Q) “probably” is notable. I judged this paragraph to be substantively strong. In paragraph 6, Max provided a restated thesis and concession regarding other ways to travel.

In Session VI, although Max’s essay has all the features, except for the Backing, his essay is neither structurally sound, nor substantively strong. It is not sound because there are unwarranted Claims and Data, which left the reader wondering about their justification. Because there were no traces of prompt use in his writing, it is possible that the absence of prompt mediation contributed to its lower quality. The lack of substantive strength, in part, originates from a rather dismissive Response to Rebuttal. He, nonetheless, included Qualification in his reworded thesis.

Paragraph 1 *people indicate that a person should share his idea with others when he makes a decision. In my opinion, a person should make an important decision alone (T) because a person should have a independent thinking and he has the responsibility to make a decision alone (BP).*

Paragraph 2 *A person who has a independent thinking can make a important decision alone (C). A person should have a independent thinking in his whole life (W). However, It is impossible that others help you make decision everytime (D1). As a result, a person have to make an important decision alone (S1). Independent thinking contributes to people who make decision alone (D2). Therefore, a person should make an important decision alone because* ***he had*** *independent thinking ability (ResC).*

Paragraph 3 *Another reason why people should make an important decision alone is that he has the responsibility to make decision alone (C). A person must have the duty for his decision(C_1). Whether the results of the decision is good or bad has to directly face the results (C_2). Therefore, an important decision alone is a person's responsibility (ResC).*

Paragraph 4 *However, some people argue that It is easy to make mistakes when a person make an important decision alone (R). Nobody is perfect, so a person do not need to pay more attention to the results (RR). He just need to follow his inner voice (S1).*

Paragraph 5 *In my conclusion, a person should make an important decision alone because he is a independent person, and he has the duty for his action. Hence, it is probably (Q) correct that a person make important decision alone.* (Max, Session VI)

In paragraph 1, Max's Thesis (T) and his Blueprint (BP) are both clear. In paragraph 2, Max's Claim (C) changes the topic from making an important decision alone to independent thinking. He continued with a Warrant (W) by presenting the principle which his Claim is based on; however, it is not clear how this principle relates to his Claim. Then, he provided Data (D1) for his Claim (C) by making a categorical statement about the impossibility of constant joint decision making. This statement itself needs a warrant by demonstrating the asserted impossibility. Sentence S1 seems to be a hasty generalization. His second Data (D2) is an appeal to the benefit of individual decision-making, which again needs to be warranted. In this paragraph, Max argued for the benefits of independent thinking, of which deciding by oneself is an instance. There is a degree of equivocation, which he should have resolved: Independent thinking and deciding alone are not equivalent concepts, and if Max wanted to equate them he needed to define the terms first.

In paragraph 3, Max introduced the theme "responsibility" to make a Claim (C). Max's support rests on two sub-claims (C_1, C_2) without any grounding or warrants. In paragraph 4, Max's Rebuttal (R) is in the form of a counter-claim, which is clear, but his Response (RR) is

rather dismissive. It justifies making mistakes by appealing to humans' fallibility; then, it claims that results are not important. Because his Rebuttal (R) raises the serious issue of mistakes in individual decision making, Max should have responded to it more rigorously by establishing, in a warrant, why or how the possibility to make mistakes should not be a concern. In paragraph 5, Max used a proper qualifying (Q) adverb in his reworded thesis.

Max's posttest essay (coded and displayed below) has all the discourse features. It is structurally sound because the Claims had proper Warrants. Except for some instances of incoherence in paragraph 2, the essay was generally coherent. It is substantively strong, too, because of the presence of Rebuttal, Response to Rebuttal, which are coherently connected, and Qualification. His Response to Rebuttal is a complete argument with a Claim and two Data items.

Paragraph 1 *Nowadays, increasingly people like to travel on their vacations. Travel is the best way to relax people's bodies and ease their minds. As usual travel is divided into two forms that are to travel in a group and or alone. They best way, to travel is in a group led by a tour guide (T) because it's convenient and cheap (BP).*

Paragraph 2 *Convenience is a main reason why people should travel in a group led by a tour guide (C). People do not need to take the schedule (D1), the prices of tourist attraction (D2) and the transportation into account (D3) while they only need to follow their tour guide (W). It is happy [?] that traveler only concentrate on the beautiful tourist attractions (S1). Therefore, traveling in a group is a less time-consuming way to enjoy the travel (S2) because they can dedicate more time to visit more tourist attraction (S3). Overall, the best way to travel is in a group because it is convenient.*

Paragraph 3 *The best way to travel is in a group led by a tour guide (C) can be attributed to the lower prices (D1). Almost, every tourist attraction has discounts to group traveling (D2). It is economical way to travel because people are to travel in a group save their bugets [sic budgets] than traveler who travel alone (W). Therefore, the lower prices cause the best way is travel in a group.*

Paragraph 4 *However, someone argue that people who travel in a group are restricted (R). Actually, travelers who are in a group always have a free time to travel on the last day (C). People are free to go to where they want to go such as shopping malls (D1) and historical attractions (D2). Therefore, travelers have enough time to travel alone (RR), and the tour guide can give travelers some good suggestions).*

Paragraph 5 *In conclusion, convenience and the lower prices (BP) are the reason why the probably (Q) best way to travel is in a group led by a tour guide. Although the free travel is popular in recent years, the group travel also dominate the travel's market. In the future, the group travel companies will create the most comfortable forms for the traveler because they are very professional.* (Max, posttest)

In Paragraph 1, Max has a clear Thesis (T) and Blueprint (BP). In paragraph 2, Max's Claim (C) has a clear topic and theme. The topic is "travel in a group led by a tour guide," which

comes in the predicate position. The theme "convenience" comes in the subject position. The reversal of the order of topic and theme suggests a higher level of syntactic maturity in formulating a claim, which was absent in his pretest essay. He provides three Data items (D1, D2, and D3) and immediately warrants the Data in the subordinate clause that follows (W). The Warrant (W) indicates how the three Data items make the travel convenient.

There seems to be a reasoning error concerning sentences S1, S2 and S3. From the three Data items he concluded S1 and S2. However, after his conclusion, he introduces another reason clause (R3), which I interpreted as either cyclical or redundant. To demonstrate the problem, note the diagram below for this chain of reasoning (→indicates "therefore" and introduces the conclusion):

1.[because of] schedule (D1), the prices of tourist attraction (D2) and the transportation (D3) →
2.traveler only concentrate on the beautiful tourist attractions (S1)→
3.Therefore, traveling in a group is a less time-consuming way to enjoy the travel (C')(S2) ←
4.because they can dedicate more time to visit more tourist attraction (D')(S3).

Sentences 1 and 2, above, logically lead to 3, so does 4. This makes clause 4 unnecessary or cyclical in the form of the fallacy question begging: the Data (D') in 4 asserts the Claim (C') in 3. This, however, does not detract from the paragraph's overall structural soundness.

In paragraph 3, Max took a Data item (D1), lower prices, from paragraph 2, and made it the first Data for his Claim (C). This is confusing, because my interpretation of paragraph 2 was that he had taken three Data items, including lower prices, to be factual examples of his main idea, i.e., convenience; however, it turned out that he might have intended the three Data items to form his Blueprint of themes to discuss in two paragraphs. Next, Max provided Data (D2) followed by what is clearly a Warrant (W). It is a Warrant because tourists' lower budgets are ostensibly linked to their desire for lower prices, the theme of the Claim. The use of "because" reflects the instruction on how to initiate the data-warrant-backing chain: "X is the case (C) because of (W) since (B)."

In paragraph 4, Max offered a Rebuttal (R), which is a counter-claim, not developed into a counter-argument, which should minimally include data for the Claim. However, his minimal approach is consistent with the exemplars he received in my instruction. For Response to Rebuttal, he generated a complete argument. First, he made a Claim (C) and, then, offered two

Data items (D1 and D2). He concluded this Claim-Data sequence by restating his Response to Rebuttal (RR). This makes his overall argument substantively strong. He initiated a new claim at the end of his rebuttal paragraph (S1), which appears to be an after-thought and was left unsupported. In paragraph 5, Max restated his thesis and included a Qualification.

In summary, Max's posttest essay has all the discourse features. Whereas the pretest essay has a few instances of incoherence, the posttest essay has none. The pretest essay included unwarranted data, where the lack of connection to the claim caused strain. No major warranting problem was observed in the posttest essay. As regards substantive strength, both the pretest essay and posttest essay feature rebuttal and response to rebuttal, but the one in the posttest essay is much better developed and organized because he included a complete argument for his Response to Rebuttal. Therefore, the posttest essay is more structurally sound and substantively stronger than the pretest essay. (I am surprised the raters did not see an improvement from pretest essay to the posttest essay for Max.) During his writing development, the quality of Max's writing fluctuated, an instance of the developmental U-curve, but his posttest essay shows one of his better performances during the Instruction. Table 6.1 summarizes Max's rhetorical development.

Table 6.1. Summary of Max's Rhetorical Development

Session	Argument quality	
	Structural soundness (Coherence + C, D, W, B)	**Substantive strength** (Coherence + R, RR, Q)
Pre	Text includes Cs, D. No W or B. At times his Ds are unwarranted without a clear connection to C, compromising coherence, so not sound.	A rare acknowledgement of R and RR but with coherence problems, so not strong.
I	Paragraph has all the discourse features, but low quality compromising coherence.	R, RR, and Q maintained from the exemplar. This is unsurprising since he already had an R and RR, but not substantively strong since RR vacuous.
II	All discourse features present in a structurally sound manner. Unlike, Session I, he now does not copy phrases from the exemplar	R and R are present in a concession clause in correct grammatical form; hence, substantively strong.
III	All discourse features present. The presence of B is notable, which occurs less frequently in student essays. Structurally sound.	R, RR, and Q are present. Substantively strong.
IV 2 drafts	All discourse features present, but instead of D, he relies on abstract Ws, yet still structurally sound.	R, RR, and Q are present. R consists of both a counter-claim and W for it. RR is an assertion that misses a required W, and is somewhat incoherent. Minimally string.
V 2 drafts	All discourse features present. Structurally sound.	R, RR, and Q are present. Substantively strong.
HW5	All discourse features present including B. Structurally sound.	R, RR, and Q are present and coherent. Substantively strong.
VI	All discourse features present except B. However, not structurally because there are unwarranted Cs and D.	R, RR, and Q are present, but his RR is simply dismissive of R; hence, low substantive strength.
Post	All discourse present and coherent. No major W problems, unlike pretest, except in paragraph 2. Sound.	R, RR, and Q are present and coherent; so substantively strong. Posttest much better developed.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal, Q=Qualification; HW5= Session V homework.

6.2. Max's Cognitive Development

In the pretest essay, Max wrote a Rebuttal or Response to Rebuttal in a separate paragraph; hence, there was direct evidence for knowledge-transforming composing ability although there were coherence issues as discussed above.

In session I, mediated by the exemplar paragraph, Max successfully generated ideas within the discourse schema. The topic was: *Write another paragraph to support [or oppose] building a factory in your area*. Max' paragraph is coded and reproduced below. His text suggests knowledge-transforming behavior since the rhetorical discourse concepts drove the content generation process. The italics indicate the text he generated within the discourse schema of the exemplar text, which is in regular typeface.

> Building a factory in my community is a good idea C). Factories built near residential *areas increase local residents' income* (D) because *factory residents can do business with the factory* (W). *they can afford the necessities of life such as cigarette, drink, food, so they will earn money in these trade for example* (B). *although some don't like do business, people who don't like money* (R) *my neighbours would probably* (Q) *want to do business with the factory* (RR). For this reason, I would support the building of factory in my area (RC). (Max, Session I)

He repeated the phrases from the exemplar verbatim but generated new ideas for Data, Warrant, Backing, Rebuttal, and Response to Rebuttal. This indicates knowledge-transforming behavior since the discourse categories, embedded in the exemplar seem to have mediated generating new content. It appears that Max responded well to the mastery model (Zimmerman & Kitsantas, 2002). He was able to extract a textual schema (the phrases representing the discourse features) and apply it generically to a new theme (*increased income*) on the same writing topic. It appears that two factors mediated his generation process: the knowledge of the discourse schema and the exemplar text. The presence of a Rebuttal and Response to Rebuttal, in itself, is evidence for knowledge-transforming.

In Session II, Max's paragraph included all the discourse features, coherently connected. The topic was: *Grades (marks) encourage students to learn.* Unlike Session I, he did not simply copy phrases form the exemplar in Task 2, but formulated his original wording. Therefore, Max could be seen as developing toward appropriation of the features, i.e., Claim, Data, Warrant, Backing, Rebuttal and Response to Rebuttal as coded below:

> Grades can promote students' performance (C). No matter the scores are high or low students can understand their [students?] merit and stortage [shortage? (D)]. When the students understand their situation of learning, they will be learning efficiently (W), because they can advocate a lot time to remove their shortage of knowledge (B). Although some argue that some students feel frustrated when they get a low scores (R), Most the will endeavor to improve their marks (RR). Therefore, students will probably get a higher marks in the next testing. (Max, Session II)

He included a Rebuttal and Response to it in a coherent concession clause in correct grammatical form, which is indicative of knowledge-transforming composing mediated by the discourse schema. In session III, mediation was provided with a set of think-sheets, one for each discourse feature. In response to the prompt questions for Data, for example, Max generated seven sentences (see Figure 6.1). (The facsimile of the think-sheet is reproduced for Max, only. For the other participants the content of the think-sheets is described only.)

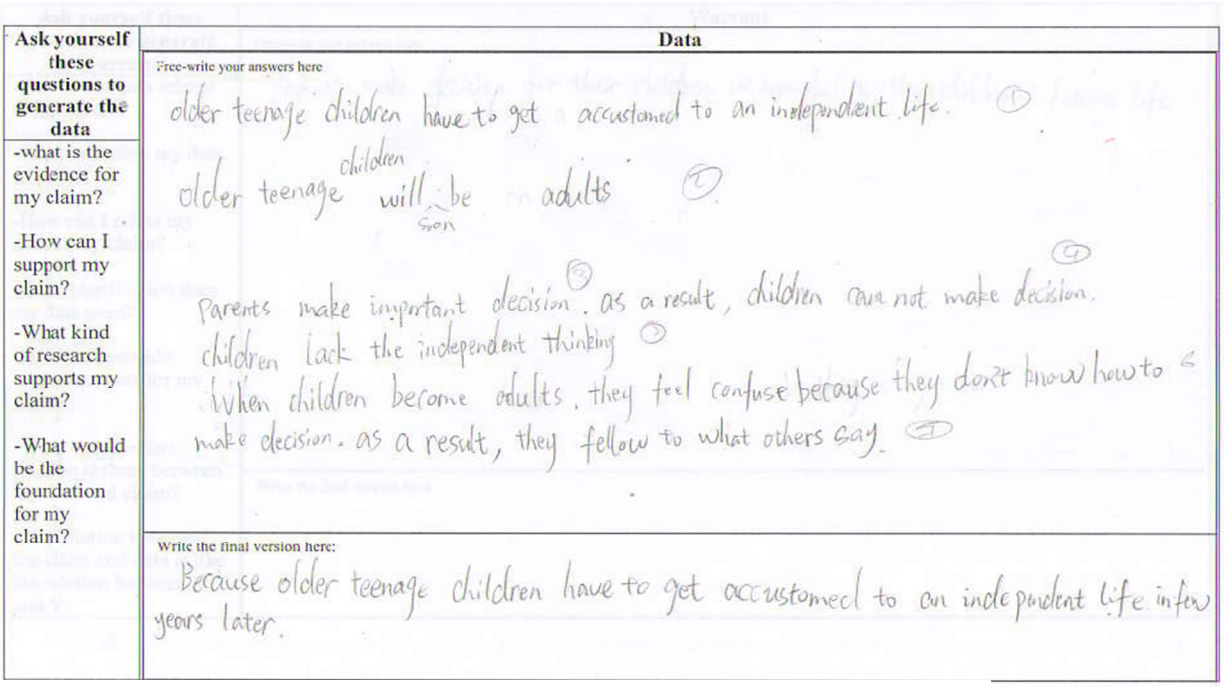

Figure 6.1. Max's think-sheet for the Generation of Data

From these seven sentences, Max formulated one final sentence, a classic case of concision knowledge-transforming for two reasons: (a) he managed to solve the problem of Data generation initiated in the rhetorical problem space by responding to the prompts, and used them to mediate generation in the content problem space, and (b) the ideas/text produced in response to the prompts are greater than the one he formulated as the final solution, an instance of concision knowledge-transforming. This is akin to think-aloud protocols of expert writers in which they generate more ideas than they inscribe (Bereiter & Scardamalia, 1987).

In response to the prompt for Claim, Max generated two sentences, and three words, from which he formulated one complex-compound sentence. In response to other prompts, he generated only one sentence each, all of which indicating knowledge-transforming by showing responsivity to prompts. Compared with the final sentence he formulated on the think-sheets, Max's final paragraph shows only one major instance of expansion knowledge-transforming, he expanded one note "relieve stress" on the prompt sheet for Rebuttal to the concession clause in bold below. Expansion knowledge-transforming happens when the generation of one idea mediated by a prompt, or otherwise, leads to the generation of another idea. Max's Session III paragraph is coded and displayed below.

> *Parents should not make important decisions for their older teenage children (C), for older teenage children have to get accustomed to an independent life in few years later (D). Parents make decisions for their children is harmful to their children's future life (W). People can not make decisions independently is dangerous because they only follow blindly to what other say (B).* ***Although someone suggest that parents make important decisions for their older teenage children can relieve their children's stress (R).*** *However, their children will face more and more pressure in the future. At that time, they also need to* make decisions by themselves (RR). Therefore, older teenage children should **probably** (Q) make important decisions by themselves (ResC). (Max, Session III)

In Session IV, Max composed two drafts (coded and displayed in Figure 6.2), as per instructions. All the discourse features were present in his second draft. He only transcribed two prompts, which he used in order to generate the Claim, and deleted them in the second draft, which is akin to when think-aloud protocols are larger than the text generated, an instance of knowledge-transforming. This provides partial evidence for knowledge-transforming since he did indicate using the prompt or rhetorical problem solving. It is possible that Max, to some extent, dispensed with the prompts and did not use all of them overtly to generate discourse features, because he might have taken a step toward internalizing them. Therefore, it is possible that external mediation had become internal mediation for him; the presence of the prompts in the previous task and the existence of the discourse features in this one supports the internal

mediation claim. The presence of Rebuttal and Response to Rebuttal in his second draft is a strong indicator of mediated knowledge-transforming. If his first draft is taken as analogous to a think-aloud protocol, then his final product demonstrates expert-like composing by featuring major content revisions and additions.

First draft (focused freewriting)	Second draft
Topic: *The expression "Never give up" means to keep trying and never stop working for your goals. Do you agree or disagree with the following statement?*	
~~My topic is never~~ give up ~~my opinion is~~ I agree with it (C). as long as people don't give up, just keeping doing, they will be successful. People persist doing one thing that they will increasingly familiar what they are doing (W1) Therefore, when they master the skills they always can be a successful man (W2). Because people do sth in a field for a long time, they know the rules, the methods, and interpersonal relationship (B). these factors will be benefit to success someone support that. people never give up to do one work. they unsuitable. (?)	*People [who] do not give up, [and] just keep doing, they will be successful (C). People [who] persist to do one thing that [sic ~~that~~] they will be increasingly familiar [with] what they are doing (W1). Therefore, when they master the various skills of what they are doing, they always can become a successful man (W2). Because they do one thing in a field for a long time, they know the rules, master the best method, and have a stable interpersonal relationship (B). These factors will be beneficial to success.* ***Whereas someone support [sic argues] that people [who]never give up to [sic ~~to~~] do one work that migh be harmful to their future (R) because they probably doing what is not suitable for them (W). However, as long as keep a long time to do one thing, they truly understand whether this job is suitable [for] them (RR) .Therefore, people persist to do one thing, they will presumably (Q) be successful.***

Figure 6.2. Max's Session IV Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Max had used. If Max deleted the prompts in the second draft, they are indicated with a strike-through. In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In Session V, Max composed two drafts, as well (coded and displayed in Figure 6.3). The knowledge-transforming dialectic is evident when comparing Max's first and second drafts. In the first draft, Max wrote the prompt numbers that he used to generate the sentences. This indicates the formulation of the rhetorical problems to be solved in the content problem space. The second draft revisions indicate problem solving both in the content problem space and rhetorical problem space. For example, he seemed to have generated the ideas "guns trade and animals trade" in the content domain and introduced two formal discourse markers "however" and "in contrast" in the rhetorical domain. These indicate expansion knowledge-transforming. In draft one, Max changed the word *disagree* to *agree* in prompt number 6. It seems that for Max the object of the verb *agree* is the proposition in the task topic and not his own claim, i.e., *some agree that should do anything they can to make a profit.* He has transformed the prompt to suit

his rhetorical purpose, which indicates movement in his meta-cognitive ability to reconcile opposite opinions.

First draft (Focused freewriting)	Second draft
Topic: *Businesses should do anything they can to make a profit.*	
(1) I disagree with that businesse should do anything they can to make a profit. *(2) Some illegal business can contribute to the big profits such as drugs.* *(4) These business are harmful to human being.* *(5) Business man can acquire much profits from the drugs trade, hundreds and thousands people died when they are addicted to the drugs.* *(6) [sic 7] <u>But people may agree[sic disagree]e. They may say</u> the characteristic of business is profit.* *(7)[sic 8] But we not only have laws but we also have ethics code.* *(8) [sic 10]Therefore Business should not presumably do anything they can make a profit.*	*(1) I disagree that businesses should do anything they can to make a profit because (2) (C)some illegal business can contribute to the big profits such as drugs* ***trade (D1) guns trade (D2) and animals trade (D3).*** *(4) These business is harmful for human being (W).* ***Businessman*** *can acquire much profits from the drugs and guns trade.* ***Due to these trades,*** *thousands of people* ***were murdered or addicted to the drugs (B). However, (7)***<u>*some people may agree [sic disagree]. They may say*</u> *the characteristic of business is to* ***earn money (R). In contrast businessmen*** *can only earn money by law and ethic code (RR). Therefore, businesses should not presumably (Q) do anything they can make a profit.*

Figure 6.3. Max's Session V Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Max had used. The numbers in parentheses correspond to the number of the prompt used. If Max deleted the prompts in the second draft, they are indicated with a strike-through. In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In Session VI (see rhetorical analysis above) Max wrote a complete essay. This essay included no traces of the prompts as mediational means, unlike in Sessions IV and V. Hence, this essay shows no evidence for overt knowledge-transforming, except for the presence of Rebuttal and a Response to it; however, their quality was low. This suggests a classic U-shaped drop in the quality of his writing since session V, which could have occurred because he might have not used the prompts to mediate his writing, without being instructed to do so. When the prompts, as auxiliary means for rhetorical problem-solving were not overtly used, the quality of writing dropped. This drop in quality may also be attributed to his decision not to take advantage of the five-minute focused freewriting, which would facilitate knowledge-telling. The prompts define the rhetorical problem and allow Max to conduct heuristic searches (Cumming, 1989) in the content problem space for the retrieval of the relevant items of knowledge. His coded essay is displayed for rhetorical analysis in the previous section.

The essay Max wrote for Session V homework, as well as his posttest essay, featured both a Rebuttal and a Response to Rebuttal, which are indicative of knowledge-transforming. (See rhetorical analysis above.)

In summary, Max demonstrated knowledge-transforming composing at different rhetorical levels, from dialectical movement between the two problem spaces as evidenced by the use of prompts, the revisions he made, and the amount of text he generated in the second drafts. His second drafts showed evidence of substantive knowledge transforming through the addition of new phrases, deleting the colloquially phrased prompts, and modifying and expanding previous thought. It can be inferred that he internalized the use and production of claim, data, rebuttal, and response to rebuttal, but he was still developing with warrant and backing. Table 6.2 summarizes Max's cognitive development over an eight-week period.

Table 6.2. Summary of Max's Cognitive Development

Session	**Knowledge-transforming (K-Tr)**
Pre	R and RR present; hence, K-Tr, but coherence problems.
I	R and RR present. Generated ideas within the schema. He repeated its phrases, but generated new ideas for D, W, B, R, RR; hence, K-Tr.
II	R and RR present. Generated ideas within the schema. He did not repeat the exemplar frame, but generated new ideas for D, W, B, R, RR; hence, K-Tr.
III	R and RR present. K-Tr in varying degrees of prompt responsivity: In response to the D prompt, he generated seven sentences, and selected one. For C he generated two sentences, and three words, and selected one sentence. For all other features, he generated one sentence or a note. One instance or EK-Tr: expanded a note for R to a complete sentence in the final draft.
IV 2 drafts	R and RR present. Prompts used to generate C. prompts deleted on second draft; hence, CK-Tr. Internalization: he did not use all prompts, yet discourse features were present. Major content revisions on second draft; hence; K-Tr.
V 2 drafts	R and RR present; Indicated prompt numbers he used to generate the sentences of the first draft. Revisions in draft 2 EK-Tr.
HW5	Strong R and RR present; hence, K-Tr.
VI	R and RR present, but low quality. Drop in knowledge-transforming composing. No evidence of prompt use. Lower text quality.
Post	Strong R and RR present; hence, K-Tr.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal; K-Tr: knowledge-transforming; EK-Tr: Expansion knowledge-transforming, CK-Tr : concision knowledge-transforming; HW5= Session V homework

6.3. Natalie's Rhetorical Development

Natalie's pretest essay was riddled with grammatical errors that caused comprehension, and, thus, coherence, problems. Thus, interpretation of her discourse relied on my many "bridging inferences" by trying to rise above the grammatical inaccuracies to construct a *textbase* of her writing (van Dijk & Kintsch, 1983, p. 49). In the pretest essay, if the assessor were able to rise above the grammatical inaccuracies, some of the discourse features, which were the subject of Instruction, could be located in rudimentary form. She consistently displayed both data and warrants for her claims. Interestingly, she did include a Rebuttal and Response to Rebuttal at this early stage in her writing development. Therefore, if one were willing to make an effort to create a *textbase* of her writing, one could see evidence for emerging structural soundness and substantive strength. This might suggest that Instruction did not necessarily introduce discourse concepts that were completely new to Natalie, but that it probably made that knowledge scientific and mediated the conscious application of that knowledge, which is the essence of development (Vygotsky, 1986). Natalie's pretest essay is coded and analyzed below.

Paragraph 1 *The developing of economy, currently situation become so comprented [complicated?]. There are many company is planning to build a factory to enchange [change?] their development. Personally, In my opinion, I oppose the factory near my community (T). The factory causes some effects on traffic, environment (BP). There are so me [many ?] reasons in following.*

Paragraph 2 *To start with, traffic is a important transportment [transportation?] in a city (S1). If there is a factory near my city, it could be cause some traffic jam (C-D1). For example, befor the factory build, it need lots resources to buit [sic build?] the building. there are may tracks come through, lead to the street is busy, and narrow (W1). It's shift people's daily life, such as: work late. The traffic noise could be the other reason (D2). The busy traffic must be noise, that can be bother the people that living near the street. Traffic pressure make people don't have good montion [motivation?]on some work (W2.)*

Paragraph 3 *The other one is environment affects people's health (S1). The factory is working hard and can't avoid pollution (C). The dirty water run into the river or lake (D1). It's polluted the water, and the water is harmful for our health (W1). The air pollution (D2) cause the plants not growing well, the sky is not that beauty than befor. Unde [under?] the polluted air, we feel uncomfortable and feel more pressure (W2). Although the factory improved the developing of economy (R), we prefer the health environment (RR).*

Paragraph 4 *To sum up, traffic problem and polluted environment cause more pressure, and it is not good for our health. We prefer the quite [sic quiet] and cleaning [sic clean] city instead o developing economy.* (Natalie, pretest)

In paragraph 1, despite the many grammatical inaccuracies which cause strain for the reader, Natalie's Thesis (T), with two clear Blueprint items (BP), clearly expresses her opposition to the factory. Linguistically, she seems not to have hesitated to take chances with forms she could not accurately use. She seems to have adopted a risk-taking attitude toward her English development, which is considered an important characteristic of L2 learning (Brown, 1987, p. 104).

In paragraph 2, Natalie seems to have included both her Claim and first Data item in the same sentence (C-D1), which implies her objection to the factory. I could not interpret Sentence 1 (S1). Grammatically, she seems to have an idiosyncratic use of the verb pattern "cause," which permeates her writing. Her Warrant (W1) for D1 explains how traffic jams are caused by the factory. Grammatical errors make it difficult to interpret her writing; however, I think her Warrant (W1) states that the construction of the factory causes traffic problems due to the narrow city streets. Her second Data item (D2) is supported with a Warrant (W2) that relates the traffic noise to the factory. Language-related coherence problems detract from structural soundness.

In paragraph 3, the theme of her Claim "pollution" (C) comes after the first sentence (S1). Thus, the first and the second sentences together contain her Claim. For Data she cited dirty water (D1), and related it to the Claim by asserting "the water is harmful for our health" (W1). For the second Data, she cited air pollution (D2) and related it to the fact the residents "feel more pressure (W2)," presumably caused by the air pollution caused by the factory. She generated a single clause Rebuttal (R), which she responded to (RR), but the response is dismissive. The existence of a Rebuttal and Response to Rebuttal, albeit in rudimentary one, before the main Instruction, is notable since that is an important indicator emerging substantive strength. In paragraph 4, she reworded her Thesis and Blueprint.

Natalie's Session I text was not available. Therefore, analysis continues with Session II. In Session II, Natalie's text contained all the discourse features, except backing, and was more coherent than her pretest essay, although there was a problem with the order in which the features were presented, which rendered some sentences irrelevant. The improved coherence could be attributed to the exemplar which had mediated the production of her text. Because there were Data and Warrant which were relevant to the Claim, her argument was more structurally sound than the one in the pretest essay. Her argument also had the main features for substantive

strength Rebuttal, Response to Rebuttal and Qualification. For the text to be judged structurally sound, I had to make some bridging inferences (van Dijk & Kintsch, 1983, p. 49). Overall, Natalie's text was structurally sound and substantively strong, only relative to her pretest essay, not as an independent text.

> *Grades encourage students to learn (C). We know mark is not show a student's intelligence (S1) because everyone can make mistake (S2). Mark is like a mirror to show how is the student's poor and strong ability (D1). The students who achieve good mark can be help he has more confidence to study (W1). It's useful. Those who disagree may argue some students who get low mark will not interest their study (R), however, the low mark is not say their have no ability (RR). And most students can learn what their lake [sic lack] in study (D2) then study hard (W3). Most students from the marks* ***probaly*** *[sic probably] (Q1) lean [sic learn] how their success and fail on study, it* ***could*** *(Q2)encourage they to learn (ResC).* (Natalie, Session II)

At first glance, Natalie's paragraph looks incoherent, because the sentences marked S1 and S2 do not appear to be relevant to the Claim (C). However, with some effort, one is able to extract elements of structural soundness from this apparently incoherent paragraph; if one ignores these two sentences (as they are similar to general statements at the beginning of an essay) and continues with sentences D1 and W1, one sees a Data item (D1) in the form of a simile, i.e., marks as mirrors, and Warrant (W1), i.e., how this reflection can help with confidence to study, which support the Claim (C). This reveals her assumption about *good* marks, which raises a question about the effect of *bad* marks; she immediately addressed that in her Rebuttal (R), enhancing the coherence of her text, and responded to it (RR), but Natalie seems to have made the assumption that the student who gets a low mark is aware of the learning potential of marks. This needs some backing, which is absent. Next Natalie seems to have continued with her argument by providing another Data item (D2), i.e., learning about what they lack, and Warrant for it (W2), i.e., students study hard, which Natalie seems to have assumed would lead to learning. She concluded the paragraph by Restating her Claim (ResC) and adding two instances of Qualification (Q1 and Q2). The presence of Rebuttal, Response to Rebuttal, and Qualification indicate substantive strength.

In Session III, Natalie seemed to have included all the discourse features. However, her argument's substantive strength was compromised mainly because of the way she acknowledged opposition, rendering her argument incoherent and weak. I made the latter judgment when assessing her independently of her history of development. However, compared to Session II, she

did not have the irrelevant sentences. This made her Session III text relatively more structurally sound and substantively strong than before. Natalie's text is coded and analyses below.

> *Parents should make important decisions for their old teenage children (C). These teenages' [sic teenagers'] age ate too young and not mature (D), because they are study in school have not enough ability to know the false and true (W). Parents have more experience than teenage children, then know which one is suite for their children (B? →D). However, children need own experience to become mature [R], when teenage children make decisions not think too much, it is not good for their life [RR?]. Parents' decisions would probaly [sic probably] helpful to teenage's future (ResC).* (Natalie, Session III)

Natalie's Claim (C) is clear with both a topic and theme. For data (D), she cited children's immaturity, and for Warrant (W) she gave the reason for this immaturity. Minimally, a warrant can function in two ways: how the data is related to the claim, or why the data is true. Natalie selected the latter function of the data. That is, the reason children are immature is that they study in school. This Warrant needs backing, establishing why being a school child necessarily makes one immature. Instead of providing backing, she seems to assert parents' more experience (B?) as grounds for her Warrant. But this sentence seems more like another Data item (B? →D). This compromises her paragraph's structural soundness. It appears that the Rebuttal (R) asserts that children need to decide for themselves to become mature. There is a coherence problem with the Rebuttal, since she did not state explicitly that she was presenting the opposite view, and not her view. If the reader does not expect a rebuttal, he can see this as a contradiction of the Claim. She seems to have responded to Rebuttal (RR?) by suggesting because teenagers "do not think too much," i.e., they do not think enough, their independent decision making can be detrimental. What appears to be her Response to Rebuttal (RR?) also comes without a proper cohesive transition. This lack of cohesion makes her paragraph incoherent and causes much strain, to relate it to her Rebuttal. For this reason, I did not judge this paragraph substantively strong. Finally, she Restated her Claim (ResC) with Qualification (Q) "probably."

In Session IV, Natalie's Claim (C) did not in fact state a position, but was a definition of the essay topic, "never give up". Her argument appeared to be a set of principles, which could function as Warrants and could be taken to be relevant to an implicit claim by relating her Data to it. Because of the many bridging inferences necessary to connect the argument elements, the argument was not structurally sound. This weakness and lack of coherence might be due to the fact that she was processing both language and rhetoric under time constraints. Her limited language proficiency might have been responsible for her lower performance. The quality of the

argument improved in the second draft, by making the Warrant more explicit; however, the Rebuttal and Response to Rebuttal remained weak. Thus, the argument was not substantively strong. Her coded and analyzed paragraph is presented below.

> *In my opinion, I agree that "never give up" means to keep trying and never stop working for your goal (C?). Never give up can bring the success,* ***to achieve the goal, not matter what problems come out, try to keep going (W1?)****.* ***Everything will be good, if it is not good, it is not the end (W2?).*** *If you stoped in the break, you never know what's going on at last (W3?). Most famous persons before they famous, they had failed many times and faced many problems (D). They can famous now because they did not give up, they keep the mind to get the goals (W4). However, some aguer [sic argue] that meaning [R?], they not really understand give up as well as stop, not doing again [RR?]. Never give up is probly [Q] important in our future life.* (Natalie, Session IV)

Natalie's Claim (C?) does not in fact state a position, but is a definition of "never give up." Her argument is a set of principles (W1, W2, W3, and W4?) that may be taken to be relevant to an implicit claim by relating her Data (D) to it. Her Data (D) draws on the experience of famous people who did not give up. She seems to attempt a Rebuttal (R) and Response to Rebuttal. Her paragraph is not structurally sound, nor substantively strong. Her limited language proficiency (Hulstijn, 2011) seems to have undermined task performance.

In session V, Natalie wrote two drafts, also. Her argument could be judged sound only after my corrections and hypothesizing about coherence issues. It had all the major elements of the argument. The argument was not substantively strong, in part, because she did not seem to have risen above the conflict between her argument and the Rebuttal she proposed.

> *The businesses should not do anything they can to make a profit (C). Profit [sic business] is not only the money* ***but also friends (D [sic W]).*** *If the business company to* ***do*** *anything that to make more money [and] have no good cooperation with others , It [sic it]is not good for future developing (D). If you have no trust to do some work, it can be affect the company's trust [sic image], [it] can be cause [sic cause] no one could [sic to] believe the company again (W). But people may say businesses to own more money should to* ***challenge anything (R)****. However, for a company the trust is more important than the profit (RR). The business should do something that can make a profit and reduce the harmful to other people.* (Natalie, Session V)

Natalie's paragraph has many grammatical inaccuracies that make it difficult to parse. However, if one manages to hypothesize about her intended meaning, one is able to reconstruct the sentences that could convey one possible intended meaning. Having done that, I identify two Data items and a Warrant. The first sentence that she generated with the Data prompt appears to be the assumption for her next sentence; thus, I coded it as "D [sic W]." My reconstruction is "because business is not only for money but also to make friends (W), businesses should cooperate with others to develop (D)." Her next sentence about trust is also a general business

principle that she advocates. Thus, I labeled it Warrant (W). She offered a Rebuttal (R) and Response to it (RR) at a rudimentary level. Her Response to Rebuttal is an assertion of her claim that trust is more important than profit. Overall, her argument would be sound only after corrections and hypothesizing about coherence issues. It has all the major elements of the argument. It is not substantively strong, in part, because she did not seem to have risen above the conflict between her argument and the Rebuttal she proposes.

For Session V Homework, Natalie wrote an essay that was structurally sound, because all the discourse features were present and logically connected, although her essay caused strain to read due to her many language errors. Behind this ungrammatical linguistic guise, however, there seems to hide a complex network of rhetorical connections that only familiarity with the history of the cognitive processes that afforded them can uncover. Although her essay featured a Rebuttal and Response to Rebuttal in her middle paragraphs, it could only be judged substantively strong if the reader was willing to make the bridging inferences (van Dijk & Kintsch, 1983) that would make the text coherent in the readers' mind, a token of how her low core language proficiency impeded her rhetorical expression (Hulstijn, 2011).

Paragraph 1 *With the development of economy, people's living standard becoming better and better than befor. Traveling is a good idea for relaxing in free time. In this cause [case?], there is a debate [that] draws people's attention to if the best way to travel is in a group led by a tour guide. In my opinion, to travel led by a tour guide is a good idea (T). There are two benefits of traveling with tour guide such as, is cheaper and more convenience (BP).*

Paragraph 2 *Traveling in a group led by a tour guide is cheaper than traveling by self (C). Because in a group could get more discount and have special price (D), from the economy [sic economic point of view] (W) traveling in a group is a good choice (ResC). When people staying hotel and visit some place, the company of tour could buy group tickets, the price is lower (B). Some people argue that the company is for profit can't not give cheaper price constom [sic customer?](R). However, in order to get more profit. tour guide probity [probably?] (Q)not lead constom cost lot money (RR). From the economy, to chosic [choice]travel with a group is a good idea.*

Paragraph 3 *Taveling with other people is more convenice [sic convenience] (C). The tour guide will arrage [sic arrange] the hotel, the restaurant, the interesting place, and the transportation (D1). When people visit some city they do not know, It [sic it] is not easy to find hotel and transportation (W). However, the tour guide would know more information than tourist (S1). The tour guide would know more information than tourist (S2). The tour guide cand [could?] introduced the special culture and take them to so same place they do know (B). Some people think [do not like?] traveling with some people they do not know (R); otherwise, to travel in a group could make more friends (RR). In addition, it can be save time that used for find hotel and driving.*

Paragraph 4 *All in all, to travel in a group is a good choice. There are some advantages are cheaper and more convenice.* (Natalie, Session V, Homework)

In paragraph 1, Natalie has a clear Thesis (T) with two Blueprint items (BP). In paragraph 2, Natalie produced her most structurally sound and substantively strong argument, up to this point in her development. Despite the poor grammar, this paragraph showcases all the discourse features. The Claim (C) has a clear topic and theme. Her Data (D) concerns discounts available to groups, and her Warrant (W) is the prepositional phrase "from the economy [sic economic point of view]." It is notable that she placed Data (D) and Warrant (W) in the same complex sentence. Although the students' model showed the data preceding the warrant, and the warrant starting with "because", she started her Data (D) with "because," embedded the Warrant, and Restated her Claim (ResC). I interpreted it as appropriation of discourse functions to the desired linguistic form. In doing so, Natalie maintained the logical connection between Data and Warrant, despite the reversal of the order. The sentence containing Data (D) and Warrant (W) can be rewritten as "A group could get more discount and have a special price (D), *and because* the economy of the trip is important (W) traveling in a group is a good choice." The reason this rewrite is equivalent to her original is related to the definition of the warrant, which is the principle, i.e., "economy" in this case, that connects Data (D) to Claim (C). The Backing (B) provides the factual basis for how this saving is achieved through the travel agency. She offered a Rebuttal (R) that seems to suggest discounts and profit are compatible. Her Response to Rebuttal (RR) indicates that it is exactly for running the business successfully and making money that the company will not lead customers to lose money. The Response to Rebuttal contains the Qualification "probably."

In paragraph 3, Natalie's writing is as structurally sound and substantively strong as paragraph 2. Natalie's Claim (C) has a clear topic and theme. Her Data (D) is about the kinds of arrangements the tour guide can make. The Warrant (W) suggests why tourists cannot make arrangements on their own, due to lack of knowledge. Then, she wrote Sentences 1 and 2 (S1 and S2), which generalize the Data she already provided. The Backing (B) explains the kinds of knowledge the tour guide has and can offer to the tourists. Her Rebuttal (R) seems to concern travelling with strangers, yet she did not state her opinion. I had to guess it was regarding not liking to travel with others. She responded (RR), although with an inaccurate conjunctive adverb "otherwise," by suggesting tourists can make friends with their fellow tourists. The appropriate

logical connection among the discourse features and the presence and appropriacy of Rebuttal and Response to Rebuttal make her paragraph structurally sound and substantively strong.

In Session VI, Natalie wrote a complete essay. Despite the grammatical inaccuracies which made intelligibility a challenge, and thus affected judgments about rhetorical development (Hulstijn, 2011), Natalie's text featured a complex sequence of reasoning, which could only be deciphered if the assessor had knowledge of Natalie's developmental history since the beginning of Instruction. Overall, because all the discourse features were present and could be interpreted to relate to one another, the minimum criterion for soundness was present. She also fulfilled the minimum requirement for substantive strength, i.e., the existence of Rebuttal, Response to Rebuttal, and Qualification. This was despite the fact that coherence was generally a problem.

Paragraph 1 *To a person, make an important decision is really hard. People should to know if the decision is good or not and if they should make decision alone. In order to have a good (1) decision and have a good future life, people should never make an important decision alone. There are some disadvantages of make decision alone and advantages of make decision with other people [T] such as a person has not enough expertise, not matual [sic mature] enough, and the group idea is better than own (BP).*

Paragraph 2 *(2) Make a decision by self is not a good idea (C). (3) a person has not enough knowledge and expertise They don't have some ability to do something they didn't do befor. In this case, people need others suggestion and to advice them avoid some bad thing happen. Other people's expercise [experience?] are different and it could make more methols [?] to strange [?] the decision. Although some times some people's suggestion are not useful or not good for them (R), most of those suggestion can help people to analiy [analyze?] the problem (RR). It would probabity [probably] (Q)help them make a correct decision(ResC)*

Paragraph 3 *To young people is not a good idea to make an important decision without other people's help (C?). A teenage is not old enough and his mind are not matual [sic mature?](D1). They are study at school and learn knowledge, that could make them how [?] not strong ability to do some work. Teenage always change their mind without think too much, and they like to do something they like or do not some thing they don't like (D2). The future life is hard to know, but they parents have expercise [experience?] (W). Although some decision made teenage unhappy (R), their parents hope [help?/want?] them have a good future (RR).*

Paragraph 4 *The group idea is better than own idea (C). The group people have many different opinion (D), but some [?] idea could have same [?] meaning. If a person decided to do some work [alone], he would thinking too much (W). However, a group people can help him to analaztion [analyze?] the problem and can easy to know what they want to do (B). The group work is more helpful than worke alone.*

Paragraph 5 *(14) A person should never make an important decision alone, it would cause some problem because they do not have enough ability, do not matural [mature?] enough, and do not know (15) group working is helpful. Therefor, make an important decision with other people is better and good for their future life.* (Natalie, Session VI)

In paragraph 1, Natalie's thesis (T) implies her claim by referring to the "disadvantages of making a decision alone and advantages of make decision with other people." Then she presented three Blueprint items (BP) for the next three paragraphs.

In paragraph 2, Natalie's support is a set of generalizations that appear to be warrants for her Claim more than factual data for it. Because of the inaccurate grammar, her support is hard to decipher rendering the text incoherent; nonetheless, it appears that she appeals to the value of others' *advice* and *experience* to support her Claim. The fact that her support does not appear to have data and backing components might be partially a token of the under-theorization of data-warrant difference for evaluation/ethical claims (Toulmin et al., 1984). She clearly signaled her Rebuttal with "although" and responded to it. She conceded the objection that others' suggestions are not always useful, but responded that they "can help people to analiy [analyze?] the problem." She Restated the Claim (ResC) with Qualification, which is poorly spelled.

In paragraph 3, Natalie's topic sentence, which should include the Claim (C?), does not contain the theme for this paragraph. Seeing through her rather incoherent text, I identified one Data item (D1) concerning what I conjectured to be teenagers' immaturity and another regarding their fickleness (D2). I was unable to decrypt the sentence between D1 and D2. I identified the next sentence as Warrant (W) because it shows how parents' experience redresses teenagers' immaturity and fickleness. Her Rebuttal (R) makes reference to the unwelcome parental intervention and her Response to it (RR) alludes to a higher purpose that warrants the intervention. Due to the numerous grammatical inaccuracies, and in the absence of level appropriate core language competence (Hulstijn, 2011), it is easy not to see the complex discourse structure concealed behind this grammatical error-strewn text.

In paragraph 4, Claim (C) introduces the theme of "group idea." This paragraph is probably the most grammatically inaccurate in her essay causing the reader much strain. After reading the paragraph a few times, I decided on the following analysis. Natalie's Data sentence makes a statement of fact: "group people have many different opinion" (D). Her next sentence is unintelligible. Then she introduced a Warrant, suggesting "if a person decided to do some work [alone], he would thinking too much" (W). This would be the Warrant because it suggests how having many opinions in the group (D) can help the person decide (C) with less effort (W). For Backing, she show how this "group idea" works in practice, "a group people can help him to

analaztion [analyze?] the problem." In paragraph 5, Natalie, seems to have reworded her thesis and Blueprint. In sum, despite language related coherence problems, I judged this essay to be minimally structurally sound and substantively strong.

In the posttest essay, Natalie demonstrated that she could produce a coherent argument containing all the main discourse features: claim, data, warrant, and backing. Surprisingly, despite their appearance in her previous essays, rebuttal and response to rebuttal did not feature in the posttest essay, which may be a token of the U-shaped developmental curve. Their absence undermined the argument's substantive strength. This absence was unusual because she had the beginnings of rebuttal and response to rebuttal in her pretest essay, and culminated their use in Session V Homework, but failed to use them in the posttest essay.

Paragraph 1 *With the developing of society, people's living standard has improved. In this case, people with lots work and stress and travelling is a good method for relaxing. There is a debate on the best way to travel is in a group led by a tour guide; However, there are three benefits of traveling in a group led by a tour guide (T) such as, convinece, time save, and more information to learn (BP).*

Paragraph 2 *To travel in a group led by a tour guide is more convinece that traveling by self (C). The tour guide would arrange everything for tourists (W). When you travelling in a strange city find a place to stay is necessary (D1). Always the tour guide would book hotel and restaurant for them (B1). The tour guide would plan the interesting place to visit (D2), and the tourist do not worry about too much details (B2). In a group led by tour guide get convinece from transportation (D3). If you travel alone, you could not arrange the bus or the taxi on time (B3). To travel with a group is easy have fun.*

Paragraph 3 *When you to travel with a group can be save much tim (C). Time is an important thing in life (W1). If you travel without tour guide, you need much time to find interesting place to choose hotel, restaurant, and to take transportation (D1). To book a hotel is not a easy work, first you need to compare which one is better, then you get there you should google the mape (B1). If you with the tour guide, you can save those time have fun (D2). Go to somewhere it is easy to waste time on one place and lead to have not enough time go to other place (W2). The tour guide will managed the time and you can visit more.*

Paragraph 4 *To travel and to learn knowledge are need a tour guide(C). The tour guide would know more information than tourist (W). He will teach tourist how to avoid some problem and what's different culture of that city (D). When you visit some place, the tour guide will introduce the history and the special information (B1). Amolty [?] tour guides are the native, they are know where is the most interesting, what food is more delious (B2). Tour guides are good helper to learn something.*

Paragraph 5 *All in all, to travel with tour guide is a good choice because you can save time, have more convinece and learn knowledge. Traveling is not a tired work but an interesting thing.* (Natalie, posttest)

In paragraph 1, Natalie has a clear Thesis (T) with three Blueprint (BP) items. In paragraph 2, Natalie's Claim (C) contains, in one sentence, both the topic and theme, in contrast

to her pretest essay and other texts she produced during Instruction, in which sometimes wrote two sentences comprising the topic and theme. The second sentence is a Warrant (W) which lays out the premise upon which the next three Data items rest. The first Data item (D1) concerns finding "a place to stay" which is an instance of the type of "arrangement" (W) the tour guide can make. The Backing (B1) narrows "a place to stay" down to finding a "hotel and restaurant." The second Data item (D2) is a factual example for making arrangements (W). Planning an "interesting place to visit" (D2) is supported by the Backing (B2), stating that tourists "do not worry about too much details." The third Data item (D3) concerns "transportation," which is supported by the Backing (B3) invoking the time saved by the tour guide. This interpretation, i.e., second sentence as Warrant, agrees with the definition of warrant as the general principle or major premise for its instances, minor premise, or data items. Therefore, Natalie has all the four features for a complete argument in this paragraph. Additionally, it does not suffer from the linguistic inaccuracies in her previous essays that would impede comprehension. For this reason, I judged it to be structurally sound. Surprisingly, however, there is no rebuttal, in contrast to her previous submissions.

In paragraph 3, Natalie's claim (C) recycles the theme of saving time from the previous paragraph. Again, she first presented her Warrant (W1) regarding the importance of time in life. Her first Data (D1) comprises three items, concerning how the tour guide can save time. The Backing (B1) factually elaborates on how the tour guide can save time with hotel arrangements. She did not develop the theme of "restaurants" in this paragraph. The second Data item (D2) combines the concept of time in the Warrant with a new fact about having time. The next sentence is another Warrant (W2) that explains how wasting time without a tour guide can lead to insufficient time for sightseeing. Like the previous paragraph, this paragraph does not have a rebuttal component, but is structurally sound because the Data, Warrants, and Backings are connected in a coherent and intelligible way.

In paragraph 4, despite the inaccurate grammar, the Claim's (C) topic and main idea are clear, the topic is the tour guide and the theme is the knowledge and learning that he or she can provide. Similar to the previous two paragraphs, the Warrant (W) can be interpreted to have come first in this paragraph. The Warrant (W) is the assumed knowledge of the tour guide, who shares it with tourists to solve problems and learn about the culture (D). The first Backing (B1)

explains how this cultural learning is facilitated by the tour guide. The second Backing (B2) provides more factual grounding for how tour guides provide learning. Surprisingly, she did not have a rebuttal in this paragraph either. In paragraph 5, Natalie restated her Thesis and Blueprint.

Overall, Natalie demonstrated that she could generate a coherent argument containing the discourse features claim, data, warrant, and backing. Because all the four features were logically connected, I judged this to be a structurally sound argument. Despite their appearance in her previous essays, rebuttal and response to rebuttal do not feature in this essay, which may be a token of the U-shaped developmental curve. She previously demonstrated that she could acknowledge rebuttal and response to it in separate paragraphs, which is a strong indicator of substantive strength. For this reason, I did not consider this essay to be substantively strong.

In summary, assessment of Natalie's rhetorical development was severely hampered by her low English proficiency, which according to Hulstijn (2011) is necessary to assess her performance. Notwithstanding, claim and data were evident in her texts and could be judged to have been internalized. Warrant, backing, rebuttal and response to rebuttal seemed to be present, too; however, the lack of logical inter-connections among them, apparently caused by linguistic expression problems, rendered them sometimes incoherent. Overall, the structural soundness and substantive strength of her arguments were still developing. She was, nonetheless, able to produce them at varying degrees of accuracy, following the U-shaped development curve, during the course of Instruction. Table 6.3 summarizes Natalie's rhetorical development.

Table 6.3. Summary of Natalie's Rhetorical Development

Session	Argument quality	
	Structural soundness (Coherence + C, D, W, B)	**Substantive strength** (Coherence + R, RR, Q)
Pre	Text includes Cs, D, W, R, and RR although comprehending her text is very difficult due to many grammatical errors. Thus, incoherent.	A rare acknowledgement of R and RR, although lack of coherence detracts from substantive strength.
I	Data not available	
II	All discourse features present except B. More coherent than pretest although problem with the order of the elements. The improved coherence can be because of the exemplar. Data and W relevant to the claim, so argument is sound.	R, RR, and Q present, although part of the support for RR was misplaced as part of the support for C; hence, lack of coherence and detracts from strength.
III	All discourse features present. However, her argument is not sound, mainly because of the confusion between D and B.	The lack of coherence renders her R and RR weak. She does use Q, however.
IV 2 drafts	C? does not state a position, but is a definition. Argument is a set of principles (W?) that might be relevant to D. Unsound due to lack of coherence. Limited language proficiency contributes to low performance.	R and RR incoherent, so substantively weak. Q present.
V 2 drafts	All discourse features present except B Her argument is sound only after my corrections and hypothesizing about coherence issues.	Not substantively strong, in part, because she does not seem to have risen above the conflict between her argument and R she proposes.
HW5	Sound, all the discourse features are present and logically connected, but a strain to read due her many language errors.	R, RR, and Q present, but RR weak; hence, substantively weak.
VI	Minimally sound because all discourse features present. Interpretation possible only after many bridging inferences (van Dijk and Kintsch, 1983)	Minimally strong because of R, RR, and Q, although coherence is a general problem.
Post	C, D, W, B present and coherently connected.	R and RR are *surprisingly* absent, so not substantively strong.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal, Q=Qualification; HW5= Session V homework

6.4. Natalie's Cognitive Development

In the pretest essay, Natalie included a Rebuttal and Response to Rebuttal, which, although incoherent, demonstrated early knowledge-transforming evidence. (See rhetorical analysis above.)

Natalie's Session I writing was not available, so analysis starts from Session II. In Session II, the only direct evidence for knowledge-transforming in Natalie's paragraph (coded and displayed below) was the use of the prompt for Rebuttal (underlined below), which had apparently mediated the production of this feature. Natalie also used the discourse marker "however" to signal the Response to Rebuttal. These two features as well as the presence of Rebuttal and Response to Rebuttal indicated her attempt to "rise above conflict" (Scardamalia, et al, 1984) and could be interpreted as evidence for knowledge-transforming. Natalie did not copy all the prompts, so it could not be concluded that she used them, to be used as evidence for knowledge-transforming. However, because the linear organization of her paragraph seems to follow the exemplar's, except for a misplaced warrant and backing (see rhetorical analysis in the next section), it is possible that the discourse schema also mediated generation of content.

> *Grades encourage students to learn (C). We know mark is not show a student's intelligence (S1) because everyone can make mistake (S2). Mark is like a mirror to show how is the student's poor and strong ability (D1). The students who achieve good mark can be help he has more confidence to study (W1). It's useful. <u>Those who disagree may argue</u> some students who get low mark will not interest their study (R), however, the low mark is not say their have no ability (RR). And most students can learn what their lake [sic lack] in study (D2) then study hard (W3). Most students from the marks **probaly** [sic probably] (Q1) lean [sic learn] how their success and fail on study, it **could** (Q2)encourage they to learn (ResC).* (Natalie, Session II)

In Session III, Natalie demonstrated clear evidence of knowledge-transforming on her think-sheets. She has a Rebuttal and apparently a Response to Rebuttal. She generated between two and four sentences and/or ideas for each discourse feature. The fact that she generated more in response to the prompts than she selected for the final text is indicative of knowledge-transforming. She did seem to have included a Response to Rebuttal, although without proper transitioning from the Rebuttal. This made these difficult to read and process, yet they still indicate developing knowledge-transforming ability. Overall, her paragraph read more coherently than the one in Session II, indicating that the think-sheets likely had a positive mediational role to organize her thinking and generation processes. Her coded paragraph is displayed and analyzed below.

> *Parents should make important decisions for their old teenage children. These teenages' [sic teenagers'] age ate too young and not mature (D), because they are study in school have not enough ability to know the false and true (W). Parents have more experience than teenage children , then know which one is suite for their children(B). However, children need own experience to become mature [R], when teenage children make decisions not think too much, it is not good for their life [RR?]. Parents' decisions would probaly [sic probably] helpful to teenage's future.* (Natalie, Session III)

There is clear evidence of knowledge-transforming on Natalie's prompt sheets. For example, in response to the Backing prompts, she generated the following four items:

> *many students make decisions that their like*
> *don't think too much*
> *parents have lots experience and know what the children needed*
> *parents are [left incomplete]*

Natalie formulated the following final version from the four items:

> *Parents have lot experience than teenage children , then know which one is suite for their children.*

Natalie reproduced the above sentence in her final draft with a minor edit; she changed the phrase "a lot" to "more." (See Backing in her coded text above.) It is remarkable that despite her lower language proficiency, Natalie managed to generate enough items, in response to this prompt, so that she was able to select from among them for her final sentence, which is classic knowledge-transforming behavior (Bereiter & Scardamalia, 1987). This is is contrast with knowledge-telling, "think-say" behavior (Scardamalia et al., 1984), such as Jay's, who generated a single item in response to each prompt and reproduced it verbatim in the final draft (see Jay's analysis below).

In Session IV, Natalie wrote two drafts (coded and displayed in Figure 6.4). The first draft read as an incoherent text, probably due to the fact that it was done in a freewriting mode and considering Natalie's low control over linguistic form. In the first draft, she did not copy any prompts, or their numbers; therefore, I could not tell if she used the prompts to generate Data, Warrant, Backing, and, hence, no knowledge-transforming inferences could be made. In the second draft, however, knowledge-transforming behaviour was evident since (a) not all that was generated in the first draft was copied to the second draft and (b) she made substantive changes to the first draft by generating new content and clarifying old content. For example, the attempt to construct a Rebuttal and Response to it, albeit quite incoherent, suggests knowledge-transforming behaviour. She seems to have a Rebuttal and Response to it.

First draft (focused freewriting)	Second draft
In my opinion, I agree that "never give up" means to keep trying and never stop working for you goals (C?). Give up can bring the successful, and give up to stop, not doing again. Keep trying some thing that you do always can achieved in the end. If you not tring any more or stop to do some difficult thing, you never no [sic know] what happened in the end. Most famous person before they famous, they had failed many times and faced many problems (D), they [are] famous now because they never give up, and never stop working for their goals (W). However, some agure [sic argue] that meaning [R?], they not really understand the give up [RR?].	*In my opinion, I agree that "never give up" means to keep trying and never stop working for your goal (C?). Never give up can bring the success,* ***to achieve the goal, not matter what problems come out, try to keep going (W1?). Everything will be good, if it is not good, it is not the end (W2?).*** *If you stoped in the break, you never know what's going on at last (W3?). Most famous persons before they famous, they had failed many times and faced many problems (D). They can famous now because they did not give up, they keep the mind to get the goals (W4). However, some aguer [sic argue] that meaning [R?], they not really understand give up* ***as well as stop, not doing again*** *[RR?].* ***Never give up is probly [Q] important in our future life.***

Figure 6.4. Natalie's Session IV Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Natalie's had used. If Natalie deleted the prompts in the second draft, they are indicated with a strike-through In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

Interestingly, she managed to transfer an idea that she generated in the freewriting task (not reported here) completed prior to the present task, "Everything will be good, if it is not good, it is not the end (W2)." This indicates that freewriting without a topic, which does not involve rhetorical problem solving, can still be an "off-line" resource during knowledge-transforming composing. Freewriting, thus, helped her generate the content that Natalie was able to retrieve in the second draft. Generating more on the second draft indicates knowledge-transforming (Bereiter & Scardamalia, 1987). This can be considered "a critical event" in Natalie's writing development: the transfer of idea from freewriting to the second draft in focused freewriting.

In Session V, Natalie produced two drafts (coded and displayed in Figure 6.5), as well. Unlike Session IV, Natalie did use the prompts, which indicate knowledge-transforming, albeit with logical problems. She seems to have a Rebuttal and Response to it. There seems to be a cause-effect confusion with the prompt meant for Warrant. The sentence she generated with the Data prompt, functioned as Warrant, because it laid out the premise for her Data in the next sentence. In her second draft, Natalie managed to delete the prompts, which is evidence of concision knowledge transforming. Additionally, she added language that did not appear in the

first draft and was generated while revising, which is an example of expansion knowledge-transforming.

First draft (focused freewriting)	Second draft
(1) ~~My topic is that~~ disagree businesses should do anything they can to make a profit. (2) ~~The reason I think so~~ is that business is not only for money. (3) ~~That fact support my claim~~. If the businesses company to anything that to make money and have no good cooperation, It [sic it] is not good for the company's future profit. Some thing that can mak more money but should be affect the company's truth. (5) That could cause no one could [sic to] believe the company again. (7) ~~But people may~~ say business is to make a profit, that can own more money when they have more idea. However, to a company the trust is more important than the profit. So, (10)~~my claim~~ is presumably true.	*The businesses should not do anything they can to make a profit (C). Profit [sic business] is not only the money **but also friends (D [sic W]).** If the business company to **do** anything that to make more money [and] have no good cooperation with others , It [sic it]is not good for future developing (D). If you have no trust to do some work, it can be affect the company's trust [sic image], [it] can be cause [sic cause] no one could [sic to] believe the company again (W). But people may say businesses to own more money should to **challenge anything (R)**. However, for a company the trust is more important than the profit (RR). The business should do something that can make a profit and reduce the harmful to other people.*

Figure 6.5. Natalie's Session V Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Natalie's had used. The numbers in parentheses correspond to the number of the prompt used. If Natalie deleted the prompts in the second draft, they are indicated with a strike-through. In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In the first draft, the fact that Natalie did use the prompts indicates knowledge-transforming. That is, she used them for problem formulation in the rhetorical problem space. Two observations are apt about the accuracy of her prompt use. First, there is a problem with how Natalie used prompt number 5. I designed this prompt to indicate a cause-effect relationship between Data and Claim, which is established by the warrant. The prompt for warrant reads: "My data cause my claim to be true because…." As with the other prompts, this prompt was meant as a heuristic to establish the logical relationship between the discourse features, and not as an eloquent phrase to express causality with. However, Natalie's use of the modal "could" after "cause," instead of an infinitive, makes the meaning unclear. One probable interpretation would be, "That could cause no one to believe the company again." Despite the inaccurate usage, she did manage to generate content with prompt number 5. (Her idiosyncratic use of the verb pattern with "cause" was first observed in her pretest essay.) Second, sentence number 2 is generated with the Data prompt; however, its function is akin to that of the warrant, because it lays out the premise or assumption for her Data in the next sentence.

In the second draft, Natalie managed to delete the prompts she used to generate content. This is evidence of concision knowledge transforming because her focused freewriting in the first draft consists of planning language that did not transfer to the second draft. Additionally, she added language that did not appear in the first draft and was generated while revising, which is further evidence of expansion knowledge-transforming (Bereiter & Scardamalia, 1987).

Her confusion between data and warrant, and still attempting to apply the prompts as instructed is reminiscent of the following Vygotskyan (1986) concept. Children learn the definition of a scientific concept, e.g., revolution, before internalizing its meaning. Natalie has applied the incorrect prompt to generate the sentence that I marked "D [sic W]." Nonetheless, she did apply the scientific concept presented on the prompt sheets, which can pave the way for future internalization of the distinction between the two. It is important to note that this development is driven by word meanings associated with the scientific concepts data and warrant. In other words language is driving cognition forward.

In Session VI (see rhetorical analysis above), Natalie's essay had many linguistic accuracy problems, making it rather difficult to read. She did not indicate the prompt numbers for all the discourse features, and she seemed to have made an error in applying the prompt for Data. As such, there was not much direct evidence for knowledge-transforming. Notwithstanding her lower language proficiency, however, she seemed to be developing in "the domain of higher language cognition" (Hulstijn, 2011, p. 229), i.e., metacognitive awareness of discourse features and how to generate them, because despite the apparent incoherence of her text, Natalie was one of the few participants who ever attempted a Rebuttal and Response to Rebuttal in two of the three middle paragraphs. Most others, if they acknowledged opposition, they included it in a separate paragraph before the conclusion paragraph. The fact that she acknowledged the rebuttal two times and responded to it indicates meta-cognitive awareness of the features. Therefore, she did attempt to rise above conflict; hence, demonstrate knowledge-transforming.

In Session VI and for Session V Homework (see rhetorical analysis above), Natalie was, again, one of the few participants who attempted a rebuttal and response to it in middle paragraphs (in two of three). (Her text is presented in the previous section for rhetorical analysis). Most other participants, if they acknowledged opposition, they would include it in a

separate paragraph before conclusion. This indicates a higher level of meta-cognitive awareness and the motivation to produce the features.

In the posttest essay (see rhetorical analysis above), Natalie did not produce a rebuttal and response to rebuttal at all. Hence, no direct evidence for knowledge-transforming. This was unusual since she had consistently produced it in the past, to varying degrees of quality. Thus, it is unlikely that she was unable to generate them. Perhaps she did not have enough time to devote to these two discourse features.

In summary, Natalie seemed to demonstrate knowledge-transforming composing ability mediated by the discourse schema, prompts, freewriting, and focused freewriting. Because of her lower language proficiency, I had to make bridging inferences to interpret her text; however, the obvious presence of rebuttal and response to rebuttal in most of her texts, despite their conspicuous absence in the posttest essay, are strong indicators of her developing knowledge-transforming ability. The presence of the prompts in some of her other texts further support this conclusion. Table 6.4 summarizes Natalie's cognitive development over an eight-week period.

Table 6.4. Summary of Natalie's Cognitive Development

Session	**Knowledge-transforming (K-Tr)**
Pre	R and RR present, but RR dismissive. Coherence issues.
I	Data not available
II	R and RR present. Used the prompt for rebuttal. The linear organization of paragraph generally matches text schema; hence, schema mediated K-Tr.
III	R and RR present. Generated 2-4 sentences and/or ideas for each prompt; hence, K-Tr; then formulated one final version; hence; CK-Tr, i.e., generated more in response to the prompts that she finally selected/formulated. Coherence issues.
IV 2 drafts	R and RR present, but incoherent. Not all that was generated in the first draft was copied to the second draft, i.e., CK-Tr. Made substantive changes to the first draft by generating new content and clarifying old content; hence, EK-Tr.
V 2 drafts	R and RR present. Used prompts to generate content, i.e., K-Tr, although a cause-effect confusion with the prompt meant for the warrant. In second draft, deleted the prompts, i.e., CK-Tr. Added new content in draft 2, i.e., EK-Tr.
HW5	R and RR present and logically connected, but severely handicapped by lack of sufficiently strong core linguistic base (Hulstijn, 2011).
VI	R and RR present in two middle paragraphs. Most other students, if they acknowledged R, they would in a separate paragraph before conclusion. This strongly indicates the motivation to "rise above conflict."
Post	No K-Tr can be inferred because of surprising absence of R, RR. A U-shaped developmental curve.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal NA: K-Tr: knowledge-transforming; ; EK-Tr: Expansion knowledge-transforming, CK-Tr : concision knowledge-transforming; HW5= Session V homework

6.5. Jay's Rhetorical Development

In the pretest essay, Jay's argument consists of claims and data. It virtually has no warrants which connect data to claims. The warrants that he did provide were general truths and principles whose connection to the claim had to be guessed. There are no backings. For this reason, his pretest essay could not be considered structurally sound. It is not substantively strong either as there is no rebuttal, response to response to rebuttal, or qualification. Jay provided an outline which he almost verbatim transferred to his draft posttest essay, a classic example of knowledge-telling. His coded pretest essay and the rhetorical analysis of it are presented below.

Paragraph 1 *Factory near us is harmful (T). If it will be build, we can't bear about that. It can't bring any benefit to people who live here. Our life will terrible because of noise, environment and health (BP).*

Paragraph 2 *Firstly, it makes lots of noise (C), such as we can't sleep well (W1). Everyday you hear the noise that (D1) you can't have a good time on your life. (W2) You can imagine the noise around you everyday (D2).*

Paragraph 3 *Secondly, it can bring the factor about the environment (C). For example, air pollution (D1) and water pollution (D2). There will have many garbage (D3). The air and water can't be fresh (S1). These are important for our life (S2). No one wants to live in abandoned place. (S3)*

Paragraph 4 *Thirdly, it is bad to our health (C). It is serious for everyone (S1). The air can make us get sick (D). Health is the most important thing (W1). We need it to enjoy the life (W2). If you are not healthy, you even don't have ability to earn money (S1).*

Paragraph 5 *In conclusion, I disagree about that. The effect that I think everyone know. In my opinion, the factory should be build in the place where no people to live. There no nay advantage for us. I think the company must think about this. The profit should be for everyone. .* (Jay, pretest)

In paragraph 1, Jay's thesis (T) and his opposition to the factory are clear. He provided three Blueprint (BP) items at the end of the paragraph. In paragraph 2, Jay produced a Claim with a clear theme, i.e., noise, and provided Warrant 1 for the Data 1 to follow. The assumption that the factory is near residences is implied in Data items 1 and 2. He provided Warrant 2 to express the consequence of noise. In a warrant, he should have explained his assumption about the proximity of the factory to residential quarters and the level of noise, and could have provided an example in form of a backing. For these reasons, this paragraph is not structurally sound.

In paragraph 3, Jay's Claim introduced the theme of the environment without expressing his opposition to the factory. Then there are three Data items (D1, D2, and D3), which are not

warranted, and seem to be based on his general observations in life. The paragraph should show how different types of pollution are linked to the factory. The Claim and Data rely on the common sense notion that factories pollute, without proper warranting. Then there are three general statements (S1, S2, and S3), which are not linked to the Data items, nor the Claim. The last item about "abandoned place" appears irrelevant. This lack of coherence could also be due to Jay's limited core language proficiency (Hulstijn, 2011), in particular, lexical range. Lack of coherence, failing to connect the Data items renders Jay's paragraph structurally unsound.

In paragraph 4, Jay provided a Data and two Warrants (W1 and W2) that established the value of health. They are Warrants because they are general principles that could be construed as relevant if they were appropriately applied; however, they are the wrong Warrants for the Data. The right warrant would connect health issues to building a factory. The two Warrants raise correct principles that are only tangentially related to the Claim. Further, the assumption about health risks due to the factory needed to be established with facts, which Jay did not provide. These observations point to Jay's essay's lack of structural soundness. In paragraph 5, Jay did not have a reworded thesis, as taught in Session Zero. The sentences in this paragraph were general claims and truths that should have been placed in middle paragraphs. There is no rebuttal or response to it. Therefore, there is no evidence for substantive strength.

Jay's Session I text was not available. Therefore, the rhetorical analysis of his texts continues with Session II. In Session II, Jay provided support for only one of his three claims (mentioned in the Blueprint) but left the other two claims unsupported without proper data and warrants. Therefore, the analysis of structural soundness is limited to the first Claim and Warrant, which he did provide; overall, his argument cannot be considered structurally sound. There was no rebuttal or response to it, nor qualification, which, in addition to general incoherence, leave the argument substantively weak. His coded text and rhetorical analysis is presented below.

> *I agree with that grades encourage students to learn (C). It can show how was the student. In my opinion, I have three opinion about [,?] such as confidence, seek knowledge and persist in (BP). First of all, the student who got a high marks can take more confidence (C1). They will not think that they can't study well (W1). They feel that they can do anything (W2). Second a good mark makes them like to seek knowledge by them slef (C2). They have more space to develop (C3). Third, if they got a high mark, they can persist in something (C4). It is hard to lose their hope (C4). They need more power [?] on everything (C5). We can't give them blow (C6). In my opinion, a good grade can give students confidence, seek knowledge and persist. There are the good way to encourage students to learn. I agree with that. .* (Jay, Session II)

Jay started with a clear Claim (C) with both the topic and theme expressed. He continued with what appears to be the Blueprint (BP). He seems to have applied the essay schema to a single paragraph. He mentioned three themes. Then, he elaborated on the theme "confidence" with a Warrant (W1), without providing data for it, a sentence that would link confidence to studying well. The next sentence could be another Warrant (W2), again without a stated connection to his claim about learning. Next, he provided another Claim (C2), which he left unsupported. The rest of the paragraph is a list of claims and sub-claims (C3-C6), whose relevance to the Claim is unclear and need warranting.

In Session III, Jay copied the following paragraph verbatim (without change, indicating classic knowledge-telling) from each of the six think-sheets for the discourse categories into his final draft. The categories in brackets are those under which Jay produced the sentences. (They are not coded by me). The sentences representing Claim, Data, and Warrant do correspond to those discourse feature, but the ones representing Backing, Rebuttal, and Response to Rebuttal do not. The paragraph is not structurally sound, nor substantively strong.

> *I agree with that parents should make important decisions for their older teenager children (C). Parents are the model for their children (D). They admire their parents and imitate them (W). The children don't have vision to decide something (B1?). They are easy to lose situation (B2?). Parents give them decision is good for them to reduce some trouble (R?). They have confident face to the life (RR?). In my opinion, parents make important decision is good for them (ResC).* . (Jay, Session III)

The Claim (C) has a clear topic and theme. The Data (D) is asserted as a statement of fact; however, it could be held to be true with some reservations which Jay should have acknowledged. With the sentence labeled as Warrant (W), Jay seems to have intended to link parents as models to their decision making role, but it is inadequate, since from children admiring parents it does not necessarily follow that parents should make decisions for their children. The two sentences that he generated under Backing (B1? and B2?) are not factual statements supporting the Warrant, although they are assertions relevant to the Claim (C). The Rebuttal (R) and Response (RR) are unrelated to the Claim (C). There is no qualification. Assessment of structural soundness is only limited to the first three sentences, which are relevant to the Claim; thus, the argument is not sound, and is weak in the absence of a relevant rebuttal, response to rebuttal, and qualification.

Jay's Session IV text was not available; the analysis continues with Session V. In Session V, any soundness or strength could be inferred if one was able to make bridging inferences (van Dijk & Kintsch, 1983). So, I judged Max's paragraph to show beginning element of structural soundness and substantive strength. There were missing warrants and linguistic inaccuracies that caused coherence problems. However for the first time, he included the most indicative features of substantive strength by attempting to acknowledge a Rebuttal, Response to it, and make a qualified claim. His coded paragraph and its rhetorical analysis are presented below.

> *(1) I don't agree with business should do anything they can to make a profit (C). Nowadays (2) business means to earn money (S1), people have many ways on how to earn money even though it is* ***criminal (D?).*** *Many of them don't care about that. Honest is the most important thing to do business (W).* ***If people who get it, they can have a good cooperation with others****.* ***However,*** *some people often lie to others. This is a big problem. (7*[=prompt number*]) Many business man maybe don't agree with me because they* ***think they can do well, they also think that if they have opportunity, they have to earn money****(R).* *My reasons tell me that it is not good* ***because my thinking is only for customers*** *(RR). So, my claim is presumably (Q) true (ResC) (10). .* (Jay, Session IV)

Jay's main argument remains mostly fragmented and incoherent; therefore, I tried to code only those sentences that I was able to interpret. Jay's Claim (C) is clear and contains both the topic and theme. He did not provide data *per se* despite the fact that he indicated the number corresponding to the Data prompt. Sentence S1 does not seem to function as data, although it may function as an early acknowledgement of rebuttal. His next sentence (D?) may be what he intended as Data. He used a principle that could function as a Warrant (W): "Honest is the most important thing to do business," which delineates the principle his Claim is based on, but not as a link between Data and Claim. So far, there is beginning structural soundness. However, I could not comprehend his next sentence, "If people who get it, they can have a good cooperation with others." It is unclear what "it" refers to, and how "cooperation" is relevant to the ethical principle he raised. His Rebuttal had to be deciphered in light of his Response to Rebuttal. He probably meant that business people believe that they should take advantage of the opportunity to make money, but he objected to it (RR), because he cared more about the customers. This reasoning is incomplete since he needed to demonstrate how doing business and customer care could not co-exist, which appears to be the missing warrant that his Claim is based on. Giving him the benefit of the doubt, beginning substantive strength could be inferred. He also included the Qualification "presumably" in his Restated Claim, which Toulmin et al. (1984) identified as an element of substantive strength.

For Session V Homework, Jay produced the minimum requirement for structural soundness, because there is at least a Data item which is accompanied by a Warrant for each claim. This paragraph does not have a rebuttal, response to it, nor qualification. Their absence compromises its substantive strength (Toulmin et al., 1984), which in this respect is, a developmental step backwards since Session V, due to the absence of the latter features (which would also indicate knowledge-transforming).

> *I agree that the best way to travel [is] with a tour guide (T) because it is good about price, comprehensive, and convenience (BP). Firstly, people travel with a tour guide is cheaper than they travel by themselves (C1). People have to pay a lot of money on transport if they go by themselves (D1). During the travel they have to pay a lot of money on food (D2). If people go with a tourist guide, they don't need to worried about these (W1). Secondly, people travel with a tour guide is comprehensive (C2). This is very important on travel. People who travel to somewhere have to know what is famous, and some knowledge about that (W2). A good guide can tell people a lot about that (D3). People can enjoy a good trip. Thirdly, a tour guide can bring convenience for people (C3). People don't need to buy airline ticket and some travel ticket (D4). The tour guide do everything for people an convenience (W3). In conclusion, A tour guide has many advantages for people, such as price, comprehensive, and convenience. In my opinion, I agree that travel with a tour guide. .* (Jay, Session V Homework)

Jay treated Session V Homework as an extended single paragraph essay with three sub-claims (C1, C2, and C3). His first Claim (C1) is supported with two Data items (D1, D2). The first Data item (D1) needs a warrant because it is conceivable to travel without a tour guide and still be able to spend less on transportation. To dispense with a warrant, Jay could have limited the scope of his Data (D1) to a specific travel event in which there is a factual comparison between the two modes of travel. For his second Claim (C2), Jay started with his Warrant (W2), "People who travel to somewhere have to know what is famous, and some knowledge about that (W)," and then presented his Data: "A good guide can tell people a lot about that (D3)," with anaphoric reference "that" pointing to Warrant 2 (W2). His third claim (C3) has an appropriate Data (D4) Warrant (W3) sequence. The presence of relevant Claims, Data, and Warrants suggests minimal structural soundness. The fact that rebuttal, response, and qualification are absent indicates lack of substantive strength.

In Session VI, in response to the essay prompt, Jay only produced the following very short text. Jay wrote a thesis (T) with three Blueprint (BP) items, the last of which is incomprehensible, i.e., "long." He showed a trace of the first prompt, by using the words "topic" and "claim" in it. He clearly did not generate enough text to merit further analysis for structural soundness, nor substantive strength.

(1) My topic is I disagree a person should never make an important decision alone (T) because they need the experience, confident, and a long [?] [BP].

*(2) My first **claim** is the experience. Everyone needs that to grow up. .* (Jay, Session VI)

Jay's posttest essay does not seem drastically improved since the pretest essay, although his Warrants sometimes do connect his Data to Claims. The improved Warrants suggest a marginal development for structural soundness. Backing for Warrants are still absent. Then, his arguments are minimally sound, although the problem of sufficient warranting persists. Only a person who is familiar with his writing development can detect minor improvements. He still did not acknowledge a rebuttal, which is a major criterion for substantive strength. The use of the modal "could" for qualification is one rare case in point for substantive strength. Therefore, inferring a marginal improvement in substantive strength may be valid. His coded posttest essay and its rhetorical analysis are presented below.

Paragraph 1 *I agree the best way to travel is in a group led by a tour guide (T). Nowadays, travel is a good way for people to relax. It becomes popular because people have to relax when that have free time. They have big stress during the work time. I have three claim to support my opinion. They are price convenient and knowledge (BP).*

Paragraph 2 *First, people travel with a tour guide is cheaper than by themselves (C). Tour guide **can** buy the cheapest airplane ticket (D1) and some trane [sic train] tickets (D2). Without a tour guide, we **could (Q)** spend a lot of money on them (W).*

Paragraph 3 *Second, it is convenient for people (C). Sometimes people don't know the route, they have to ask others (W). The tour guide can take people to any place they want (D1). The tour guide help you to book a hotel (D2). Tour guide can do their best (S1).*

Paragraph 4 *Third, people travel with a tour guid can know some knowledge about local culture (C). They tell people anything around here (D). This way is better than people go some where by them slef (S2). Travel is not only to see some amazing things, but also hear some wonderful news about here (W).*

Paragraph 5 *In conclusion, price, convenient, and knowledge can show my opinion is right. The tour guide can bring many benefit for people to travel. .* (Jay, posttest)

In paragraph 1, Jay had a clear Thesis (T) with three Blueprint items (BP). Contrary to Instruction in Session Zero, the thesis and blueprint are separated by a few other general statements, which do not cause much strain. His use of meta-discourse lexis "claim" and "opinion" is noteworthy, and suggests some awareness of the cognitive tools presented in Instruction, which is the first step toward knowledge-transforming (see previous section).

In paragraph 2, Jay's Claim has a clear topic and theme. He provided two Data items (D1 and D2) and related them through a Warrant to the Claim. Unlike the Warrants in the posttest

essay, the Warrant here directly connects the Data items to the Claim. The use of Qualification "could" in the Warrant (W) is noteworthy. For D1 he mentioned a specific possibility and qualified it with "can," which simultaneously signifies ability and possibility. These observations suggest a degree of structural soundness.

In paragraph 3, Jay's Claim has a clear theme. For the topic, he used the anaphoric reference "it," which presumably refers to raveling with a tour guide mentioned in the previous paragraph. After his Claim, he provided a Warrant, which presents his assumption about the tourists' lack of knowledge of "the route." This Warrant cannot be assumed and should be further expanded with a factual backing, which he did not provide. Then, he gave two Data items (D1 and D2), the first of which can be related to the Claim through the Warrant, but D2 cannot. This causes a coherence problem. The last sentence (S1) is unconnected to the Claim. The presence of some warranting suggests Jay's development toward structural soundness.

In paragraph 4, Jay's Claim is complete with a topic and theme. The Data has a pronoun "they" with an unclear referent, but it presumably refers to the tour guide (albeit by violating the grammatical number agreement requirement), which causes some strain. Following sentence S2, Jay provided a Warrant, in which he spelled out his assumption about the purpose of travel; this connects his Data to his Claim. Similarly to the two previous paragraphs, Jay's inclusion of warrants contributes to a beginning level structural soundness quality. The absence of rebuttal and response to rebuttal render his essay substantively weak.

In summary, compared to his pretest essay, Jay's posttest essay is more structurally sound because of the improved warrants. That is, the connection between Claims and Data is better established in the posttest essay. However, his posttest essay does not indicate much improvement over his pretest essay for substantive strength, due to the absence of rebuttal and response to rebuttal in both tests. Notwithstanding, considering only these two time points can be misleading. In Session V, Jay did provide evidence for substantive strength by generating a Rebuttal and Response to Rebuttal as well as Qualification. Jays' Session V writing was mediated by both focused freewriting and the prompts. This suggests that with (artefact) mediation, Jay's performance improved, since he was able to generate the discourse features indicative of substantive strength. Table 6.5 summarizes Jay's rhetorical development.

Table 6.5. Summary of Jay's Rhetorical Development

Session	Argument quality	
	Structural soundness (Coherence + C, D, W, B)	**Substantive strength** (Coherence + R, RR, Q)
Pre	C and D present. Virtually no relevant Ws, because the Ws that he did provide are for the wrong Cs. So, structurally unsound.	No R, RR, or Q, so substantively weak.
I	Not available	
II	Attempted to support one of his three Cs (incorrectly applied the essay schema to a single paragraph), but left the other two Cs unsupported. He provided two Ws for the first C. No Data provided, so structurally unsound.	No R, RR, or Q, plus general incoherence, so substantively weak.
III	Although he generated sentences with the prompts under C, D, W, B, R, and RR, the sentences under B, R, and RR do not represent these categories, causing coherence problems; hence, not structurally sound.	No relevant R or RR. Q missing, so substantively weak.
IV	Not available	
V 2 drafts	C, D, W present, but other W missing. No B. Generally, showing beginnings of structural soundness, but linguistic inaccuracies caused coherence problems This may due to the activity focused freewriting and lack of core linguistic competence (Hulstijn, 2011) is compromising argument quality.	Although he does have R, RR, and Q, but R is unclear and the RR is an assertion related to his claim. RR could improve with a W that linked it to RR. Shows beginnings of substantive strength Jay's best effort so far.
HW5	He has the minimum requirement for structural soundness since there is at least one D where needed for each C and implied warrant.	No R, RR, Q, so no substantive strength.
VI	Not sufficient data generated to warrant analysis.	
Post	C, D, W present. Ws slightly improved, but not much since pretest essay. His arguments are minimally sound, and the problem of sufficient warranting still persists. Only a person who is familiar with his writing development can spot minor improvements.	No R, or RR, so not substantively strength, except for the use of the modal "could" for Q is one rare case of improved strength.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal, Q=Qualification; HW5= Session V Homework

6.6. Jay's Cognitive Development

In the pretest essay, Jay did not produce a rebuttal or response to rebuttal. Thus, there was no direct evidence for knowledge transforming (see rhetorical analysis above).

Jay's Session I text was not available. Therefore, the analysis of his texts starts from Session II. In Session II, Jay produced no observable evidence of knowledge-transforming. The task was to write a single paragraph, but, instead, he seemed to have applied the schema for an essay. He did produce a main Claim, several sub-claims, and two Warrants; the connection between which was unclear, rendering his paragraph incoherent. There was no rebuttal or response to rebuttal. Therefore, Jay did not seem to have attempted the argument discourse schema taught in Sessions I and II. Jay's coded text and its analysis for cognitive development is below.

> *I agree with that grades encourage students to learn (C). It can show how was the student. In my opinion, I have three opinion about [,?] such as confidence, seek knowledge and persist in (BP). First of all, the student who got a high marks can take more confidence (C1). They will not think that they can't study well (W1). They feel that they can do anything (W2). Second a good mark makes them like to seek knowledge by them slef (C2). They have more space to develop (C3). Third, if they got a high mark, they can persist in something (C4). It is hard to lose their hope (C4). They need more power [?] on everything (C5). We can't give them blow (C6). In my opinion, a good grade can give students confidence, seek knowledge and persist. There are the good way to encourage students to learn. I agree with that.* (Jay, Session II)

Evidence for knowledge-transforming at this stage would constitute applying the discourse schema for a paragraph to this text. Additionally, the "rise above conflict" criterion (Scardamalia et al., 1984), which would be realized by generating a rebuttal and response to rebuttal, is absence. Because neither piece of evidence is present, Jay's paragraph cannot be judged to be knowledge-transformative.

In Session III, and at a macro-level, Jay simply wrote one sentence for each discourse feature (two for Backing) on the think-sheets, and transferred these sentences verbatim to his final copy. There was no revision, addition, or omission. The sentence that he generated on the Rebuttal and Response to Rebuttal think-sheets were unrelated to either category. As this level, therefore, there has been no knowledge-transforming composing, because he displayed a think-say behaviour which is akin to knowledge-telling, without any problem solving in the rhetorical spacing, and not rising above conflict (Bereiter & Scardamalia, 1987). Jay's coded text and its analysis for cognitive development is below.

> *I agree with that parents should make important decisions for their older teenager children (C). Parents are the model for their children (D). They admire their parents and imitate them (W). The children don't have vision to decide something (B1?). They are easy to lose situation (B2?). Parents give them decision is good for them to reduce some trouble (R?). They have confident face to the life (RR?). In my opinion, parents make important decision is good for them (ResC). .* (Jay, Session III)

At a micro level, however, and compared to his paragraph for Session II, Jay managed to use the think-sheets to mediate his writing to both sequence the steps and generate language for each step. This was an incremental improvement since Session II paragraph consisted mostly of unsupported claims. The Session III paragraph could be considered a small development toward knowledge-transforming since the rhetorical categories triggered content generation, albeit with non-relevant sentences for Rebuttal and Response to Rebuttal.

In Session IV data for Jay was not available, so the analysis proceeds with Session V. In Session V, Jay produced two drafts, which are coded and displayed below (See Figure 6.6). Jay started to show early knowledge-transforming behavior. This was a critical event in his writing development. His second draft was larger than his first draft, and not simply a copy of it; unlike Session III, it was not a verbatim transfer from one draft to the next. The longer second draft indicates that the act of writing helped him generate new content. He rearranged his sentences and generated new ones. For the first time, Jay generated a Rebuttal, mediated by prompt number (7) and responded to it. This is a critical moment in his development. Scardamalia, et al. (1984) identified "rising above conflict" as the main feature of knowledge-transforming, whose elements appear in Jay's Session V paragraph. Also, Jay generated more text for both Rebuttal and Response to Rebuttal in the second draft, an instance of expansion knowledge-transforming. Although he did not number the prompts that he used in the first draft, he did so in the second draft. This was interpreted to mean that he did use those prompts to formulate the rhetorical problem and retrieve items of knowledge for it in the content problem. For the first time in this research, Jay has managed to revise his first draft. These observations indicate knowledge-transforming behaviour.

First draft (focused freewriting)	Second draft
Business means to earn money, but here I don't agree with this idea (C). Nowadays, people have many ways ~~on how~~ to earn money even though it is crime (D?). Many of them don't care about that. ~~It is not good for them, also don't good for the customers~~. Honest is the most important thing to do business (W). Some people often lie to others. This is a big problem. Many business man maybe doesn't agree with me because they thing [sic think] money is important (R). My reasons tell me it is not good because~~ ~~I don't think a lot for business~~ (RR). I just think some for customers. So my claim is presumably (Q) true (ResC).	*(1) I don't agree with business should do anything they can to make a profit (C). Nowadays (2) business means to earn money (S1), people have many ways on how to earn money even though it is* ***criminal (D?).*** *Many of them don't care about that. Honest is the most important thing to do business (W).* ***If people who get it, they can have a good cooperation with others***. ***However,*** *some people often lie to others. This is a big problem. (7) Many business man maybe don't agree with me because they* ***think they can do well, they also think that if they have opportunity, they have to earn money****(R).* ***My*** *reasons tell me that it is not good* ***because my thinking is only for customers*** *(RR). So, my claim is presumably (Q) true (10)(Res Claim0.*

Figure 6.6. Jay's Session V Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. If Jay deleted something in the second draft, it is indicated with a strike-through In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In Session VI, Jay did not produce much evidence of knowledge-transforming because he did not write much and only produced the two sentences shown below. In this very short response, Jay produced a Thesis [T] with three Blueprint [BP] items, the last work of which, i.e., "long," is incomprehensible. He showed a trace of the first prompt, by using the word "claim" in it. He clearly did not generate enough text to merit further analysis.

> *(1) My topic is I disagree a person should never make an important decision alone (T) because they need the experience, confident, and a long [?] [BP].*
>
> *(2) My first claim is the experience. Everyone needs that to grow up. .* (Jay, Session VI)

For Session V Homework and posttest essay (see rhetorical analysis above), Jay's essay did not include a rebuttal or response to rebuttal. Thus, there is no evidence to be inferred for knowledge-transforming behavior except his use of the meta-discoursal terms "claim," "support," and "opinion" which might indicate that these concepts have become more scientific for him. This suggests a small amount of movement toward knowledge-transforming behaviour since Session I.

In summary, Jay did not produce much evidence of knowledge-transforming. The only exception was in Session V, when he wrote two drafts, in which he indicated he used the prompts, he expanded his second draft, and acknowledged an opposition and responded to it. The quality of the latter was rather poor, however. This indicates that with mediation through the

prompts and freewriting (in Session V), there were some burgeoning knowledge-transforming abilities. It is possible that Jay did not invest emotionally (Swain, 2013) in the tasks. For example, the fact that he did not complete the task in Session VI might indicate lack of motivation. However, when he did appear to set his heart and mind to the task (e.g., in Session V), he was able to show engagement and some early evidence for knowledge-transforming. Table 6.6 summarizes Jay's cognitive development over an eight-week period.

Table 6.6. Summary of Jay's Cognitive Development

Session	**Knowledge-transforming (K-Tr)**
Pre	No R or RR, so no K-Tr. Provided an outline which he transferred almost verbatim to his draft, so a classic case of knowledge-telling.
I	Data not available
II	No R or RR, No observable evidence of K-Tr, i.e., no evidence that he applied the text schema.
III	Generated content in response to R and RR, but content irrelevant to R and RR. However, the content for C, D, and W. At a macro-level there is classic knowledge-telling, because there are no revisions from the responses to the prompts to the final draft, but at a micro-level he seems to have *responded* to the prompts, hence, K-Tr, albeit inappropriately at times. This indicates development since Session II.
IV	Data not available
V 2 drafts	For the first time, attempted R and RR. Generated more in draft 2; hence, EK-Tr. This happened to be the only time he acknowledged R and RR.
HW5	A developmental step backwards since Session V. No R, RR; hence, no k-Tr.
VI	Not sufficient data generated to warrant analysis.
Post	No R or RR. No indication of K-Tr, except use of meta-discoursal terms "claim," "support," and "opinion" indicating that these concepts have become more scientific for him; hence, a small movement in K-Tr since Session I.

Notes. C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal NA: K-Tr: knowledge-transforming; EK-Tr: Expansion knowledge-transforming, HW5= Session V Homework

6.7. Mohammad's Rhetorical Development

In the pretest essay, Mohammad's extended argument comprised two middle paragraphs, each with two supports. It included some of the argument discourse features, i.e., Claim, Data, and possibly one Warrant. His text was not always structurally sound mainly due to missing warrants and not substantively strong in large part due to a lack of rebuttal, response to rebuttal, or qualification (Toulmin et al., 1984).

Paragraph 1	*Nature is the world that we live in it, and it's the most beautiful thing in our life, we should respect it and give it as she always give us. It's not fair to pollute it and damage it. As a result, I completely disagree with those who want to build a factory around my community (T) for many reasons such as the smoke of the factory and the crowded (BP).*
Paragraph 2	*First, as we all know how much pollution does the factory make especially the smoke that comes out from it (C). This kills everything around it and damage our community as well (D1) Also, the smoke that comes from the vehicles which runs always around the factory (D2). All that makes a lot of smoke which is a lot of pollution and a big destroied [sic destruction] to the nature (W).*
Paragraph 3	*Second, that'll make crowded around our community all the time (C), and It'll not be only cars(D1). There will be trucks and many vehicles that crowd our community (D2). In addition, there wil be less parking for cars (D3), and that of course, will bother us (W?). Therefore, I don't like this idea to build a factory around our community.*
Paragraph 4	*To sum up, build a factory in our clean community is a bad idea, and I disagree with it for some reasons such as the smoking and the crowded. .* (Mohammad , pretest)

In paragraph 1, Mohammad has a clear Thesis (T) with a Blueprint (BP). In paragraph 2, Mohammad's Claim (C) contains both a theme and topic, i.e., smoke and the factory. His topic sentence is not a complete claim because he did not relate the theme to his position, i.e., objection to the factory; however, he might not have considered it necessary in a short essay. He supported his Claim with two Data items: smoke from the factory (D1) and smoke from the cars running around the factory (D2). The theme of smoke from the factory is supported enthymematically (with an assumed warrant); however, the word "kills" in the Data needs warranting to demonstrate the fatal nature of the factory smoke; otherwise, it sounds hyperbolic. The smoke from the cars around the factory is less directly related to the factory. Therefore, a warrant is critically missing to connect the Data to the Claim about factory pollution. A backing would be required to lay the factual grounds on which this warrant is accurate, demonstrating that there will in fact be more cars in the neighbourhood due to the factory. His final sentence

can be interpreted as a general Warrant (W) for his Claim. It relates in general terms the idea of the pollution caused by the factory to the destruction of nature, not the neighbourhood, which is his topic. This lack of correspondence compromises the paragraph's structural soundness.

In paragraph 3, the Claim (C) relies on the pronoun "that" to refer to the topic, i.e., factory The Claim has a clear theme. The Data for the theme are again cars (D1) and trucks and other vehicles (D2). Thus, the Data item, cars, is used for the theme of pollution in the first paragraph and crowdedness in the second paragraph. The third Data item is the parking problem (D3), but it is unclear, in the absence of a warrant, how parking problems will be caused by the addition of the factory. However, the idea that the parking problem "will bother us (W?)" can function as a link to the Claim, albeit a weak one. In paragraph 4, Mohammad restated the Thesis and Blueprint. In sum, the missing warrants rendered his pretest essay generally structurally unsound, and the absence of rebuttal and response to rebuttal, substantively weak. Mohammad's writings for Sessions I and II were not available, so the analysis proceeds with Session III.

In Session III, Mohammad included all the discourse features including Rebuttal, Response to Rebuttal, and Qualification. This was a substantial improvement since the pretest essay. There was a problem with the use of "therefore" to initiate Backing, which should logically start with a subordinator of reason, not conclusion. However, he had erased "therefore" on the think-sheet before transferring to final draft, which indicates the journey that a linguistic form, e.g., "therefor," takes on its way to internalization, is far from smooth. There were instances of Qualification. Also, the sentence generated with the Backing prompt is not actually backing. There was a Rebuttal, which was grammatically inaccurate, as well as a Response to Rebuttal, which did not read coherently. These indicate that he was moving toward a more structurally sound and substantively strong argument, which are developments since the pretest essay, but language errors impeded accurate linguistic performance. His coded paragraph is displayed below.

> *A part of the parents' responsibility is taking important decisions for their children (C). If we look around we will see the huge amount of drugs that some people provide it for teenager (D) and this is one [of] the examples to show how teenagers are not young [sic old] enough to take all their decisions by themselves (W). Therefore (?), limiting teenagers of doing things may (Q) protect them from dangerous (B). Even though, that may (Q) effect on their personality and limiting them of exploring the world, that may (Q) creat[e] limited [sic a limitation](R), but great personality that has great ideas (RR). More likely (Q), it's really important to take some important decisions for our teenagers that may (Q) can't take important decisions themselfs.* (Mohammad , Session III)

Mohammad's paragraph seems to have all the discourse features. His Claim (C) is clear with a topic and theme. He used the idea of drugs as Data (D) and related it to the Claim with a Warrant (W) which implies adult supervision. Of note is his Backing (B), which starts with "therefore". The Backing is clearly not a conclusion and should not start with "therefore." However, he seems to have erased the word "therefore" on the think-sheet for Backing, yet, he still reproduced it in his final draft. This might be a token of his developing writing ability (see discussion above). Interestingly, Mohammad already has four instances of Qualification (Q) with hedging words "may" and "likely." The presence of a Rebuttal, notwithstanding its grammatical inaccuracy, at this stage is significant, because it was absent in his pretest essay. Mohammad attempted a Response to Rebuttal which reads incoherently: "but great personality that has great ideas (RR)." It is possible that he intended to state "despite the limitation, this will help teenagers *develop* a great personality with great ideas." This would be a claim that needs data, which he did not provide at this point in his development. Overall, these observations suggest movement toward structural soundness and substantive strength.

In Session IV, Mohammad's paragraph includes all the discourse features. What he generated with the Backing prompt, however, is not in fact backing, but another data item, yet the example he provided was irrelevant to his Warrant. If his Backing were taken to be another Data for the Claim, his argument could be seen to be bordering on structural soundness (given the short 10 minutes he had to produce it). His argument was not substantively strong, since his Rebuttal and Response to Rebuttal were weak. He did include Qualification which contributed to the substantive strength of his argument. Mohammad's paragraph is coded and displayed below.

> *My opinion is "never give up" has a big meaning that really encourage* ***people*** *to do hard things and never give up (C). The reason I think is based on these facts which are lots of boxing coaches use these words to support their players* ***(D1)****and that encourage them to never stop and* ***still trying for ever****(W). Also, these other supports which is many of my teachers use these words to push me to learn more about the difficult things in English and never give up* ***(B →D2)****, but people may disagree. They may say that may dipressed [sic depressed] people when they can't get whatever they* ***want*** *to do get****(R)****.. **However**, here is my response to those who disagree which is we should be positive all the time no matter what happened at the end* ***(RR)****. Finally, my claim is presumably* ***(Q)*** *true* ***for what I said about how the word can influence people and support to do things no matter what the result, and that what I really agree with (ResC).*** (Mohammad , Session IV)

Mohammad's paragraph contains all the discourse features. (He did not delete the prompts that he used from his final drafts). His Claim (C) includes both a precise opinion about

"hard things" and a tautology, i.e., "'never give up' … encourage[s] people to 'never give up'." As Data (D1) Mohammad cited boxing coaches, and as Warrant (W) he claimed the coaches' encouragement expressed in the phrase "never give up" helps the boxer to keep trying. Next, he generated a sentence with the prompt for Backing (B→D2). The prompt is truncated and incorrectly used. His Backing is not in fact a backing, but another Data item (B→D2). The backing should provide the factual grounding for the Warrant, yet the example about his teachers is irrelevant to his Warrant (W) about boxers. Nonetheless, the second Data item (B→D2), although generated with the wrong prompt, is relevant to his Claim (C). He generated a sentence with the Rebuttal prompt, which is incomprehensible, and his Response to Rebuttal (RR) is a cliché, thus, not strong, since it is only a counter-claim that needs data for support. Given the short 10 minute limit Mohammad had, he boarded on a "structurally sound" (Toulmin et al, 1984) argument, which at face value, included all the discourse features. Mohammad was not able to satisfy the criterion of substantive strength due to his incoherent Rebuttal and Response to Rebuttal, although he did include Qualification (Q) which somewhat contributes to a sense of substantive strength.

In Session V, Mohammad's paragraph was minimally structurally sound and substantively strong. It included all the discourse features including a sentence that he generated with the Backing prompt. However, this sentence did not provide factual grounding for the Warrant, but it was, in fact, another Data item. Because he included a coherent Rebuttal, Response to Rebuttal, as well as, Qualification, his argument was substantively strong. His coded paragraph is displayed below.

> *I disagree that businesses should do anything they can to make a profit (C). The reason* ***why*** *I think so is* ***because*** *they limit the chance of* ***small businesses*** *to be successful(D-W)). Also, may be disapointed them from their dreams (B→D).* ***However, some people may*** *think businesses are like a big chalange and you should be strong enough to be successful in this side (R2).* ***However, my opinion about that is*** *businesses must be proved [sic provided] to everyone no matter how strong you are, and you should be able to control people of doing bad things in business (RR2). Presumably (Q), making a profit by doing anything businesses can do is a bad idea (ResC).* (Mohammad, Session V)

Mohammad's paragraph has a clear Claim (C). For data, he presented his interpretation of "doing anything to make a profit." Because this is an assumption I coded it as either Data or Warrant (D-W); it could be an objective observation he made; hence, Data; or it could be a principle he believed in; hence, Warrant. Similarly to Session IV, Mohammad's Backing does not support the Warrant, but adds another Data item (B→D). Mohammad's Rebuttal (R) presents

the opinion that for some, business is "a challenge," i.e., competitive. His Response to Rebuttal (RR) presents the idea of equality of opportunity. Despite the word choice problems, the latter features are coherent. He Restated his Claim (ResC) with Qualification. These three points made his argument substantively strong.

For Session V Homework, Mohammad's essay had all the elements, except backing. Problems were observed with the use of causality conjunctions, confusing cause and effect, which was a common error in both groups. Missing warrants or lack of definition (delineating how a new topic connects the data to claim) caused a coherence problem. He used the adverb "usually" as hedging for the Data which he provided for the Claim. He had a complete Rebuttal paragraph with two Responses to Rebuttal. Each of the responses is a minimal argument with Claim and Data; however, his responses repeat his arguments in the middle paragraphs. This repetition detracts from the quality. He did not provide Qualification for the Claims, another instance of U-shaped development. I judged his essay to be moderately structurally sound and substantively strong.

Paragraph 1 *Nowadays, travelling between countries is becoming much easier and faster as well. Thousands of airplanes are in the air now. Therefore, spending a vacation abroad becomes reality faster and easier. However, I would agree with travelling with group led by a tour guied for many reasons (T) such as being away from getting lost and visiting more attractions (BP).*

Paragraph 2 *First, travelling with a tour guid in a group led will help people to organize their time of their trip (C) that is because the chance of getting lost is much lower if you are in group (D1), and also the tour guide will give all the directions that people need (D2)*

Paragraph 3 *Moreover, that will help people to see more attractions and places (C) because the tour guied usually (Q) know all the attractions and some special place to see in the city (D). Therefore, that will save people's time (W), and give them the chance to see more places (ResC)*

Paragraph 4 *On the other hand, some people may (Q) think that if they are traveling alone and without any tour guied, that will give them more flexibility with the movement and moving between places in the city that they are visiting (R). However, there will be a chance for them to get lost (C1) because they don't know the city of the place they are visiting (D1)(RR1). Also, they can't see all the places in the city (C2) because they don't know about it (D2) (RR2).*

Paragraph 5 *To sum up, travelling with a group led by a tour guid is great and has many advantages such as being away from getting lost and visiting more attraction (ReBP).* (Mohammad , Session V, homework)

In paragraph 1, Mohammad presented a clear Thesis (T) with two Blueprint items (B). In paragraph 2, Mohammad's Claim (C) is problematic because he introduced a new theme which is different from the one he introduced in the Blueprint (BP). This causes structural soundness problems. According to the Blueprint (BP), the theme should be "away from getting lost"; however, the theme of the Claim is "organize their time." With this new theme, the clause that comes after the Claim (C) contains the Data (D1). However, this is the theme in the first Blueprint item and should in fact be the Claim in paragraph 2. Namely, the claim-data relationship is reversed, thereby, reversing the antecedent-consequent relationship. Mohammad changed the expected claim to data for a new claim. The theme of his claim, based on his thesis, should be "that it is less likely to get lost with a tour guide"; however, his Claim (C) in the first paragraph states travelling with a tour guide will help people to organize their time. Therefore, the theme of this claim is time organization and not the lower likelihood of getting lost. Next, he provided the Data (D) for it: that is because the chance of getting lost is much lower if you are in a group. In that light, the *expected* Claim (C_e) according to the Blueprint (BP) should look like:

> *It's less likely to get lost in a group led by a tour guide (C_e) because one is able to organize their time better with a group led by a tour guide (D_e)*

However, the *observed* (C_o) claim is paraphrased as:

> *One is able to organize their time better with a group led by a tour guide (C_o) because it's less likely to get lost with a group led by a tour guide (D_o)*

This reversal of cause and effect seems to be systematic with participants in both groups. (as per my informal observations of the CG texts, e.g., Niaz's, which is not reported here) This error underscores the need for systematic instruction in a separate lesson for warranting, which I had to delete due to the reduced instructional time. Further, it cannot simply be assumed enthymematically (Fulkerson, 1996) that if one is in a group, one can organize their time better. Therefore, either the notion of time management had to be defined, which is a problem of definition, or a warrant needed to be provided to establish the link; otherwise, the argument is unsound. He concluded the paragraph with another Data item, "tour guide giving directions" (D2), which seems unrelated to the observed Claim (C_o) "time organization," although if Mohammad had properly warranted it, a logical relationship could be inferred.

In paragraph 3, Mohammad's Claim is consistent with his second Blueprint (BP) item. For Data (D) he presented an observation that could be considered factual. For Warrant (W),

Mohammad introduced the notion of time. The Warrant connects the Data to the Claim by demonstrating that the reason people can see more attractions with a tour guide (C) is that they save time (W) if they go with the tour guide that usually knows all the attractions. Thus, the notion of time (W) warrants the Claim (C). This paragraph is more structurally sound than paragraph 2.

In paragraph 4, Mohammad's rebuttal paragraph starts with a counterclaim sentence (R) with Qualification (Q). Unlike the Claim in paragraph 3, he did have a topic in his counterclaim *tour guide.* He did not, however, follow up his claim with data as grounds for his claim. That may be because most of the exemplars in Instruction also only contained a counterclaim, after Toulmin (1958/2003). He responded to the Rebuttal (RR1), which contains both Data (D1) and Claim (C1), but he repeated the Data from paragraph 4. He provided a second Response (RR2) by presenting another Claim and Data sequence (C2 and D2). These ideas are borrowed from paragraph 3. He did not provide qualification. Despite the repetition, I judged this paragraph both structurally sound, because the ideas are coherently connected, and substantively strong, as a result of the coherent Rebuttal and Response to Rebuttal. In paragraph 5, Mohammad reworded his Blueprint (ReBP). Overall, the problematic reasoning in paragraph 2 and repetition in paragraph 4 detract from the argument quality. For this reason, I judged the essay moderately structurally sound and substantively strong.

In Session VI, Mohammad's essay featured all the elements, except backing, in one of the two support paragraphs, and Claim and Data only, in the second. The second paragraph did not read as a structurally sound argument due to missing warrants. Mohammad did not provide concrete data for his Claims. Data were given in the abstract in this essay (a relatively common occurrence among all essays), which might be a token of the under-theorized reality of the distinction between data as fact and warrant as principle (Toulmin, 1958/2003). Consistent with the new model, he had a complete paragraph for Rebuttal and Response to Rebuttal. Rebuttal and Response to Rebuttal were present, but did not read coherently, due to language errors, and word choice problems. Despite the presence of the discourse features I did not judge the argument structurally sound, or substantively strong. It was, however, an improvement over Session V in that Mohammad managed to apply the discourse model to a complete essay. His coded essay is presented below.

Paragraph 1 *Human was born free, and no one can control them of being free. However, as people starting their life, they realized they need someone to keep them to stay alive. Therefore, it's not wrong if you ask for help any time you need. Also, I completly agree with that a person should never make an important decision alon (T) for several reasons such as people's knowledge and the big responsibility of that (BP).*

Paragraph 2 *My first claim is(2) people are not knowledgeable enough to take their own decision alon* ***(C).*** *Because it's impossible to be knowledgeable in every thing in this life, people shouldn't take their decision alon* ***(D)****. We were born needed [sic needing] help, so it's human nature* ***(W)****. Therefore, if people are knowledgeable about everything, they will deserve [?] to take their decision alon.(ResC ?).*

Paragraph 3 *Furthermore, people taking their decision alon, they take all the risks of being in a real danger* ***(C).*** *All the responsibility will deserve [?] it because no one share the decision with them* ***(D).*** *Therefore, it's good to take an important decision with people (ResC).*

Paragraph 4 *On the other hand, some people may say (10) that's consider [sic may consider themselves?] as strong or knowledgeable personality, so they can take whatever decision they want* ***(R)****. But, here is my response to those who disagree. People are human and all human can't be away from mistakes all the time (RR), so there must be someone to help them.*

Paragraph 5 *So, my claim a person should never take a decision alone is presumably (Q) true (12).* (Mohammad , Session VI)

In paragraph 1, Mohammad generated a clear Thesis (T) and two Blueprint (BP) items. In paragraph 2, Mohammad's Claim (C) has a clear theme, i.e., lack of knowledge, which implies his position, i.e., objection to making decisions alone. For Data (D), he presented the uncontroversial fact that nobody knows everything. This sentence could equally be interpreted as warrant because it's a general principle supporting his Claim. The sentence that I coded (W) is another fact about human nature, which explains the Data (D) sentence. The sentence that I coded (ResC?) seems to contradict his Claim (C), but it could be interpreted as an implied counter-factual. Doing so can make it consistent with the Claim. In his Restated Claim (ResC) Mohammad probably meant to say that as it is the case that people are not knowledgeable about everything, then they should not make decisions alone. This lack of coherence detracts from the paragraph's structural soundness.

In paragraph 3, Mohammad's Claim contains a new theme: the risk involved in taking decisions alone. He provided a single Data item (D): the responsibility will not be shared. This is another categorical fact that he provided as Data. He did not add a warrant explaining why joint responsibility is better than sole responsibility in decision making, nor did he ground the warrant that he assumed in a fact, by giving a concrete example as backing. These inadequacies compromise structural soundness. In paragraph 4, notwithstanding Mohammad's inaccurate

grammar, I could decode a Rebuttal (R), i.e., people's self-perceptions about their ability to make decisions alone, and a Response to Rebuttal (RR) which is a reference to human fallibility. Because these sentences did not read coherently, they did not allow for a substantively strong argument, although they bordered on it. In paragraph 5, Mohammad reworded his thesis with Qualification (Q).

In the posttest essay, Mohammad's essay seemed to contain all the discourse features except backing. Overall, I judged it to be structurally sound and substantively strong. His first support paragraph had a missing or unclear warrant. In his second support paragraph there was a problem with discourse markers of causality. These detracted from structural soundness, although it seemed improved since the previous ones and, certainly, the pretest essay. His Rebuttal, Response to Rebuttal and Qualification were adequately substantively strong, although there was a problem with the Data in the Rebuttal. Also, there were language and coherence problems in the rebuttal paragraph that compromised its structural soundness. Interestingly, he used a verb of perception "seem" to qualify the Claim. This is notable because up to that point, he had relied on adverbs to hedge his claims, for Qualification. Mohammad's posttest essay is coded and displayed below.

Paragraph 1 *The new technology has brought for people many new things, and one of them is the transportation has become more convenient and faster, and it has become easier to use to travel between countries. Some people prefer to travel alone and others prefer to travel with a group led by a tour guide. I agree with travelling with group led by a tour guide (T) for many reasons such as saving time and enjoying more (BP).*

Paragraph 2 *Traveling with a group led by a tour guide saves the time for people (C). That is because the tour guide know all the directions (D1) and they will never get lost (D2). Also, they will help each other when they get lost to find the correct way easily (D3) and save their time (W?). Therefore, it's better to travel with a group led by a tour guide (Res C).*

Paragraph 3 *The other reason of travelling with a group led by a tour guide is better [is] that people will enjoy more (C). Therefore , [sic because] they can visit lots more places that they can't do it themselves (D1) because it's the tour guid specialist (W1). Also, they can make a reservation to meet a famous person as a group (D2) and the tour guide will give them all the details they need (W2) and make it easier for them. It's much more enjoyable and great if you travel with group led by a tour guid who will let you enjoy your time*

Paragraph 4 *On the other hand, some people might say that people limit their selves (C) with scholed [sic scheduled?] and rooled [sic ruled?] trip (D?) that limites their freedom in their travels (R). However, I think this limitation will let you relax and enjoy your trip without any responsibility that may inconvenient you (RR) and for that I seem (Q) to be correct (ResC).*

Paragraph 5 *To sum up, if people travel with a group led by a tour guid that will be saving people time and enjoying people more . It's great to let people manage everything for you, just relax and enjoy your travel.* (Mohammad , posttest)

In paragraph 1, Mohammad generated a clear thesis (T) with a topic (T), travelling with a tour guide, and two themes, saving time and enjoying more (BP). In paragraph 2, the Data for the Claim is that the tour guide knows the directions (D1) and this will prevent the tourists from getting lost (D2), which is a chain of reasoning consisting of two Data items, presented without a warrant, creating an enthymeme. The second support has a single Data sentence (D3), suggesting "they", whom I interpreted to refer to the tourists, can help each other out. The unclear anaphoric reference "they" poses a cohesion problem, because the grammatical subject is expected to be the tour guide, yet the only logical referent for "they" should be the tourists. The warrant is missing for this Data; it could be the notion that if one does not get lost, one saves time. This idea seems to be suggested in the sentence which I coded (W?).

In paragraph 3, Mohammad wrote a clear Claim (C), which is followed by a sentence headed by "therefore." If this sentence is to be data, it cannot start with a conjunction of result or consequence, because it would be question begging, the logical fallacy of assuming the claim and drawing conclusions from it. The sentence (D1) headed by "therefore" appears to be the cause of the claim more than its effect; thus, I propose "because" instead of "therefore." The fact that tourists can visit more places should logically be the grounds for enjoyment, not its consequence; thus, interpreting "therefore" as "because," yields the data (D1) for the claim. This misuse of causality markers was a common occurrence among participants. The Data (D1) is appropriately supported by a Warrant (W1). The second support starts with a Data item about visiting famous people (D2), which is supported by a Warrant (W2) implying *how* (and not *why*), that leads to enjoyment (C). Normally warrants, show the causal link between the data and the claim (Toulmin et al., 1984; Fulkerson, 1996), but Mohammad used the Warrant to indicate the manner in which the Data is possible.

In paragraph 4, Mohammad generated a Rebuttal with what seems to be a Data item (D?): "with scholed [sic scheduled?] and rooled [sic ruled?] trip." If my interpretation is correct, Mohammad was implying that a trip with a tour guide has schedules and rules, and these limit the tourist's freedom. Again, language proficiency (Hulstijn, 2011) limited his ability to accurately generate what seemed to be Data and my ability to interpret it. Also, the topic "tour guide" is absent in his Rebuttal, but should have been expressly stated. His Response to Rebuttal (RR) links this apparent limitation to his Claim in paragraph 3, i.e., enjoyment. In his Restated

Claim (ResC), Mohammad provided Qualification (Q) with the verb of perception, "seem," instead of the usual adverb. I judged this to be an improvement in his ability to make a qualified claim, although the tone of his Restated Claim is colloquial. I judged his paragraph to be substantively strong. In paragraph 5, Mohammad restated his Thesis and Blueprint.

In summary, Mohammad generated an argument that was adequately structurally sound and substantively strong. There were warranting problems both in the main argument and the rebuttal paragraph. Mohammad generated a complete rebuttal paragraph with a few language inaccuracies. Nonetheless, the presence of a Rebuttal, Response to Rebuttal, and Qualification were indicators of substantive strength. Because the latter features were absent in his protest, they are an important milestone in Mohammad's rhetorical development.

Compared with the pretest essay, Mohammad generated three middle paragraphs, one more than the pretest essay. The third middle paragraph was exclusively for Rebuttal and Response to Rebuttal. Compared with his pretest essay, his posttest essay featured stronger claims as well as a rebuttal paragraph which featured all the elements of instruction. This gave the posttest essay its superior structural soundness and substantive strength. Table 6.7 summarizes Mohammad's rhetorical development.

Table 6.7. Summary of Mohammad's Rhetorical Development

Session	Argument quality	
	Structural soundness (Coherence + C, D, W, B)	**Substantive strength** (Coherence + R, RR, Q)
Pre	Text includes C, D, W, other but missing Ws render text incoherent.	Not substantively strong in large part due to absence of R, RR, and Q
I and II	Data not available	
III	All features present, but coherence issues. Also, problem with the use of "therefore" to initiate "Backing." However, had erased "therefore" on think-sheet before transfer to final draft (i.e., problem of internalization).	Four instances of Q. R, but syntactically inaccurate. RR incoherent. Not strong, but improved since pretest.
IV 2 drafts	All features present. B not in fact backing, but D although he uses the B cue to generate it, and is relevant to C. "structurally sound" given the short 10 minutes.	R and RR are not strong since they are only counter-claims that need D for support. Q present.
V 2 drafts	All features present. Second draft has many lexical and syntactic revisions, which did not always improve the quality. Overall structurally sound.	R, RR, and Q present. However, those in the first draft were more coherent than the ones on the second. Overall Substantively strong.
HW5	All features present, except B. Moderately sound. Problems were observed with the use of causality conjunctions, confusing cause and effect. Missing W or lack of definition caused a coherence problem.	A complete paragraph for R with two RRs in it. Each of the RRs is a minimal argument with C and D; however, his RRs repeat his arguments in the middle paragraphs. No Q. Generally, strong.
VI	All features present, except B, of an extended argument. He does not provide concrete D and B for his claims. These elements are given in the abstract. Minimally sound.	A complete paragraph for R and RR. R includes a W, which is an improvement over the previous attempt, and RR is appropriate. No Q. Minimally strong.
Post	All features present, except B. Compared with pretest, the posttest has stronger Cs. Generally sound despite lack of coherence in the first support paragraph and an implausible support idea.	A strong R and RR paragraph. The use of the verb of perception "seem," instead of an adverb," for Q is significant. Overall, Substantively strong.

Notes C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal, Q=Qualification; HW5= Session V Homework

6.8. Mohammad's Cognitive Development

In the pretest essay, Mohammad did not write a rebuttal or response to rebuttal. Therefore, there was no direct evidence for knowledge transforming (see rhetorical analysis above).

The data for Sessions I and II were not available. Therefore, analysis proceeds with Session III. In Session III, Mohammad's paragraph shows clear evidence of knowledge-transforming at least three levels. Firstly, his writing was mediated by the prompts provided on the think-sheets. He utilized the prompts as rhetorical tools to retrieve/generate between two and four sentences for each discourse feature. For example, in response to the prompts for the Warrant he generated two items of content, of which he selected one, revised it, and included it in the draft. Knowledge-transforming is evident because Mohammad responded to the prompt *and* did not simply copy the two sentences into the final version, as is the case in knowledge-telling. Another interesting example of knowledge transforming is on his think-sheet for Backing. Mohammad generated the following ideas in response to the Backing prompts:

- Schools/college students/ night clubs
- Limiting the freedom of teenagers may protect them from the drugs

For the final sentence, he generated the following sentence with the word "therefore" erased from the beginning:

- ~~Therefore~~ [erased], limiting the freedom of teenagers may protect them from the drugs.

Mohammad correctly deleted the misplaced conjunctive adverb "therefore"; however, he did reproduce it in his final copy. This may be either a careless mistake or related to the problem of internalization (Bereiter & Scardamalia, 1986; Vygotsky, 1978). At this point, he might have been processing the discourse function of backing (to support the warrant) regulated by the prompt as an artefact, yet for that to become intrapsychological (Vygotsky, 1978) more time, practice, and/or mediation might have been required. Thus, being possibly unsure of the discourse function of "therefore," he reproduced it. This dialectic between the presence and absence of this discourse marker might be a token of the "internal monologue" (Scardamalia et al., 1984) Mohammad might have had while composing; a monologue characteristic of knowledge-transforming. Mohammad's coded text is displayed below.

> *A part of the parents' responsibility is taking important decisions for their children (C). If we look around we will see the huge amount of drugs that some people provide it for teenager (D) and this is one [of] the examples to show how teenagers are not young [sic old] enough to take all their decisions by themselves (W). Therefore (?), limiting teenagers of doing things may (Q) protect them from dangerous (B). Even though, that may (Q) effect on their personality and limiting them of exploring the world, that may (Q) creat[e] limited [sic a limitation](R), but great personality that has great ideas (RR). More likely (Q), it's really important to take some important decisions for our teenagers that may (Q) can't take important decisions themselves.* (Mohammad, Session III)

Secondly, he demonstrated other elements of "expert composing" by producing more in response to the prompts on the think-sheets than he selected to include in the final product (Bereiter & Scardamalia, 1987). All the discourse features were present in Mohammad's paragraph, but were of varying degrees of strength. Thirdly, Mohammad also included a Rebuttal and Response to it, albeit rather incoherent, further demonstrating knowledge-transforming because they reflect the "rise above conflict" criterion (Scardamalia, et al., 1984).

In Session IV, using the prompts, Mohammad wrote two drafts (coded and displayed in Figure 6.7). In the first draft, Mohammad's knowledge-transforming was evident in that he used all the prompts, except the one for Warrant, as part of focused freewriting, to generate discourse features. Thus, both the prompts and focused freewriting mediated his writing. As Mohammad was instructed, he copied the prompts in his first draft. This indicates conscious rhetorical problem formulation and content retrieval. In the second draft, however, he did not delete the prompts. This indicates absence of concision knowledge-transforming, which are second-draft revisions (Bereiter & Scardamalia, 1987) that occur in the rhetorical problem space and, if executed, would make the text more concise. Mohammad demonstrated expansion knowledge transforming in that he expanded his first draft by restating his Claim in the second draft. The fact that Mohammad generated a Rebuttal and Response to Rebuttal, despite their low quality, suggests knowledge transforming since they represent the "rise above conflict" criterion (Scardamalia, et al., 1984).

First draft (focused freewriting)	Second draft
*My opinion is "never give up" has a big meaning that really encourage ~~you~~ to do hard ~~but not an impossible things~~ (C). The reason I think is based on these facts which are lots of boxing coaches use these words to support their players **(D1)**and that encourage them to never stop and trying for ever(W). Also, these other supports[:]which is many of my teachers use these words to push me to learn more about the difficult things in English and never give up **(B →D2)**, but people may disagree. They may say that may dippressed [sic depress] people when they can't get whatever they ~~wish~~ to do get**(R)**, here is my response to those who disagree which is we should be positive all the time no matter what happened at the end **(RR)**. Finally, my claim is presumably true **(ResC)**.*	*My opinion is "never give up" has a big meaning that really encourage **people** to do hard things and never give up (C). The reason I think is based on these facts which are lots of boxing coaches use these words to support their players **(D1)**and that encourage them to never stop and **still trying for ever**(W). Also, these other supports which is many of my teachers use these words to push me to learn more about the difficult things in English and never give up **(B →D2)**, but people may disagree. They may say that may dipressed [sic depressed] people when they can't get whatever they **want** to do get**(R)**.. **However**, here is my response to those who disagree which is we should be positive all the time no matter what happened at the end **(RR)**. Finally, my claim is presumably **(Q)** true **for what I said about how the word can influence people and support to do things no matter what the result, and that what I really agree with (ResC).***

Figure 6.7. Mohammad's Session IV Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Mohamamd had used. If Mohammad deleted the prompts (or other words) in the second draft, they are indicated with a strike-through. In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In Session V, Mohammad wrote two drafts, too, mediated by focused freewriting and prompts (coded and displayed in Figure 6.8). Mohammad's paragraphs indicate strong evidence of knowledge-transforming. As instructed, he transferred the number and text of prompts to his first draft. A significant development since Session IV was that he did delete the prompts from his second draft, indicating "revision consciousness," another predictor of expert-like composing (Bereiter & Scardamalia, 1987). In his second draft, Mohammad included lexical and syntactic, as well as content, revisions, making his second draft a more refined piece than the one in Session IV. Both drafts included all the discourse features, including Rebuttal and Response to Rebuttal, which are indicators of knowledge-transforming. The latter are more coherent than the ones in Session IV, despite the word choice problems. He revised his Rebuttal (R2) and Response to Rebuttal (RR2) features in his second draft. These indicate improved knowledge-transforming ability.

First draft (focused freewriting)	Second draft
~~*Here is my claim (1)*~~*. I disagree that businesses should do anything they can to make a profit (D). The reason I think so is* ~~*based on these facts.*~~ *The chance for biggners will be limited (D) and that is because (4) they take every single chance which beggners are needed to it (W). Also, that dipressed them as well and kills theire future(B). But* ~~*people may disagree*~~ *(7). They may say businesses are chalnge [challenge] and as strong as you facing other people you will be successful, so the chance should be proved [sic provided] to every one to join this race (R1). However,* ~~*this argument isn't strong because*~~ *(9) that chnge [changes] the idea of business into war without roles [rules], and roles [rules] must control all that (RR1).* ~~*So, my claim is*~~ *presumably (Q)* ~~*true*~~ *(10) we shouldn't all [sic allow] businesses to take profit more than they desire [sic need].*	*I disagree that businesses should do anything they can to make a profit (C). The reason* ***why*** *I think so is* ***because*** *they limit the chance of* ***small businesses*** *to be successful(D-W)). Also, may be disapointed them from their dreams (B→D).* ***However, some people may*** *think businesses are like a big chalange and you should be strong enough to be successful in this side (R2).* ***However, my opinion about that is*** *businesses must be proved [sic provided] to everyone no matter how strong you are, and you should be able to control people of doing bad things in business (RR2). Presumably (Q), making a profit by doing anything businesses can do is a bad idea.*

Figure 6.8. Mohammad's Session V Task 3 Coded Paragraphs for Evidence of Knowledge-transforming Behaviour. In the first draft, I underlined the prompts that Mohammad had used. The numbers in parentheses correspond to the number of the prompt used. If Mohammad deleted the prompts in the second draft, they are indicated with a strike-through In the second draft, the new phrases are in bold. In both drafts, the phrases in brackets are my best estimates of the writer's intent. I added them for clarity. I did not edit either text.

In Session VI, Mohammad wrote a complete essay. His Session VI text is presented below (and repeated under rhetorical analysis) to show Mohammad's prompt use. (The other three participants' texts are only presented under rhetorical analysis as they did not indicate the prompts in their drafts.) The direct evidence for knowledge-transforming comes from the three underlined prompts (C, R, and RR) that he transferred to his draft. He used them for rhetorical problem definition and generating a solution in the context of an essay. The fact that Data and Warrant were also present (although the associated prompts were missing) may be through internal mediation. The prompts might have become internal signs by this point, which he could call up at will and use to guide his discourse schema construction. Unlike his Session V essay, in which he managed to revise and delete the prompts from his second draft, in Session VI his prompts still remained in the essay, an example of U-shaped development in his writing performance. The presence of Rebuttal and Response to Rebuttal indicate knowledge-transforming.

Paragraph 1 *Human was born free, and no one can control them of being free. However, as people starting their life, they realized they need someone to keep them to stay alive. Therefore, it's not wrong if you ask for help any time you need. Also, I completly agree with that a person should never make an important decision alon (T) for several reasons such as people's knowledge and the big responsibility of that (BP).*

Paragraph 2 *My first claim is(2) people are not knowledgeable enough to take their own decision alon* ***(C).*** *Because it's impossible to be knowledgeable in every thing in this life, people shouldn't take their decision alon* ***(D)****. We were born needed [sic needing] help, so it's human nature* ***(W)****. Therefore, if people are knowledgeable about everything, they will deserve [?] to take their decision alon.(ResC ?).*

Paragraph 3 *Furthermore, people taking their decision alon, they take all the risks of being in a real danger* ***(C).*** *All the responsibility will deserve [?] it because no one share the decision with them (****D****). Therefore, it's good to take an important decision with people (ResC).*

Paragraph 4 *On the other hand, some people may say (10) that's consider [sic may consider themselves?] as strong or knowledgeable personality, so they can take whatever decision they want* ***(R)****. But, here is my response to those who disagree. People are human and all human can't be away from mistakes all the time (RR), so there must be someone to help them.*

Paragraph 5 *So, my claim a person should never take a decision alone is presumably (Q) true (12). .* (Mohammad, Session VI)

For Session V homework and posttest essay (see rhetorical analysis above), Mohammad generated a Rebuttal and a Response to Rebuttal, which are indicative of knowledge-transforming.

In summary, Mohammad demonstrated knowledge-transferring by active use of prompts to formulate rhetorical problems and retrieve content for them. The amount of revision he managed to do in the second draft indicated that writing itself mediated revisions, which is further evidence of knowledge-transforming (Bereiter & Scardamalia, 1987). He seemed to have internalized the following elements of discourse schema: Claim, Data, Qualification, Rebuttal and Response to Rebuttal, as rhetorical concepts that drive content generation. His mastery of warrant was still developing, and backing was generally absent. The presence of Rebuttal and Response to Rebuttal in his writing was a strong indicator of knowledge-transforming. He demonstrated both expansion knowledge-transforming, generating more content in the second draft, and concision knowledge-transforming, making items of content more concise in the second draft. Table 6.8 summarizes Mohammad's cognitive development over an eight-week period.

Table 6.8. Summary of Mohammad's Cognitive Development

Session	**Knowledge-transforming (K-Tr)**
Pre	No R or RR; hence, no K-Tr.
I and II	Data not available
III	R and RR present; hence, K-Tr, but coherence problems. Generated 2-4 sentences for each prompt; hence, strong K-Tr. Then, formulated one final version; hence, CK-Tr, i.e., generated more in response to the prompts that he finally selected/formulated .On-line contextual revision.
IV 2 drafts	R and RR present; hence, K-Tr., coherent, but low quality. Used all the prompts to generate all the features, *but* did not delete the prompts in draft 2. Generated more content in draft 2, hence, EK-Tr.
V 2 drafts	R and RR present and revised in draft 2; hence, strong K-Tr: Used all the prompts to generate all the features *and* deleted prompts in draft 2, i.e., revision as K-Tr. Coherence improved.
HW5	R and RR present; hence, K-Tr, but quality of RR was low as it repeated main argument.
VI	R and RR present; hence, K-Tr: Used prompts to generate R, RR, and C, hence, direct K-Tr, *but* did not delete them.
Post	R and RR present; hence, K-Tr, but language-related coherence problems.

Notes C=Claim, D=Data, W=Warrant, B= Backing, R=Rebuttal, RR=Response to Rebuttal; K-Tr: knowledge-transforming; EK-Tr: Expansion knowledge-transforming, CK-Tr : concision knowledge-transforming; HW5= Session V Homework

6.9. Summary of Findings for Rhetorical Development

To study the participants' rhetorical development, I analyzed their texts for structural soundness and substantive strength (Toulmin et al., 1984).

Max's rhetorical development in structural soundness was marked by improved warrants over the course of instruction. At the beginning, lack of warranting created coherence problems, but they were resolved in the posttest essay. As with substantive strength, while both the pretest and posttest essays included rebuttal and response to rebuttal, the ones in the posttest essay were better developed since they were not merely counter-claims and responses, but full arguments.

Natalie's texts demonstrated varying degrees of structural soundness and substantive strength. At first glance her texts appeared incoherent due to the many language errors that impair comprehension. However, the discourse features were mostly present and connected logically if one made the effort to rise above grammatical errors and made bridging inferences to create a textbase (van Dijk & Kintsch, 1983). The rebuttal and response to rebuttal were present in elementary form in the pretest essay, but their quality improved over the course of Instruction in the texts analyzed above. This, together with her use of qualification suggested improved substantive strength, although she failed to produce these features in the posttest essay.

Jay's rhetorical development was perhaps the most nuanced of the three participants. Comparing the pretest and posttest essays, one could not perceive much improvement. However, he did seem to generate improved warrants. Neither his pretest nor his posttest essay contained a rebuttal and response to rebuttal. However, Jay did produce these discourse features in Session V. This indicates that his arguments were just beginning to become substantively strong, yet the posttest essay failed to feature that.

Mohammad's rhetorical development was most significant in that he moved from no acknowledgement of rebuttal in the pretest essay to a complete paragraph for that in the posttest essay. This indicates improved substantive strength. Mohammad also wrote stronger claims with clear topics and themes by the time Instruction was completed. This indicates improved structural soundness.

6.10. Summary of Findings for Cognitive Development

Max's cognitive development in knowledge transforming behavior is evident in his appropriation of the discourse schema from the exemplar texts into his writing. He was able to generate new content with the exemplars provided. His use of think-sheet prompts indicate knowledge-transforming by showing varying degrees of responsivity. Rebuttal and response to rebuttal were present both in the pretest and posttest essays, but those in the posttest essay were more coherent and substantive.

Natalie's cognitive development in knowledge-transforming was severely hampered by her lower language proficiency (Hulstijn, 2011). This made making judgements about her development difficult. Natalie's pretest essay included a rebuttal and response, but the quality and the amount of text generated for these two features improved over the course of Instruction. She was one of the few students who included these discourse features in two of her middle paragraphs in the essay she wrote during Instruction. Surprisingly, she missed them in the posttest essay. On her prompt-sheets, Natalie produced two to four sentences to select from for final formulation. She made active use of the prompts to mediate the discourse content generation process.

Jay demonstrated little evidence for cognitive development in knowledge-transforming. Neither his pretest, nor his posttest included a rebuttal or response to rebuttal. During Instruction, he barely used the prompts to mediate his writing. His behavior was akin to classic "think-say" knowledge-telling (Bereiter & Scardamalia, 1987). For example, his second drafts were mostly a verbatim copy of the first draft. The only exception was in Session V, when during a focused freewriting-revision task, Jay managed to do some expansion-knowledge-transforming revisions in the second draft. He also produced a rebuttal and a response to rebuttal in Session V.

Mohammad's cognitive development in knowledge-transforming was most notable in the absence of rebuttal and response to rebuttal in the pretest essay, and their presence in the posttest essay and during Instruction. The quality of these discourse features, however, varied throughout the Instruction. Moreover, Mohammad demonstrated the use of prompt mediation, as an instance of rhetorical problem-solving. Also, he both expanded and revised his texts, which are other indicators of knowledge transforming.

In summary, the text analysis findings enhance those of score analysis in Chapter 5. Because the study had an MM design (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009), I was able to compare findings across methods. For example, for Jay whose development was judged to be rather flat according to the summative assessment results, the text analysis revealed that he in fact had been able to demonstrate a degree of knowledge-transforming composing behaviour, indicating partial effectiveness of Instruction for him. Further, as discussed in Chapter 4, an MM design can be used to examine both causal effects and causal mechanisms (Teddlie & Tashakkori, 2009, 127). The MM designed of the present study indicated that a student such as Mohammad had increased his score from the pretest to the posttest (Research Question 1) and *how* he did so, i.e., presumably through the use of the various mediational means and processes that this text analysis provides evidence for. The MM design allowed for mixing paradigms as well. While the Instruction was theorized, planned, and implemented from an SCT perspective, the origin of Instruction was grounded in cognitive strategy instruction (CSI) and cognitive writing theory. The text analysis was grounded in and arose from Bereiter and Scardamalia's (1987) insight that the number and type of cognitive processes can be inferred from the final text. The present text analysis presented an innovative way to do so by comparing multiple drafts and looking for traces of conceptual processes (van Wijk, 1999).

Chapter 7: Effect of Instruction Reflected in Dynamic Assessment

The motivation for incorporating dynamic assessment (DA) into this study was to explain the reflective knowledge-transforming cognitive processes that the researcher had reason to believe were present, at least in part, in the participants, but the posttest data failed to feature them. It answers Research Question 3. Complementing qualitative text analysis in Chapter 6, DA provides microgenetic evidence for knowledge-transforming composing ability that was either de facto present in a participant, or needed other- or artifact regulation to be realized. DA provides evidence for "psychological processes …undergoing changes right before one's eyes" (Vygotsky, 1978, p. 61). DA by definition involves instruction, which is distinct from Instruction, the independent variable, from Sessions Zero to VI given to the entire EG.

The dynamic assessment was conducted with four selected students and was integrated with the interview section of the present study. This chapter reports on two of them. The two participants whose DA is reported here are Jay and Mohammad, who represent participants with the least and most amount of writing development, as evidenced by the score analysis and my observations throughout Instruction (see Section 4.4. for their profile and selection criteria).

7.1. Jay's Dynamic Assessment

Jay's posttest essay included the following discourse features: Claim, Data, and Warrant; however, it did not have the other four features: backing, rebuttal, response to rebuttal, and restated claim. The goal of dynamic assessment was twofold: first, to help Jay (a) identify the warrant, (b) produce the labels for the missing discourse features, which represent the corresponding scientific concept, and (c) generate the texts associated with the discourse features with appropriate mediation; and, second, assess the amount of mediation he needed to do the above. Jay succeeded to achieve all these goals through dyadic interaction sensitive to his ZPD. The mediation which was required for Jay to retrieve/form the discourse feature labels was often very explicit. However, once the discourse feature label was available to Jay, he generated the content with little mediation. Jay's ability to respond to mediation to achieve the DA goals indicated a degree of knowledge transforming composing ability, because it was rhetorical knowledge and problem-solving that led to the generation of content. The DA results indicate that Jay still needed explicit mediation for knowledge-transforming composing.

One mediational tool was the graphic representation of the Toulmin (1958/2003) model, which Jay and I co-constructed on the pencast paper with the smartpen capturing both the audio and video of the inscription process. Figure 7.1 shows the discourse feature labels that were either written by me, the mediator, e.g., data, or elicited, and subsequently produced by Jay with implicit mediation, e.g., warrant, or explicit mediation, e.g., response to rebuttal. At the bottom, it also shows the sentence that Jay generated with mediation. As the DA interactions reveal, the discourse labels in the chart were not readily accessible to Jay at the beginning of each ZPD, but they gradually became so, with more explicit mediation (cf. Siekmann & Charles, 2011). The following analysis summarizes the DA interactions that resulted in Jay achieving the stated goals. Jay's DA is divided into 11 discourse generation episodes (DGE). The DGEs are related to the stated DA goals and are presented in the same order below. The posttest topic was:

> *Do you agree or disagree with the following statement? The best way to travel is in a group led by a tour guide. Use specific reasons and examples to support your answer.*

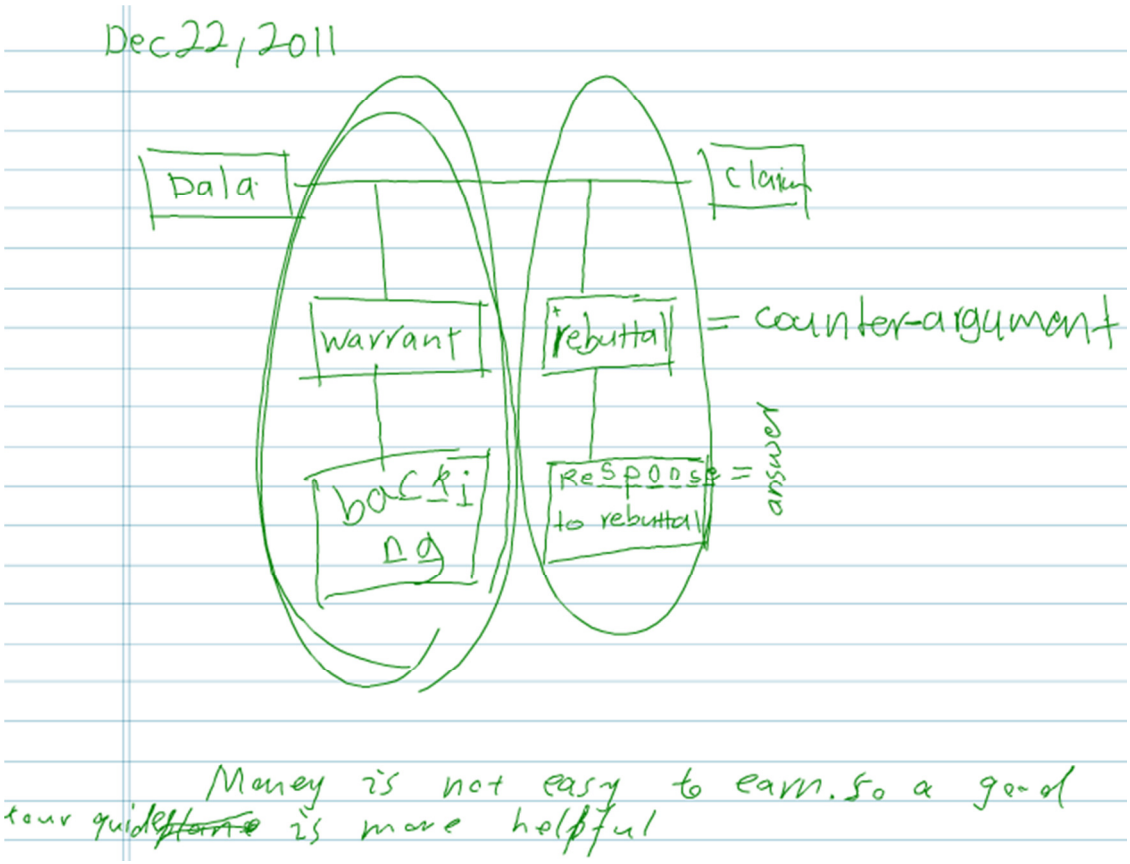

Figure 7.1 . Co-constructed Discourse Schema and Backing Sentence in a Dynamic Assessment Session Using the Smartpen and Pencast Paper

7.1.1. DGE 1. Goal: identifying the Warrant.

The transcript for DGE1 is displayed in Excerpt 7.1. The goal was for Jay to name the discourse label for warrant and the sentence that represented it in Jay's posttest text. The dynamic assessment concerns paragraph 2 below:

> Paragraph 2 *First, people travel with a tour guide is cheaper than by themselves (C). Tour guide **can** buy the cheapest airplane ticket (D1) and some trane [sic train] tickets (D2). Without a tour guide, we **could** spend a lot of money on them (W).*

Mediation was both through dialogue and the artifact I drew (Figure 7.1). In turn 1, I started the mediation to help Jay name the discourse label warrant, which he immediately identified in turn 2. In turn 10, because Jay did not locate the sentence for Warrant, mediation became more explicit. I nominated a sentence for Warrant, which he failed to confirm, but he eventually did so, tentatively, in turn 13 with a "maybe." In turn 14, because of Jay's lack of response, mediation suddenly became most explicit, by my supplying the correct answer. This sudden move from implicit to explicit was due to time-constraints. The overall DGE goal was to move more quickly to the elements of the model that were missing in his writing; Jay had already produced a correct Warrant; thus, I skipped intermediary moves that would have allowed Jay to locate the Warrant sentence himself. In this episode, Jay was able to produce the label Warrant with the least amount of mediation, and was explicitly shown the sentence representing it.

Excerpt 7.1: DGE 1. Goal: Identifying the Warrant 14 m 39.56 s

1	A	[---] So, now the model, Jay, that we talked about in class had these parts [A begins to draw the model]You have the data, right? And you get to the claim, right? But before we get to the claim, we need to provide something. Do you remember that thing (.) that [we need to provide]?
2	J	[mmm][[student reflecting]] Warrant [---]
10	A	[---] now what is this? [[M pointing at a sentence that A thinks qualifies as warrant and reading from the student's essay]] "without a tour guide, we ca- could spend a lot of money on them↑." What is this?=
11	J	=Mmm. I even- I even don't know.
12	A	You don't know↓((quick chuckle)) Isn't this a warrant?
13	J	Maybe, n-=
14	A	=I-yeah, I think it is a warrant
15	J	=Yeah (chuckles)=
16	J	= I think it is a warrant [---]

7.1.2. DGE 2. Goal: generating discourse label Backing.

The transcript for DGE2 is displayed in Excerpt 7.2. There was no backing in any of Jay's posttest paragraphs. The goal of DGE 2 was for Jay to produce the discourse label Backing independently of his writing. The purpose was to remind him of the word meaning, as the scientific concept, so that it would later lead to the generation of the content for a Backing sentence. The transcript for DGE2 is displayed in Excerpt 7.2. By the end of the episode, Jay was able to produce the label with explicit mediation. In turn 17, mediation began most implicitly by a hint at the discourse function of backing. In turn 19, mediation through dialogue was complemented with artifact mediation. I drew an empty box in the model for Backing (See Figure 7.1), indexing Jay to fill it in. In turn 22, because implicit mediation did not elicit the response, I decided to provide orthographic cues as "double-stimulation" (Vygotsky, 1978). The first stimulus was the definition of backing which Jay indicated he understood in his affirmative response to my direct question in turn 17, and the second stimulus, was the orthographic cues. In turn 27, because giving away the first two letters did not elicit the response, and short of providing the remaining letters of backing, I drew blanks, indicated with hyphens, for him to fill in to mediate his retrieval of the missing letters for backing. Up to turn 33, Jay remained unresponsive, so I embedded the answer in a paraphrased definition which contained the morphological stem for "backing", i.e., "back", seeking to cue him to produce "backing." In turn 34, Jay was immediately responsive. In turn 36, I closed this mediational section by letting Jay be the agent in its completion; Jay supplied the missing letters of backing. In turn 37, I asked a confirmation question about the discourse function of backing. In turn 38, Jay confirmed that he had a scientific understanding of backing by supplying the definition. In turn 39, I concluded the DGE by offering Jay praise.

Excerpt 7.2. DGE 2. Goal: Producing Discourse Label Backing

17	A	[---]But uh your warrant needs more support, correct?=
18	J	= Yeah=
19	A	=do you remember how you support- if I may have the pen [[A reaching to J for the smartpen]] Okay, what do you- what do you have after the warrant?=[[M draws an empty box below the "warrant' in the model]]
20	J	=Mmm
21	A	to support the warrant.
22	J	I don't (…)
23	A	You don't remember? It starts with a "bee" [[M writes a "b" in the box]]
24	J	.hh
25	A	don't remember "bee ei" [[A adds the letter "a" to "b"]]
26	J	.hh (No) .hh ((chuckles))
27	A	All right, so, let me give you the remaining (.) letters [[A draws five dashes after "ba" representing "backing"]] You need these many letters, five more letters
28	J	I don't know the name=
29	A	=okay, so let me give you more clues. It's- it ends in an "ai en jee" [M writes "ing" on the last three dashes]
30	J	(…)=
31	A	= "bee ei"
32	J	No
33	A	hh- uh this thing backs up the Warrant
34	J	Backing
35	A	Backing, exactly, can you write the remaining two letters (.) please?
36	J	[[J fills in "ck" completing the word "backing"]]
37	A	Backing, okay, so the backing- what does the backing do?
38	J	Mmm, To sss- to support the warrant=
39	A	=to sup- support the warrant, okay, very good [---]

7.1.3. DGE 3. Goal: generating the Backing.

The goal of DGE 3 was for Jay to produce content for Backing. The transcript for DGE3 is displayed in Excerpt 7.3. The goal of DGE 3 is to produce the Backing. In the series of mediational moves preceding this Excerpt, Jay was able to realize that the Backing was missing. The following is the original paragraph in his posttest.

Paragraph 2 *First, people travel with a tour guide is cheaper than by themselves (C). Tour guide **can** buy the cheapest airplane ticket (D1) and some trane [sic train] tickets (D2). Without a tour guide, we **could** spend a lot of money on them (W).*

By the end of DGE 3, Jay succeeded to produce the following Backing with a relatively small amount of mediation and added it to the end:

Money is not easy to earn, so a good plan is more helpful (B).

In turn 41, I indicated to Jay to produce the Backing for the Warrant. In turn 43, because Jay was unresponsive, I repeated the instruction, which Jay immediately responded to in turn 44. In turn 45, to get Jay into the mental frame of sentence he had to generate, I asked him to copy posttest paragraph 2 so that when he reached the point of inscription for Backing, he would have engaged with its co-text (Brown & Yule, 1983) and his working memory would be processing it (de Beaugrande, 1984). The co-text or the text produced thus far (Hayes & Flower, 1980) would mediate the generation of the subsequent text (van den Berg & Rijlaarsdam, 2007).

In turn 56, Jay started to write the Backing sentence. Jay ignored my instruction to copy the text produced thus far, yet I decided not to enforce my instruction because he was reading it, instead, and seemed to be mentally rehearsing the text to be generated for Backing. While generating the Backing sentence he asked a question about the spelling of "plan," which I answered in turn 57. In turn 64, Jay completed his Backing sentence, which I assessed to cause a coherence problem. The goal of the next episode was to resolve the problem.

Excerpt 7.3. DGE 3. Goal: Generating the Backing

41	A	[---]can you provide a Backing a Backing for this uh paragraph? (4.18) Can you try=
42	J	=uh
43	A	you know I want you to rewrite this okay? This is good, right? I'd like you to rewrite this, okay? Uh and uh also (.) improve it by providing a Warrant uh by providing a Backing [[my self-correction]] [there so
44	J	[write the] Backing =
45	A	=Yeah, but, but repeat everything from the beginning or if you want to revise it fine, but read everything from- from the beginning down please.
46	J	[[J silently reads previously written paragraph]] write it here?=
47	A	=Yeah, yes, yes, repeat everything up to here, right, and then add the Backing=
48	J	=Mmm=
49	A	=so, first
50	J	((chuckles))
51	A	((chuckles)) yeah start by just writing, just copying that
52	J	copy?
53	A	Just-just copy, yes=

54	J	=Mmm
55	A	Up to here copy and then (.) add the Backing
56	J	Mmm [[J ignores A's instruction to copy the previously written text, reads previously written text, or reflects to generate Backing, and writes the Backing]] "Money is not easy to earn so a good plan-" a good plan (i- there) have "ee"? [[J starts inscribing "e" at the end of "plan"]]
57	A	Uh, no "ee"
58	J	No "ee" [[J crosses out partially inscribed "e"]][---]
63	A	[---]So, okay, so read it for me please
64	J	Reads "Money is not easy to earn so a good plan is more helpful"

7.1.4. DGE 4. Goal: revising the Backing.

The goal of DGE 4 was to mediate a revision process as an instance of knowledge-transforming composing (Bereiter & Scardamalia, 1987). In DGE 4 (Excerpt 7.4), Jay revised a word that I assessed to compromise the argument's lexical cohesion (Halliday & Hassan, 1976). Although apparently lexical, the revision goal was essentially rhetorical in nature, because the lexical revision would improve the structural soundness (Toulmin et al., 1984) of Jay's argument by connecting the Backing to the Claim. The posttest paragraph to which Jay added the Backing is coded and shown below. The elements Claim (C), Data (D), and Warrant (W) were present in the posttest. Jay generated the Backing (B) in DGE 3. By the end of the episode Jay revised "plan" to "tour guide." Jay achieved the goal with a small amount of mediation.

> *First, people travel with a tour guide is cheaper than by themselves (C). Tour guide can buy the cheapest airline tickets (D), without a tour guide, we could spend a lot of money on them (W). Money is not easy to earn, so a good ~~plan~~ → tour guide is more helpful (B).*

In turn 65, assessing the Backing just produced, I noticed the word "plan" was not lexically cohesive with the Claim that he made about tour guides. In fact, the topic of the Claim and the topic of the Backing sentence were inconsistent. This prompted me to question the relevance of the Backing to the Claim in general implicit terms, seeking to alert Jay to the inconsistency. Observing Jays' hesitation in turn 66, I made the reference more explicit in turn 67 by stressing the word "plan." The pause after "or" allows Jay to process the information. Because jay does not fill the pause, mediation became more explicit by suggesting the word "plan" should be changed. In turn 68, Jay was still unresponsive, so I decided to provide more specific mediation. In turn 69, I suggested to Jay that the topics of the Claim and Backing should be co-referential. This goal was achieved through prosody, rising intonation at the end of the contrastive lexical elements, i.e., "plan" and "tour." At this point, Jay read the previously

inscribed text, crossed out "plan" and replaced it with "tour guide," completing the Backing he just produced. I concluded the dyad by offering him praise in turn 73.

Excerpt 7.4. DGE 4. Goal: Revising the Backing

65	A	Okay, a good plan, so this is the Backing, right? How does it tie in with the "tour guide"?
66	J	Mmm
67	A	So a good plan↑ is more helpful or (.) do you want to change the word "plan" to something else?
68	J	mmm- uh
69	A	Because here you are not talking about a plan↑ , you are talking about a tour↑ guide.
70	J	[reading the previously inscribed text] so a good [crossing out "plan" adding new text]tour guide.
71	A	Mhm
72	J	[Crosses out plan and writes "tour guide"]
73	A	Perfect [---](21 m 31:95 sec)

After this episode, interaction continued, but it is not transcribed here. I instructed Jay to copy all of his posttest paragraph together with the Backing he had just generated. I also asked him to read aloud while he wrote it and change anything he wished. After he completed the task, I asked him how he felt and he responded "it's not hard." I further asked him what he needed to complete the task on his own. He responded, "time" and I added "practice." This concluded the mediation provided for the generation of Backing.

7.1.5. DGE 5 Goal: generating discourse label Rebuttal.

Jay's posttest essay did not include a Rebuttal. The goal of DGE 5 was to have Jay produce the discourse label "Rebuttal" as the scientific concept that triggers rhetorical problem solving for knowledge-transforming. Jay succeeded to achieve this goal, albeit with very explicit mediation. The transcript for DGE5 is displayed in Excerpt 7.5.

In turn 74, my goal was to draw Jay's attention to the missing rebuttal, by (a) physically pointing at where it should appear in the model (see Figure 7.1) and (b) by constructing a declarative sentence, "but you have something here." My gestural and linguistic cues were meant to provide scaffolded assistance for Jay to retrieve the discourse label representing the associated scientific concept. They are examples of the most implicit level of mediation in this dyad. Seeing Jay's hesitation in turn 75, I converted the declarative sentence into interrogative, thereby

making the mediation more explicit. In turn 78, Jay still hesitated, so I provided a synonymous phrase for rebuttal. I pause after "opposite" to trigger the articulation of the complete phrase "opposite opinion", yet it was not successful. Therefore, I had to provide the complete phrase. In turn 80, Jay is still unresponsive, so I asked a yes-no question, to which Jay cannot help but respond, making mediation more explicit. In turn 82, I assessed that Jay is probably conducting a memory search to retrieve the discourse-label for "opposite opinion", so I explicitly asked a meta-discoursal question, the discourse label of the opposite opinion. In turn 83, it appeared that Jay produced a word that sounded like "argument", a word which I recast in turn 84 as "counter-argument", providing implicit negative feedback. Then I draw a circle around the part of the model comprising the warrant and backing, while simultaneously saying in turn 84 "this is your argument" and then pointed at the blank part of the model. In line 86, I tried to elicit rebuttal by providing orthographic cues with pauses in between until Jay produced the intended word "rebuttal" in turn 89. It took Jay 16 conversational turns to produce the label Rebuttal. This is very explicit mediation. In turn 90, I offered praise for the learner's partial completion of the task, alerted him to the gap in his essay, and instructed him to write a Rebuttal.

In turn 91, Jay asked a meta-discoursal question that was pleasantly surprising. During Instruction, there was a discussion as to whether rebuttal should be provided in every middle paragraph or in a separate paragraph before the conclusion. Although Jay's posttest had no rebuttal paragraph, the mediation provided in this dyad helped him recall the discussion, ask a pertinent question, and thus reinforce the learning objective. This was possible because mediation was graduated within the learner's ZPD so that at this juncture Jay was developmentally ready to ask the proper question. Jay's question indicates that he did have a concept of rebuttal in his consciousness, but he probably needed the word meaning designated by the label rebuttal to activate to retrieve that knowledge. The assessor's knowledge of what the learner knows (Pellegrino, Chudowsky, & Glaser, 2001) was only possible because of DA.

Excerpt 7.5: DGE 5 Goal: Producing Discourse Label Rebuttal

74 A [---]There is something here that I also talked about (.) between Data and Claim you have Warrant and Backing, fine, but you also have something here
75 J: mm hh.
76 A: What do you put in there?
77 J: mm (I)=
78 A: =you don't know. .hh, uh, it is the opposite (.) opinion=
79 J: =uh
80 A: Do you remember this?
81 J: (xxx)No
82 A: Do you remember the word for it
83 J: Mm (argument)
84 A: Uh counter-argument, counter-argument right? You see, this is your argument, this part is your argument=
85 J: =aha
86 A: And this is your counter-argument, but we gave it another word, do you remember the other word. It starts with an "ar"=
87 J =mm
88 A: ar, ee,(.),bee (.)
89 J: Rebuttal
90 A: very good, rebuttal, rebuttal like you said, it's-it's a counter↑-argument, it's a counter (.) argument [M writes]now, your essay, your post-test does not show a counter-argument, okay↑read this quickly and I would like you to propose, before your conclusion, propose a counter-argument, and write it here. Read it quickly, please, read it aloud=
91 J: =do we need to write a rebuttal on each body=
92 A: =very good question, you can do it that way, or you can do it in a separate paragraph at the end. This is easier. The second way is easier, the first one is harder, okay, so I think at this level, at your level, I think it's a better idea to write a separate paragraph before the conclusion.

7.1.6. DGE 6. Goal: generating the Rebuttal containing Data.

Jay's posttest essay did not feature a rebuttal paragraph, which would be the direct evidence for knowledge-transforming composing (Bereiter & Scardamalia, 1987). In DGE 6 (Excerpt 7.6), with a minimal mediation, Jay produced a Rebuttal, which contained not only a counter-claim but also the Data and Backing for an implicit warrant. His Rebuttal is coded and displayed below:

> *My claim ~~is~~ maybe (Q) not be right for someone think that the tour guide take you to some shopping mall (C). For example, they take you to a mall, you buy an expensive thing (D). It is true that the seller give the tour guide some money (B)(R).*

In turn 94, Jay wrote the Claim for his Rebuttal, or the counterclaim for his main Claim. He did so without any mediation beyond the instruction to write a Rebuttal. In turn 95, reacting to Jay's long pause of 13.3 seconds, I decided to cue him to provide Data for his Rebuttal claim. I provided the scientific explanation for the Data. However, as it appears in turn 98, he was actively planning without verbalizing or writing, and I mistakenly took silence to mean mental inactivity. In turn 99, Jay demonstrated that his silence was not due to mental inactivity, as, in turn 100, he promptly generated the Data for Rebuttal. (I apparently misinterpreted Jay's silence as a point of "stuckness" (Scardamalia et al., 1984) that needed mediation.) In turn 100, Jay produced not only Data but also Backing without mediation.

Excerpt 7.6. DGE 6. Goal: Generating the Rebuttal including Data 25 min

93	M:	Now I want you to write your rebuttal where I have indicated with an X
94	J:	[[J writes a rebuttal]]" My claim is [crosses out "is" and changes it to "maybe"] maybe not be right for someone think that the tour guide take you to some shopping mall." (13.3)
95	A	Mm, okay good, good, this is good [[I read Jay's rebuttal which is so far a counterclaim]] "My claim may, may not be right for someone who thinks that the tour guide take you to some shopping mall" Good, so this is the rebuttal, right? Your rebuttal also must contain the reason (.) right?
96	J	Yeah
97	A	the reason the opposition thinks so. Can you add a reason here please?
98	J	Yeah, I'm [thinking]
99	A	[you're thinking] about it, sorry, sorry I interrupted your thinking
100	J	[Jay writes] "For example, they take you to a mall, you buy an expensive thing. It is true that the seller give the tour guid some money" (14)[---]

7.1.7. DGE 7. Goal: generating the label Response to Rebuttal.

The goal of DGE 7 (Excerpt 7.7) was to have Jay produce the label for response to rebuttal, to initiate knowledge-transforming in the rhetorical problem space. As with backing, and rebuttal, I expected conscious awareness of the scientific concept to mediate the generation process. Jay achieved this goal with very explicit mediation.

In turn 107, the mediational goal was to have Jay retrieve the discourse label for response to rebuttal. I drew a box below rebuttal in the model (see Figure 7.1) to prompt him to fill it in with the phrase response to rebuttal. In turn 109, having observed Jay's lack of response in turn

108, I offered mediation by reference to “the given,” which is the rebuttal, as the entry point in this ZPD, for the “new,” the response to rebuttal. In turn 111, I paused for 2.7 seconds for Jay to retrieve the complete label, but he did not; then, I prompted him with orthographic cues. In turn 112, Jay was still unresponsive and paused for 6.7 seconds. In turn 113, I decided to supply more of the “the given,” i.e., the phrase “to rebuttal” aiming for Jay to produce the remaining letters of the label, i.e., “Response.” In turn 116, Jay took an educated but unsuccessful guess. In turn 122, although Jay still failed to produce the correct label, he proposed a synonym for his earlier candidate “rewrite.” This indicates that Jay was not thinking in terms of a response to rebuttal, but of restating or rewriting his claim, a concept that I had taught during Instruction as appropriate paragraph ending, and their main teacher Harold likely did, too. This suggests that Jay may probably have been thinking of restating the claim and ending the paragraph.

I decided on the next cue to be sensitive to Jay’s level of responsivity (cf. Roth & Radford, 2010). In turn 127, I offered the synonym “answer” for “response” hoping to trigger its retrieval, but it was unsuccessful. I disregarded the incorrect response in line 128 and continued with more explicit mediation. In turn 130, Jay produced the correct concept “respond” but in the incorrect lexical category (a verb instead of a noun). In turn 131, I recast the correct form. I concluded the dyad by restating the purpose of the Response, reinforcing the scientific concept. This dyad demonstrated that very explicit mediation was required for Jay to generate the discourse label.

Excerpt 7.7: DGE 7. Goal: Retrieving Label for Response to Rebuttal

107	A	[---] After you- you presented the Rebuttal, you need to do something else (.) beFORE you get to your claim. Do you remember (.) this? The name for this?
108	J	Mmm
109	A	Okay, so, let me help you. You provide a rebuttal or counterargument, okay, which is this, [okay
110		[mmm
111		and then you provide a (2.7) It starts with an ar, ee (1.9)[[A inscribes the letters "r" and "e" in the box for "Response to Rebuttal"]]
112		Mmm (6.7)
113	A	So, let me help you with more [[in the box and below the letter "r" and "e", A writes]]"to rebuttal
114	J	Re
115	A	Aha
116	J	Rewrite?
117	A	No
118	J	Re (7.4)
119	A	You need this many more letters [[A draws six dashes after "re" representing the remaining letters of the word "response."
120	J	(re)
121	A	Let me help you here. There is an es here. [[A writes the letter "s" in the first blank after "re"]] (3.3)
122	J	Restate
123	A	Rrr, no, starts- and there- you've got a pee here [[Ali inscribes the letter "p" in the next blank]]
124	J	Resp
125	A	aha
126	J	(6.7)
127	A	This word means answer [[A writes "answer" next to the box]]
128	J	(4.7) (respect)
129	A	Resp- and there is an o
130	J	(2.5) respond
131	A	Very good, resPONSE, response, °let me write this properly I have to turn the notebook to write properly° [[A adds the remaining letters "o", "n", "s", and "e"]] response to rebuttal, okay?
132	J	Mmm
133	A	So, your rebuttal is good. You say, hey this is what these people say
134	J	Yeah
135	A	But my argument is still strong, right? This is your resPONSE to the rebuttal
136	J	Yeah [---]

7.1.8. DGE 8. Goal: clarifying the meaning of Response to Rebuttal.

The goal of DGE 8 was to clarify the concept response to rebuttal. The goal was achieved with very explicit mediation. In DGE 8 (Excerpt 7.8), Jay's verbal behaviour indicated to me that he did not understand either the meaning of "response" or the concept response to rebuttal. In

turn 143, I decided that my instruction was unclear to Jay, so I elaborated. It is in turn 146, where Jay indicated that he does not understand either the term "response" or concept "rebuttal." In turn 147, I recast his question to ensure my comprehension. In turn 151, I decided to provide the most explicit type of mediation and give a short lesson on the concept. The DA could have ended here, assessing the learner was unable to produce the discourse feature; however, because the educator is responsible to set the learner up for success, it would be inappropriate to allow him to leave the DA session feeling defeated and unable to produce a discourse feature. In retrospect, this was prudent because as later analysis revealed, in Session V, Task 3, when mediated by prompts, Jay had already produced both a Rebuttal and Response to it. In turn 151, I taught the meaning of the word "response," concluding the dyad with very explicit mediation.

Excerpt 7.8: DGE 8. Goal: Clarifying the Meaning of Response to Rebuttal

137	A	[---]So can you provide a response to rebuttal for me? Here is the pen. [A hands Smartpen® to Jay]
138	J	Response (1.5)
139	A	Pardon?
140	J	Response to rebuttal=
141	A	=[exactly
142	J	[(xxx] (this support?)
143	A	This is, you know, you wrote the Rebuttal here, very-very well
144	J	Yeah
145	A	Now you write the response to it at the end of this paragraph (.)
146	J	What's this mean?
147	A	What does it mean?
148	J	yeah)
149	A	Answer to the rebuttal
150	J	(xxx)
151	A	An answer FOR the rebuttal (2.7)do you- see- ask me a question, any question you want, you know, I ask you "how old are you?" (.) How old are↑ you?
152	J	I'm nineteen
153	A	You're nineteen. That's a response.
154	J	mm-
155	A	Okay, Nineteen is a response to my question
156	J	Ah (okay) [---]

7.1.9. DGE 9. Goal: Writing the Response to Rebuttal.

The goal of DGE 9 was to have Jay generate a sentence for Response to Rebuttal. In DGE 9 (Excerpt 7.9), Jay achieved this goal with virtually no mediation beyond my instruction to write a Response. In turn 157, it seems the mediation in DGE 8 enabled Jay to start the

production of Response to Rebuttal. However, he remained silent for 34.8 seconds, which I took to be a formulation pause. To make certain, I asked what he was thinking in turn 159. After another 17 seconds Jay produced the Response:

No one control you to buy that, if you don't like, you don't need to buy (RR).

I concluded the DGE by offering praise and instructing him to finish the paragraph. The fact that virtually no mediation was provided indicates that once the scientific concept is internalized, the learner can use it to generate content, which is mediated knowledge-transforming.

Excerpt 7.9:. DGE 9. Goal: Writing the Response to Rebuttal

157	A	[---]Okay? So said, uh, you- you- you wro- wrote a Rebuttal here, write a Response
158	J	Mm (34.8)
159	A	What are you thinking?
160	J	(17) [[Jay starts writing]] "No one can control you to buy that, if you don't like, you don't need to buy." [Then he reads the same sentence out loud.]
161	A	Very good, well done, well done.
162	J	That's right?
163	A	Yeah, that's correct, yeah, so you may want to finish this paragraph[---]

7.1.10.DGE 10. Goal: Generating the Restated Claim.

The goal of DGE 10 (Excerpt 7.10) was for Jay to restate his Claim. Jay achieved this goal with a simple instruction to "finish the paragraph." He produced the followed Restated Claim:

I think my claim is still right (ResC).

Interestingly, I did not even articulate the discourse label. This indicates that the concept internally mediated the generation process. In DGE 10, Jay achieved this goal. In turn 165, I indicate the standard of work he had produced by characterising it as "basic," while praising him for having developed his thinking skills.

Excerpt 7.10. DGE 10. Goal: Generating the Restated Claim

163	A	[---]Yeah, that's correct, yeah, so you may want to finish this paragraph
164	J	Uhum [Jay writes] "I think my claim is still right."
165	A	Yeah, this is basic, but my point is, I mean you got the- you got the THINKING right.
166	J	Yeah

In the final exchange in Jay's DA session, (Excerpt 7.11), I sought to make certain Jay was conscious of his microgenetic development. I explained his movement, and the gap the DA session allowed him to fill.

Excerpt 7.11. Goal: Closing and Raising Awareness about Jay's Movement

A Okay? You moved in this session from no rebuttal to a rebuttal. You moved from no rebuttal and response to rebuttal to a rebuttal and response to rebuttal, and that's very important. You see? So, this private lesson I gave you, basically, I think, helped you understand the lesson that I had given in class. This part I had taught in class [Ali circles warrant and backing in the model], this part I had also taught in class [Ali circles rebuttal and response to rebuttal in the model], but now you had an opportunity to sit one on one with me, to, to practice it, okay, so good job.

Jay's Rebuttal paragraph generated during the DA session is coded and displayed below:

My claim ~~is~~ maybe (Q) not be right for someone think that the tour guide take you to some shopping mall (C). For example, they take you to a mall, you buy an expensive thing (D). It is true that the seller give the tour guide some money (B)(C+D+B=R). No one control you to buy that, if you don't like, you don't need to buy (RR). I think my claim is still right (ResC).

Jay's paragraph features a complete counter-argument with a Claim, Data, and Backing. He also responded to the Rebuttal, and concluded the paragraph with a Restated Claim. In summary, Jay was able to demonstrate mediated knowledge-transforming composing behaviour. Once the discourse feature label was available, Jay did not need much mediation to generate the content for that feature. To retrieve/form the discourse label, however, very explicit mediation was often required. He moved significantly within the multiple ZPDs that were enacted to achieve the rhetorical goals envisioned.

7.2. Mohammad's Dynamic Assessment

Mohammad's posttest featured all the discourse features, except backing. The goal of the DA was to assess if Mohammad was indeed capable of knowledge-transforming composing (Bereiter & Scardamalia, 1987) by (a) assessing if Mohammad could identify the discourse features to ensure that he had a scientific knowledge of them, (b) assisting Mohammad to revise them as an aspect of knowledge-transforming behaviour, which would also improve the structural soundness, and (c) helping him expand the rebuttal paragraph to include Data for his counter-claim, which would improve the substantive strength of his argument (Toulmin et al., 1984). Compared to Jay's DA with 10 DGEs, Mohammad required only four. As will be demonstrated in the conversation analyses below, Mohammad was able to achieve the three DA goals with far less mediation and in fewer conversational turns. This allowed for deeper textual and meta-discoursal engagement during the DA. In contrast to Jay whose mediation required repetition of elements of Instruction and schema building, Mohammad required the mediation that would facilitate the memory process of retrieval form long-term memory. For Mohammad, the discourse schema that was required for knowledge-transforming had already been internalized. He needed mediation to execute the plan and to utilize the schema. The DA results indicate that Mohammad was indeed capable of knowledge-transforming composing.

7.2.1. DGE 1. Goal: identifying the discourse features.

The goal of DA was to confirm Mohammad's scientific knowledge of the discourse features in paragraph 2 of his posttest essay (coded and displayed below), by asking him to name each sentence. That knowledge would mediate knowledge-transforming composing because the "word meanings" (Vygotsky, 1986) for the discourse features would cue the generation process for those features. That is, problem formulation in the rhetorical problem space leads the generation processes in the content problem space. Naming the sentence indicates that he was able to identify the discourse feature. Mohammad achieved this goal with minimal mediation. Additionally, he was able to revise the Warrant.

> *Traveling with a group led by a tour guide saves the time for people (C). That is because the tour guide know all the directions (D1) and they will never get lost (D2). ~~Also~~, they will help each other when they get lost to find the correct way easily (D3) and save their time (W?). Therefore, it's better to travel with a group led by a tour guide (Res C).*

In turn 3 (Excerpt 7. 12), after Mohammad began reading, I asked a *wh*-question so that he would stop and provide the discourse feature label for Claim Here I provided the most implicit level of mediation. In turn 4, Mohammad answers correctly. In turn 5, I offered praise, building the emotional bond necessary for cognitive development. In turn 7, I confirmed his self-repair in turn 6, and elicited the Data. In turn 8, Mohammad identified the Data correctly, but questioningly with a rising intonation. In turn 9, I confirmed the Data.

He continued reading without my prompting him. In turn 11, I elicited the label warrant. In turn 12, Mohammad attempts to retrieve the label "warrant" by verbalizing the first two letters and thus allowing his private (and social) speech to mediate the retrieval process. His verbal behaviour is both private and social because he used it to achieve two goals: to mediate the retrieval process through the phonological loop of his working memory (Baddeley, 1986) and to indicate to me, his collaborative partner, that he is engaged in problem-solution and potentially seek assistance. In turn 13, I provided the assistance that I infer Mohammad needs in order to retrieve "warrant." I immediately provided the answer and did not mediate the process any further, because knowing Mohammad's history of development; I suspected he was only manifesting a temporary lapse of memory and not a knowledge gap. In turn 14, Mohammad immediately confirmed my answer. He appeared to have had the label "Warrant" on the tip of his tongue.

In turn 15, I identified a cohesion problem of conjunction (Halliday & Hassan, 1976) about the use of "also," and asked Mohammad a yes-no question, implicitly mediating his response. In turn 16, Mohammad immediately and correctly responded to mediation, and self-corrects. In turn 17, I prompted him, only with an interjection, so that he would provide a scientific explanation for his self-correction. In turn 18, Mohammad seemed to reason that "also" could be used after a single sentence, which is accurate; however, I recast his response, in turn 19 to explain what the discourse function of warrant is *not*, i.e., not to "add" to previous discourse. It turn 22, he correctly stated the function of warrant, i.e., to explain. I turn 23, I paused with a rising intonation after "explain" to invite Mohammad to supply the answer, which he did not within the five-second pause, so I supplied the answer to move the assessment along. In turn 24,

he immediately confirmed my answer, showing that he needed slight prompting to supply it himself.

In turn, 28, Mohammad's much higher level of responsivity, compared to Jay, is manifest when he interrupted my turn 27 and fills the gap, to suggest his choice of "also" was unnecessary. In the remainder of the excerpt, Mohammad identified the Restatement of Claim. He slipped up on the way in turn 32 misidentifying it as Rebuttal, which he quickly corrected by stating the discourse function of the Restated Claim. I took this as evidence that the feature that was introduced as a scientific concept to him, i.e., Restated Claim, had become proceduralized, because, in turn 32, he produced a definition spontaneously, without pause or hesitation. Interestingly, in turn 32, the definition he gave, i.e., "it's my opinion about it," confirms Vygotsky's (1986) observation that "scientific concepts … supply structures for the upward development of the child's [and the adult's] spontaneous concepts toward conscious and deliberate use" (p. 194, additions are mine). He can spontaneously contrast the function of Rebuttal with the Restated Claim. In turns 36 to 42, Mohammad received very implicit mediation, which he cued me to provide, to aid his working memory process of retrieval of the lexical item "restatement" and "claim." I concluded the dyad by offering praise, another instance of the educator's consciousness of the unity of cognition and emotion (Swain 2013), aiming to unite Mohammad's cognitive achievement with its emotional counterpart to foster positive feelings associated with this success

Excerpt 7.12: DGE1 Goal: Identifying the Discourse Features

1.	A	Now, I'd like to look at your essay here, Mohammad, uh, this is your pretest, let's look at your posttest. Now, I'd like you, if you can, show me the elements of the model in your second paragraph, right? If you don't mind looking at this, okay? You may want to read it out to me and tell me what part is what. Do you want to read it?
2.	M	Like [[M reads the second paragraph of his text]], "*Travelling with a group led by a tour guid saves the time for people*."
3.	A	What is this?
4.	M	This is the Claim.
5.	A	Very good.
6.	M	Yeah, and [[reads]], "*That is because the tour guid know all the directions and they will* have, uh, [[he misreads "never" as "have" and self-corrects]] *they will never get lost.*"
7.	A	"They'll never get lost." Okay. What is this part? What is this sentence?
8.	M	This is the Data?

9. A This is the Data, okay[22]. Thank you.
10. M *"Also, they will help each other when they get lost to find the correct way easily and save their time."*
11. A Okay, good, What is this?
12. M This is the double-u, ei
13. A ((chuckles))the Warrant, right?
14. M Warrant
15. A Okay, yeah, so you understand the sequence, but why do you have "also" for the Warrant. Do you think, for the Warrant, you need "also"?[23]
16. M No, we don't need it especially =
17. A =uh-hu
18. M I, (like), one sentence with the "also"
19. A Yeah, you don't need "also" for the Warrant. Because Warrant doesn't ADD something, uh, to show it=
20. M =(xxx)
21. A Go ahead
22. M It explains (xxx) more
23. A Exactly, explains↑ (.) the DAta more=
24. M =the Data (xxx)
25. A So it (.) yeah, so you can get rid of "also", right?=
26. M =right
27. A They will help each other, very good,
so this "also" kind of=
28. M =repeated, uh, unnecessary=
29. A = unnecessary
(chuckles) there you go. "Also" is unnecessary, so read, read the last=
30. M ="*Therefore. Its' better to travel with a group led by a tour guid.*"
31. A Right.
32. M I think this is the, uh, the rebuttal, no, no, no, not the rebuttal (.) it's my opinion about it.
33. A It's your opinion. Right? So what is the name?
34. M I forget.
35. A Your opinion, your opinion is already here too [presumably pointing at the topic sentence]
36. M Yeah, it's yeah it's the re-(.)=
37. A =mhm
38. M Something starting with "re"
39. A Exactly, res- (.)
40. M I think restatement?
41. A Yeah, restatement of?
42. M The rebuttal, of the claim (
43. A Claim, perfect, restatement of the claim, okay, very good, so you've got the elements figured out in this, no wonder I liked it. I looked at this and I said, wow, this is quite a jump, [---]

[22] Here, I did not insist that Mohammad do a complete analysis, breaking down the sentence into a Data and a Warrant segment, as I did in my own analysis. Thus, if the complete sentence is interpreted as Warrant, the discourse marker *also* becomes redundant. See line 15.

7.2.2. DGE2: Goal: constructing Data for Rebuttal.

Mohammad's rebuttal paragraph (coded and displayed below) only had a counter-claim. It did not feature clear data, nor warrant or backing. The goal of DGE2 (Excerpt 7.13) was to assist him to generate or clarify the Data, as an indicator of knowledge-transforming composing. Mohammad achieved this goal with a small amount of mediation.

I coded the paragraph below to trace his rhetorical development up to the posttest. The phrase I marked (D?) was my best guess of what appeared to be Data. (In a dyad not reported here, Mohammad clarified his intention when he wrote "scholed [sic scheduled] and rooled [sic ruled] trip." What he meant was a trip with rules and schedules.)

> *On the other hand, some people might say that people limit their selves (C) with scholed [sic scheduled] and rooled [sic ruled] trip (D?) that limites their freedom in their travels (R). However, I think this limitation will let you relax and enjoy your trip without any responsibility that may inconvenient you (RR) and for that I seem (Q) to be correct (ResC).*

The mediation provided in this episode enabled Mohammad to revise his Rebuttal. It is presented below with his revisions and edits in bold and strike-through. In addition to confirming my conjecture about what he intended for Data (D? above), Mohammad added two clauses (Cl 1 and Cl2, below) that clarify the Data for the Claim.

> *On the other hand, some people might say that people limit their sleves (C) with* ***schedule*** *and* ***trip with rules when they travel with a tour guid (Cl. 1) who limits their freedom by the time and the rules (Cl. 2) (D) (R).*** *However,* ~~*I think*~~ *this limitation will let you relax and enjoy your trip without any responsibility that may inconvenient****s people*** *(RR) and for that I seem to be correct.*

In turn 101 (Excerpt 7.13), I provided the most implicit level of mediation. My goal was to alert him to the missing Data. In turn 102, it immediately triggered the correct response, when Mohammad correctly remembered the fact that rebuttal operated similarly to an argument, a point that was covered in Instruction, but he did not apply it in his Rebuttal. In turn 106, Mohammad proactively indicated his awareness of the function of Data and the inadequacy of supplying a counter-claim only. In turn 108, Mohammad showcased his scientific knowledge of the structure of an argument, that an idea needs "explanation."

In turn 116, I asked Mohammad to "start from the beginning" till he reached the point of inscription of Data. As with Jay, the rationale was for his discourse to be situated in the

appropriate mental frame. Repeating the Claim he had already generated was expected to trigger the generation of subsequent text (van den Bergh & Rijlaarsdam, 2007). When I tried the same mediation with Jay he completely ignored my instruction. However, Mohammad was immediately responsive. In turn 120, when Mohammad asked if he could revise his work, I answer positively, reinforcing the idea of writing across multiple drafts (Murray, 1980), which was presented during Instruction.

In turn 126, possibly noticing little change or simply wanting to confirm Mohammad's scientific procedural knowledge of the discourse feature he just generated, I asked an explicit question for him to specifically explain how his Data sentence would support the claim in Rebuttal. In turn 128, I hesitated with a "mhm" indicating to Mohammad that "who," or the agent that Mohammad refers to in turn 127, was already clear, so I signaled with my interjection for him to try another explanation. In turn 129, he immediately added "what" to the answer, and I recast both "who" and "what" in turn 130. He completed this dyad by revising his Data as follows:

who limits their freedom by time and the rules.

In turn 136, I confirmed the grammatical structure, i.e., the relative clause that he used to formulate his Data, in order to draw a connection between form and function. In sum, Mohammad was able to generate the Data in his Rebuttal with only a small amount of mediation.

Excerpt 7.13. DGE2 Goal: Constructing Data

101	A	Okay, how can you improve this? What is missing from this rebuttal? (.)
102	M	Is it like a (.)something support the rebuttal
103	A	Exactly
104	M	Yeah
105	A	Exactly, something supporting the rebuttal, right?
106	M	Because it is just the idea
107	A	Mhm,
108	M	there is no explanation for it
109	A	Absolutely, so how can you support the rebuttal
110	M	Like, by giving examples [---]
116	A	[---] start from the beginning so you have a complete rebuttal. Rebuttal has the counter-claim, you have the counter-claim already, right? Then the supporting part of it
117	M	Okay [[M writes]]*"on the other hand, some people might say that people limit their sleves with schedule and trip with rules when"* can I cross, like, some sentences?
118	A	Pardon me?
119	M	Some part of a sentence
120	A	Absolutely, do whatever you want with it. This is your uh next draft after this, okay, so treat this [Ali pointing to the posttest essay] like an earlier draft and treat this [[A pointing to the rebuttal paragraph M was generating]]like a later draft
121	M	I see [[M writes]] *"when they travel with tour guid who ~~has every~~* [[deletes text]]*limits their freedom by the time and the rules."* Can you (recut it)?
122	A	Pardon me?
123	M	This is the rebuttal?
124	A	This is the rebuttal, so read it for me please
125	M	Like, [[Mreads]]*"on the other hand, some people might say that people"* limits *"limit their sleves with schedule and trip with rules when they travel with a tour guid* ***who limits their freedom by time and the rules."***
126	A	Very good, so how did you provide support for your counter-argument?
127	M	Like, by showing who do, who does that for them
128	A	Mhm
129	M	And what he did, like, by the time and the
130	A	Exactly, who limits their schedule and what they do
131	M	Yeah
132	A	Perfect, and what kind of a grammatical structure did you use here?
133	M	The adjective, the noun-
134	A	Yeah
135	M	I think it's the adjective=
136	A	= it's an adjective clause, perfect [[referring to the following clause he added to his rebuttal ***"who limits their freedom by time and the rules."***]] [---]

7.2.3. DGE 3. Goal: confirming scientific knowledge of qualification.

The goal of DGE 3 (Excerpt 7. 13) was to confirm his scientific knowledge of the hedging verb "seem" which Mohammad used as Qualification in his Restated Claim: "and for that I seem to be correct." (Interestingly, there was a debate between the two multiple-trait raters about the appropriacy of his usage. However, the use of the verb of perception "seem" suggested to me that Mohammad had appropriated the discourse function of Qualification and applied it to soften his Claim. This dyad was to confirm this inference.) Mohammad achieved the goal of this episode with a moderate amount of mediation.)

In turn 138, I asked Mohammad to read his Response to Rebuttal to direct his attention to the word "seems." In turn 142, I intended to confirm the hypothesis that Mohammad was using the verb "seem" to qualify his Claim. However, in turn 143, Mohammad misidentified the point of my question and added an "s" to "seem" and sought to confirm the change with an information seeking question.

In turn 144, I specifically directed his attention to the verb "seem," making the mediation more explicit. My question was significant because when the raters when assessing this essay for the linguistic appropriacy trait of the rubric, they had a debate as to whether to consider it colloquial and thus inappropriate in formal academic writing. Thus, an instructional goal that was designed to foster knowledge-transforming change in the cognitive composing processes could have resulted in language that could be interpreted as inappropriate for academic purposes. Consequently, the student could be assigned a lower score, which would contribute to statistical non-significance in the study. In a non-research static assessment situation, this could also be judged inappropriate and the student could be penalized for it.

In turn 146, I started a retrospective recall, in which I asked Mohammad to remember his thoughts when he was generating the word "seem." In turn 150, I offered explicit mediation to assess meta-cognition, whether or not he was conscious of "seem" as a hedging word, and thus as Qualification for Claim. In turn 151, although Mohammad did not provide a scientific explanation for the discourse function of Qualification, he expressed his spontaneous knowledge, using the term I used in Instruction: "add something not 100%." In turn 152, seeking to elicit the

discourse label, I aimed to establish the dialectic between the spontaneous knowledge of Qualification, which he demonstrated, and its scientific label.

Before the DA and during the interview (see next Section), Mohammad had indicated that he appreciated the discourse features having names. In turn 154, I reminded him of his words to encourage him to retrieve the label. As with Jay, I mediate with orthographic cuing starting in turn 156, which returned the answer in turn 159. Mohammad confirmed he had both a spontaneous knowledge of this discourse feature and could provide the scientific label for it with some moderate mediation. Therefore, in this DGE Mohammad demonstrated that his use of the verb "seem," which was judged as inappropriate was in fact indication of knowledge-transformative, the search and use of a word in the content problem space to satisfy a rhetorical goal, i.e., hedging.

Excerpt 7.13. DGE 3. Goal: Confirming Scientific Knowledge of Qualification

138	A	[---]Your response to the rebuttal (.9) you want to read it aloud?
139	M	Yeah, I think, like
140	A	[A reads] "*However, I think*"
141	M	"*However, I think this limitation will let you relax and enjoy your trip without any responsibility that may inconvenient you, and for that I seem to be correct*
142	A	Very good, why did you just say, "I seem."
143	M	I seems to be?
144	A	No "I seem to be correct" is corRECT, but why did you use the word "seem."
145	M	Mhm, you mean I should say, like,=
146	A	= no, this is correct, I like it, but I want you to tell me what you were thinking when you said, "I seemed to be correct."
147	M	Like, to, to show, how, like, I trust my opinion?
148	A	Okay
149	M	And, um, and, like, how I think it's better than what people say
150	A	Good, by why did you not say, "for that I am SURE I am correct." (.5)
151	M	I don't know, but I think, you usually use it, like, add something not one-hundred per cent
152	A	Exactly, what do you call that? That was part of your model, too.
153	M	Yeah, it's, like, a (.) sorry but I forget its names
154	A	That's okay, but you said names are important [A citing Mohammad's reference to "You named them, i.e., the discourse features, by name"] because they show you what is missing
155	M	Yeah
156	A	It starts with a cyu
157	M	cyu?
158	A	Yeah
159	M	Yeah, It's the qualifi- qualification?

160 A Exactly, qualification, so, I like this, and [Ali reads} “and for that I seem to be correct.”
161 M (yeah)[---]

7.2.3. DGE 4. Goal: Mediating Mohammad’s revision: identifying/editing prompts

During Instruction, the students were told to remove the mediating prompts from their final text, because they were phrased in conversational English to facilitate their use during knowledge-transforming. I called this concision knowledge-transforming. The purpose of the prompts was not rhetorical elegance, but rhetorical problem solving. Although the students were advised that the prompts were only thinking tools and to be deleted in the second draft (see Chapter 3), they continued to leave them in their completed essay. The goal of this DGE was to mediate the revision of Mohammad’s posttest essays to identify and edit the trace of one such prompt, “I think.” Mohammad needed moderate-to-high explicit mediation to achieve this goal. The sentence in his posttest which was the subject of DA is the following:

> *However, ~~I think~~ this limitation will let you relax and enjoy your trip without any responsibility that may inconvenient**s people***

Prior to turn 175, I reminded Mohammad of the judicious use of the first person in academic writing. In turn 175, I continued to pursue this goal to help him make his writing impersonal. I was seeking to help him eliminate the traces of his “thinking” from his final copy. The class were instructed not to transfer the prompts that helped them generate content, and I interpreted the use of the phrase “I think” as a case in point. The effect of this requirement would be his improved linguistic appropriacy score. In turns 180-182, Mohammad regressed to the use of personal pronouns, and argued for the use of the first personal because he found it consistent with his rhetorical goal to convince his audience. This demonstrated his awareness of his rhetorical purpose and audience.

By turn 186, Mohammad was still thinking self-centrically despite his awareness of his audience. Therefore, I provided more explicit mediation in turn 187 and suggested that he should delete “I think.” In turn 188, Mohammad responded to mediation and deleted “I think.” When he read out his sentence aloud and heard the sound of it, he seemed to realize that “I think” was redundant (he stated “I see”). His act of reading aloud mediated this realization. In turn, 194, he described the new revision as more academic. In turn 195, using the dramatic metaphor of head-

scratching, I make sure he understands that personal constructions are not necessary to define ownership of ideas. In turn 216, Mohammad cited the Instruction he received on this point, which can be used to evidence the effectiveness of Instruction, and the fact that internalization would take more time than the six weeks of Instruction afforded.

Excerpt 7.14: Mediating Mohammad's revision: Identifying/Editing Prompts

175	A	[---] Let's see how we can fix this, this is great, uh, uh, let me look at [Ali reads] "*However, I think this limitation will let you relax and enjoy,"* so, instead of saying, I think this limitation will let you relax and enjoy your trip without any responsibility," Instead of saying "I think" what else can you say?
176	M	Like, people think?
177	A	"People think" is better, right? But you don't want to say "people" too often either
178	M	We?
179	A	"We is like "I"
180	M	But, it's my opinion
181	A	right
182	M	I'd like to convince the reader
183	A	True, you know, I-
184	M	(shouldn't I) use, like, "I"?
185	A	It's okay, li-, you know, it's not the end of the world, but if you can change it, that's better
186	M	My opinion?
187	A	Can- can you, delete "I think" all together? (.) Read it, and see how it sounds
188	M	[He deletes "I think" and reads] "*This limitation"* uh I see "*will let you relax without any responsibility that may inconvenient you*." Inconvenient [---]
193	A	[---]Yes, okay, how do you, how do you like the sound of it?
194	M	I think it's more, like, academic
195	A	Academic right? Would anybody wonder whose opinion this is? [pointing at Mohammad's essay and reads] "*This limitation will let you relax*" so and so forth. Will anybody wonder, scratch their head, whose opinion is this?
196	M	No [---]
207	A	[---] you've said it there. One of the things I tried to get across to you in class, was that the prompts, the thinking prompts I taught, they are just for thinking
208	M	(I see)
209	A	Right, the "I think" stuff, "my opinion" stuff, all those things are great, but they are thinking tools
210	M	I see
211	A	Do you remember [the prompts]right
212	M	[yeah]
213	A	You shouldn't transfer them all to your final essay
214	M	I see
215	A	[keep them]
216	M	[Asked us about that] like, to don't put that in the real essay

217 A Exactly, just keep it as thinking tools

In summary, this revealed that Mohammad did have a scientific knowledge of prompts as tools for knowledge-transforming composing, but he needed more time and practise to remove their traces form his final text. This required explicit mediation to be realized in the present episode.

7.3. Summary

The purpose of this chapter was to answer the research question about the effect of Instruction on the cognitive processes of knowledge-transforming composing, when dynamically assessed. To answer the question, two students' DA data were analysed and the findings are summarized below.

For Jay whose development was assessed to be almost flat, according to the posttest, there was evidence that he was indeed capable of knowledge-transforming behaviour, although with explicit mediation. Mediation was provided at two levels (a) to retrieve/form the discourse feature labels and (b) to generate the content corresponding to that discourse feature. Jay often needed very explicit mediation to retrieve/form the label; however, once he was conscious of it, he generated the corresponding content with little or no mediation. This is evidence for the claim that it is, indeed, the scientific concept of the discourse features that initiates problem solving in the rhetorical space and enables the return trip to the content problem space (Scardamalia et al., 1984). Jay left the dynamic assessment session feeling empowered to have achieved the discoursal goals set for him. The amount of mediation required to enable Jay of knowledge-transforming would arguably be much less than that of an equivalent participant form CG, who never received the Instruction, (although only an empirical comparison of DA with a CG participant could verify this conclusion). In fact, as will be discussed in the Interviews and Surveys section, Jay was able to transfer his instruction to a future context, which confirms the effectiveness of the DA session to enable and assess knowledge-transforming.

Mohammad's DA findings were different from Jay's. Mohammad's posttest did include all the discourse features except backing. The goal of the DA was to confirm his conscious awareness of the features as knowledge-transforming rhetorical problem solving tools and to help him improve his text consistent with the Instruction. Evidence for Mohammad's

knowledge-transforming ability was present when he readily identified all the discourse features that were present in his posttest essay (except Qualification) with virtually no mediation. When Mohammad was asked to improve his Rebuttal, he immediately remembered to provide an "explanation," i.e., Data, for the Claim. Although in that particular dyad, I, the mediator, did not ask for the discourse label data, his mastery of other labels suggests, he would have provided it if asked. Mohammad's use of the verb of perception "seem" for Qualification was notable. However, it took explicit mediation to have him retrieve the label Qualification. The fact that he did include it suggests that the scientific concept had become proceduralized but he failed to demonstrate prompt declarative knowledge of it. He needed much less mediation than Jay, suggesting he had internalized more of the discourse features, and, thus was able to apply them to knowledge-transforming composing.

In summary, the DA findings enhance those of score analysis in Chapter 5 and text analysis in Chapter 6. Because the study had an MM design (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009), the two methods of assessment could be used productively to answer the research questions. The summative assessment results provided the entry point into the ZPD for each participant so that gradual and contingent mediation (Aljaafreh & Lantolf, 1994) could be provided in order to simultaneously assess and instruct the learner in knowledge-transforming composing. The DA results confirmed that a participant such as Jay who had produced a discourse feature, i.e., Rebuttal and Response to Rebuttal, during Instruction in Session V (see Chapter 6), but failed to produce it in the posttest, was able to generate it with mediation during DA. While the text analysis provided evidence for successful artifact-mediation for Jay, on one occasion in Session V, DA provided evidence for the effectiveness of mediation provided by a mediator, with the aim of assessing and teaching the construct of knowledge-transforming. DA provided further evidence for the degree to which Instruction was effectiveness to foster knowledge-transforming composing ability.

Chapter 8: Effect of Instruction as Perceived by the Participants

The purpose of this chapter is to report and analyze the survey and interview data that were collected to solicit the participants' perceptions about Instruction to answer Research Question 4. In Session Zero, in order to empirically test my argument for the significance of the study, I solicited the participants' perceptions about the importance of various aspects of writing ability. I asked all of the EG and CG students who were present to complete a questionnaire in which they ranked on a scale of one to six, with one meaning not very important and six meaning very important the importance level of ideation and language in writing ability. The descriptive statistics[24] are displayed in Table 8.1.

Table 8.1. Participants' Perceptions of Importance of Ideation and Language in Writing Ability

		EG (n = 13)				CG (n = 15)			
		M	*SD*	*Min*	*Max*	*M*	*SD*	*Min*	*Max*
Ideation /content	Ability to produce ideas for writing	4.85	0.80	4	6	4.67	0.98	3	6
	Ability to develop ideas into text	4.77	1.01	3	6	5.00	1.00	3	6
Language	Vocabulary knowledge	4.92	1.19	2	6	4.60	0.91	3	6
	Grammar knowledge	5.08	1.12	3	6	5.20	0.94	3	6
	Organizing ability	5.08	0.64	4	6	4.87	0.83	3	6

In this table I included the participants who did not complete the study, because they would represent the population being investigated. The findings suggest that both groups found ideation and content *important* in their writing ability. For example, for the ability to develop ideas into text, the EG mean was 4.77 out of 6 (SD = 1.01) and for the CG it was 5.00 of 6 (SD = 1.00). These finding indicate that they found idea generation and developing them into text, i.e., discourse content generation, important. The present study operationalized them as instruction in reflective knowledge-transforming composing (i.e., Instruction).

[24] These statistics include data from students who were present in Session Zero, but some left the program, and, thus, were not included for group statistical comparisons; As such, the *n* for CG is larger than that for statistics presented before.

8.1. EG's Perceptions of Instruction

To solicit the emic perspective of the EG participants about Instruction, I administered a survey to the EG on the last day of instruction, i.e., Session VI. The survey asked about the usefulness of Instruction on a six-point scale, one indicating not useful and six very useful (see Appendix M). The descriptive statistics are displayed in Table 8.2. I calculated the descriptive statistics for each question, each of which would inform one aspect of the independent variable, Instruction. For example, the participants found instruction on the Toulmin model, Question 1, quite useful (M = 4.85, SD = 0.99). Additionally, questions 1-9, altogether, measure the totality of the Instruction, as one single construct, with its own descriptive statistic. The participants found the Instruction as a whole useful (M = 4.62, SD = 1.02). Questions 10-13 treat the Instruction as a dichotomous variable and solicits general perceptions about whether instruction was helpful or not. In response to these questions, out of the 13 participants, 12 found the Instruction helpful to improve their writing quality, 11 to improve their argument quality and 11 to change their cognitive process while they write.

Table 8.2. Descriptive Statistics for the Survey on Participants Perceptions of Instruction

	Question	*M*	*SD*	*Min*	*Max*
1	Usefulness of instruction in argumentation, based on the Toulmin Model (C,D,W,B,R, ResR)	4.85	0.99	3	6
2	Usefulness of instruction in freewriting?	4.85	1.21	2	6
3	Usefulness of *the teacher* modelling freewriting *without* a topic	4.92	0.95	3	6
4	Usefulness of *a classmate* modelling freewriting *without* a topic	4.54	0.97	3	6
5	Usefulness of *the teacher* modelling freewriting *with* a topic	4.92	0.76	4	6
6	Usefulness of instruction in argumentation to improve the general writing quality.	4.54	1.05	3	6
7	Usefulness of instruction on the use of *prompts*	3.85	1.14	1	6
8	Usefulness of instruction on the I-don't-know-what-to-write problem.	4.46	0.88	3	6
9	Usefulness of instruction to help think better when writing an essay	4.62	1.04	3	6
		Yes	No		
10	Instruction helped with general writing quality	12	1		
11	Instruction helped with argument quality in writing	11	2		
12	Instruction changed thinking processes while writing an essay	11	2		
13	Participants liked the Instruction*	9	1		

Note. n = 13, *n = 10

Interestingly, all the means are above 4 out of 6, except for that for Question 7, which asks about the usefulness of the prompts (M = 3.85, SD = 1.14). This lower mean is affected by the lowest score on the entire scale. One of the participants did not like the prompts at all and found them not useful. This has both skewed the results for this item and for the entire survey. I chose not to treat this participant as an outlier because the interview section shows one of the participants has strong feelings against the prompts, and makes valid arguments for his position. Therefore, this data point should be preserved to reflect the variability within the experimental group.

8.2. Interviews

Four EG participants were selected for a combined interview and dynamic assessment session. See Chapter 3 for the selection criteria. Initially, the interview participant selection criterion was to select two students whose essays would demonstrate the greatest and two students whose essays would show the least amounts of development. However, this criterion was compromised because such students were not available for an interview. In the end, the following four students participated. Two of them, Max and Mohammad, qualify as the more developed and one, Jay, as the least developed.

Interestingly, the main classroom teacher's (Henry) independent final assessment of the students indicates that my selection of the students is consistent with Henry's assessment of their writing ability. He gave the four students the following marks: Max achieved the highest mark (80/100), followed by Mohammad (76/100). Jay received the lowest mark (65/100). Then, Henry would agree that these three students do fall in the most and least improved categories as I had anticipated. Natalie's mark was 75/100. She was not my ideal choice, because I needed a lower achieving student; however, she volunteered and I welcomed her initiative. Because the class average was 72.0, Natalie would fall above average.

8.2.1. Max's interview.

On the topic of his experience of Instruction, Max's interview revealed the following main themes: awareness of discourse schema, appropriation of discourse schema, and writing apprehension management. Max expressed satisfaction that his writing had improved much in terms of "logical thinking and procedures to write." When asked, Max was able to produce the

labels for all the Toulmin model elements. For qualification, he first produced examples, i.e., "probably" and "presumably," and then immediately, he retrieved the label "Qualification." He stated he did not like the "prompts" part of Instruction because they created a "conflict." He mentioned the Instruction itself had helped him "have his own model." This is a clear indication that he had internalized the Instruction and appropriated it. Instruction had helped him rise above writing apprehension since he mentioned: "Before I came here I was afraid to write, but you gave me a method how to write."

Regarding the topic of the effect of Instruction on general writing quality, Max indicated transcendence (Poehner, 2007) of his ability to other writing contexts and that writing had become a habit. He stated because of the Instruction, he got relatively high marks for his other class assignments: 85% for in-class writing and 82% for the final test, which were both cause and effect essays. He stated he applied the model by "obeying the rules," i.e., applying the claim, data, warrant, backing. However, he mentioned he had not used the rebuttal and response to it in the cause and effect essays, required for the course, because he did not have time as they were written in class. He did not use the model for the research paper, because he stated the paper was not about his opinion, and it was objective, which indicates he can distinguish between the two genres, suggesting his developing awareness of generic differences. He expressed satisfaction with his freewriting experience, "Freewriting is great." He stated he had started writing something every day, and it helped him get over his fear of writing.

When asked to divide the effect, which he observed in his improved writing ability, between my Instruction and his main teacher's instruction, he attributed 50% of his improvement to my Instruction. Max characterized my Instruction as "skeleton" of writing and his main teacher's as the "meat." This suggests that, for Max, the effect of cognitive strategy instruction in knowledge-transforming was as important, as other instruction, to improve his writing quality.

Additionally, during the interview the following themes also emerged: cross-cultural rhetorical comparison; syllogistic reasoning, comparison between artefact mediation and direct Instruction.

Max compared Chinese writing with English writing. He characterized the former as condensed, e.g., "like a summary," whereas the latter is more expanded, e.g., "in a sentence." He attributed this change in ability to expand his writing from "four words" to "a sentence" to my Instruction.

Also, Max raised the topic of the syllogistic reasoning problem I posed to class in Session I (see Chapters 2 and 3)[25]. Max stated that he was confused by my example, not because it was difficult, but because of cultural and linguistic problems. In fact, he stated that the problem was simple, but suggested he did not understand the problem. Max's analysis of his state of confusion confirms Donaldson's (1979) argument that it is the subject's failure to understand that is often confused with failure to *reason*, and that once the language is clear the logic is inescapable**.** This further supports the argument I made above (see Chapter 2) about the universality of syllogism once communication barriers are redressed.

Finally, For Max, artefact mediation with prompts conflicted with and was not facilitative of cognitive processes. He stated he did like asking questions, but not with prompts. He seemed to prefer to be asking the questions himself, and not be given the questions to ask. He found the procedure and order in which the discourse was presented clear and simple, but, for him, the prompts were long and would complicate the process. He also stated that before being introduced to the prompts, he already knew how to apply the model through direct Instruction. He stated many times that he learned the "order and procedure," which helped him write. The prompts made him feel confused. Max's observation supports van der Veer's (2008) argument that not "all mediating devices necessarily go through an external material phase" (p. 28). Max seems to have quickly skipped (or appropriated) the external mediational phase, allowing the discourse schema to internally mediate the text generation process.

Although, Max's judgment was that prompts were unnecessary and intrusive, a look at his application of prompts in Session III, Task 4 reveals a rich artefact-mediational process to generate discourse content. The conflict between my interpretation of his collected performance

[25] In Session I, I posed a simple syllogism question to class, as an entry-point to Toulmin, and checked their comprehension. Of the 14 students who were present, only seven initially supplied the correct answer; however, once a language problem was resolved the correct response rate increased to ten.

data and his perceptions of such performance, revealed during this interview, is interesting. It concerns a methodological issue, the difference between reality observed by the researcher and the reality perceived by the participant. The pedagogical import is that both realities should both inform instruction.

8.2.2. Natalie's interview.

A reporting note regarding Natalie's interview is in order. Natalie's speech, as well as her writing, needed many "bridging inferences" (Kintsch & van Dijk, 1983) for coherent interpretation (notwithstanding the fact that she did report improvement in being able to better "connect" parts of her discourse). To be able to report her interview in a coherent fashion, I transcribed parts of her interview and inevitably had to draw inferences to relate her response to the questions. Therefore, the significant statements had to be edited with ellipses and additional comments added to improve her responses' readability.

When I asked Natalie about her experience of Instruction, her responses suggested the following themes: ability to write logically connected discourse, freewriting reducing writing processing load, a new-found interest in writing, and declarative and procedural knowledge of discourse elements.

Natalie seemed to relate her new ability to generate logically connected discourse to learning how to make an outline as a result of Instruction. This was surprising because outlining was not part of Instruction and it was Harold, the main teacher, who had taught it. Nonetheless, she stated:

> from your class, I learned how to make … [an] … outline. I know [how to] finish the outline, [and] finish the essay. I know how to process … each part, each sentence, how to connect the first sentence and the second sentence and … write the Claim and the Data and Rebuttal, everything. It's really useful for me.

It may be the case that once she became aware of the connection between the discourse items, the discourse structure helped her construct the outline. I draw this conclusion because she indicated she learned how to connect the sentences, which represent the discourse features. It is possible that while making the outline, she was mentally rehearsing the logical connections between the outline elements, and she did that having her newly learned discourse schema mediating her planning process. The ZPD constructed in class to teach the discourse schema

might have continued beyond instruction enabling her to apply it to a different process, i.e., creating an outline.

Natalie reported she "really liked the freewriting." She stated "before this class I just writing something, just to think about some idea and then (translate) to English. It's [sic was] sometimes not connected sentence, but now it's better." With freewriting she reported, "I can write anything I want, not to worry about grammar, or anything, just anything I want to write down. It's really help me to open my mind to have some idea to write down, some topic or, some paragraph." Thus, freewriting helped Natalie reduce the processing load that writing exerts. She indicated there was nothing she did not like about Instruction. She stated before Instruction started, she did not like writing. This new-found interest in writing is remarkable.

Natalie attributed an improvement in her overall writing quality to having "more ideas to write down," i.e., discourse content generation, which was the goal of Instruction. She indicated that before Instruction she was more concerned with producing as many words as possible, but with Instruction she knew how to make connections between sentences. She stated:

> "before [Instruction] I just think how to make … more words and more information to write, not to think how to connect …. It … make[s] no sense, but now you … [gave] the process …different name[s], so I can follow the process and to write …."

Thus, she was aware of the "names" of the elements of "the process." Before Instruction, she reported she did not have too many ideas about how to write the next sentence, but as a result of it she learned how to "follow the process" and connect sentences. This indicates that Instruction facilitated discourse content generation and sequential processing of text production, and that rhetorical knowledge of discourse schema, as she stated "you … [gave] the process …different name[s]," mediated content generation, which suggests knowledge-transforming. Thus, word meanings (Vygotsky, 1986) representing a scientific knowledge of discourse features mediated the discourse content generation process.

Natalie demonstrated declarative and probably procedural knowledge of discourse schema. When asked to read her posttest essay and identify the discourse elements, she readily identified the Claim and Data, and then identified the Warrant with some mediation. She correctly remembered the function of the warrant to be to "explain the data." With mediation she remembered that warrant connects the data to the claim, and that backing supports the warrant. I led her to successfully locate a sentence that could function as factual backing. These

interactions indicate that she had a declarative and probably procedural knowledge of the features because she could both identify them and apply them in text. Whether or not she consciously attending to these features while she was composing could not be conclusively answered during the interview, yet the fact that she readily identified Claim and Data suggests that she might have generated them during the return trip from the rhetorical problem space to the content problem space (Scardamalia, et al., 1984); hence procedural knowledge.

When asked why she did not use a rebuttal in her posttest, Natalie responded "because I didn't give the argument against my opinion." This answers a different question such as, "why is there not a rebuttal in the essay." Nonetheless, her answer confirmed her awareness of the function of the rebuttal. She added, "Maybe I forgot or did not have the idea how to write against my opinion." Upon further reflection, she decided it was more likely that she had no idea for the content of a rebuttal. Natalie's comment suggests that the Instruction could mediate learner's composing at two levels: the need for the presence of a discourse feature as well as how to produce it. For rebuttal, it appears that Instruction achieved the former goal for Natalie, because she acknowledged the function of rebuttal, but she failed to achieve the goal of actually generating that feature, as Natalie suggested that she had no idea about the content of a potential rebuttal.

8.2.3. Mohammad's interview.

The themes that emerged from Mohammad's interview regarding his experience of Instruction were the following: discourse schema knowledge and scientific concepts driving development. Mohammad divided Instruction into two periods. At the beginning, he stated he did not understand the Instruction, since he "was not used to arguing" and that because I used new labels, which were not familiar to him. He stated: "You even called it by different names, like claim and data." However, he observed that in the final weeks, he "got the idea." He liked the organization that he learned during Instruction. He stated, "Each part of the paragraph, you named it by name." Therefore, this naming helped him know what was important and he remembered it. This suggests that discourse schema and labels representing word meanings functioned as scientific concepts which led the development of his writing ability. Among the discourse elements, he identified data and claim as more important, and rebuttal as less

important. When asked if there was something about Instruction that he did not like, he responded, “It was all good.”

Regarding the effect of Instruction on his general writing ability, Mohammad indicated that he found freewriting beneficial. He stated: “My ideas come to my paragraph immediately.” He characterized the Instruction in argument as “perfect.” He commented that it helped him provide “more advanced reasons to convince the reader.” This suggests that Instruction helped him with knowledge-telling since he indicated fluent discourse content generation as a result of freewriting, and freewriting was how knowledge-telling was operationalized.

When asked to apportion the weight of his success between Instruction and his main teacher’s instruction, Mohammad responded, “Your method is good when you argue, but in Harold’s class, we did comparison and contrast the simple way.” He stated, “Your method moved my writing to a higher level.” He indicated both improved his writing. He attributed 40% of his improvement in writing to my Instruction. This indicates his awareness of the difference between argumentative and expository genres and that he observed movement in writing ability.

When asked if “my teaching of thinking to write an argument changed *the way you think* while you write,” Mohammad gave a response that indicated that he had internalized focused freewriting as a rhetorical problem solving tool, allowing it to mediate the writing process: “Yes, at the beginning, it would take me forever, but now, it is easier, especially freewriting for five minutes to write the outline …. I try freewriting in my head to say just things and pick good things and put it in my outline.” Mohammad’s trying “freewriting in his head” suggests that focused freewriting had become an internal problem solving tool for him. That is, external mediation had become internal. For Mohammad, focused freewriting had become a goal oriented activity of rhetorical problem solving. His appropriation of focused freewriting shows his movement from general goal-less freewriting to a goal-oriented activity in which language was used as a problem solving tool. He pointed out freewriting was “the main thing” in Instruction, but he mentioned argument structure, i.e., discourse schema, also helped him with small supporting details, which he would include in the outline first and then in the essay. He reported he would not include specific details prior to Instruction, but he did so during and after Instruction.

Mohammad demonstrated discourse schema awareness by successfully identifying the following elements in his posttest: Claim, Data, and Warrant, which started with "also." In a dyad (See Chapter 7), he decided "also" was not appropriate to start a Warrant, because its function is to reason, not to add, so he decided to delete it. This clearly indicates awareness of the discourse feature functions that mediate his discourse content generation process.

On the topic of transcendence (Poehner, 2007) to a new context, Mohammad indicated he was able to *transfer* his new rhetorical knowledge to other contexts. In the comparison and contrast research paper for his course, he stated that he used the model to argue Steve Jobs was better than Bill Gates. He reported that in that essay, he acknowledged why people preferred Gates (rebuttal), but argued for Jobs (response to rebuttal). He achieved a mark of 84% on this paper. This indicates that Instruction changed his planning and generating composing processes because rebuttal and response were absent in his pretest, but he reported that he did use them in this paper, which indicated awareness and application of these features and transcendence to a new context.

8.2.4. Jay's interview.

Regarding his experience of Instruction, Jay's interview revealed the following themes: perceived cognitive change and awareness of overall structure and organization of the essay. Jay made an observation about his experience of the Instruction, which was surprisingly refreshing and positive. Despite the fact that his posttest shows minimal if any improvement and the very explicit mediation he needed in the dynamic assessment session (See Chapter 7), he stated, "I can write … very fast. I have a new mind, thinking, when I write." His observation about having "a new mind," points to his perception of the cognitive change he experienced, although that change failed to realize itself in his posttest essay and required very explicit mediation to be realized during dynamic assessment. He also indicated the argument structure was clear to him. He stated he did not like writing, but he "learned something he did not know before." He liked the structure and stated "the first sentence, the last sentence, the warrant," suggesting his awareness of the sequence of discourse features. He made reference to discourse organization knowledge, which was the topic of Session Zero, when I taught the five-paragraph theme to both CG and EG. He stated, "In the first paragraph, you write about three things," By this, he was

referring to the Blueprint, and did indicate he learned this feature in Session Zero and that he did not know it before that. He added, "The first body paragraph should start with the conclusion," which is a reference to the thesis. He stated there was nothing in the Instruction that he did not like.

On the topic of effect of Instruction on his general writing ability, Max's response indicated an apparent conflict between generating and topic knowledge. Jay commented, "I can think a lot," which suggests that Instruction helped him generate ideas. Ironically, however, he indicated, if he had not "touched" the topic before, i.e., it was new to him, he could not write about it. Maybe his assessment can be taken to mean if the topic is familiar, Instruction will facilitate discourse content generation for him, but if it is not, then Instruction will not help considerably. (Confirming this inference would take many conversation turns, a luxury of time, due to his limited oral language proficiency, which I did not have at my disposal.) The tension between topic knowledge and generating ideas is evident in the following, "Anything I know, I can write. If I have no ideas, I cannot write." His assessment suggests that for Jay knowing about the essay topic is more important than knowing about discourse production through cognitive strategy instruction. He also found freewriting "better" for his thinking (than the Instruction in discourse schema).

The following other themes also emerged in the interview: a new interest in writing and a limited command of discourse schema. He stated, "Before [Instruction] I don't like [writing], but now I can try to write something." He was only able to identify the Claim and Data without mediation. Only when the dynamic assessment session started (See Chapter 7) was he able to identify and generate the model elements, including the rebuttal and response to rebuttal. This confirms his perception that the most readily internalized element of Instruction was not discourse schema, but freewriting.

When asked why he did not use a rebuttal in the posttest essay, he answered, "Because I am lazy. I don't like to think a lot." Apart from suggesting a negative self-perception about his intellectual engagement in writing, he also indicated he did not understand the rebuttal lesson when I first gave it. However, the evidence from the texts he produced during Instruction

suggests otherwise. For example, in Session V, Task 3, which was artefact-mediated by numbered prompts, Jay correctly applied a rebuttal and responds to it:

> (1) I don't agree with business should do anything they can to make a profit (C) …. (7) Many business man maybe don't agree with me because they think they can do well, they also think that if they have opportunity, they have to earn money. My reasons tell me that it is not good because my thinking is only for customers. So, my claim is presumably true (10).

It may very well be that the cognitive effort required to utilize the appropriate discourse schema without prompts at the posttest prevented Jay from applying what he demonstrated he was able to generate with prompt mediation in Session V, Task 3. This explains the utility of prompt mediation for discourse generation for a lower proficiency learner. In contrast, a higher proficiency learner such as Max found the prompts conflicting with his natural composing processes. Max attributed the reason to the fact that he "had his own model" after direct Instruction, indicating he did not need further mediation with artefacts, which was indeed necessary for Jay. The fact that Max was older (22) and had a university degree, and Jay was younger (18) and was only preparing for university can also explain the differential cognitive-academic mediational means each one of them needed, depending on their developmental level. In the final analysis, however, there was a discrepancy between his negative perception of his ability and the positive empirical evidence to the contrary, e.g., Session V, Task 3. Another finding confirming this inference is the following: Jay asked an organization question which he had already asked in his dynamic assessment session: He asked if there are three support paragraphs, whether the third will be the rebuttal. I confirmed that it was the case. This indicates that, for Jay, rebuttal was indeed on its way to internalization, but needed more mediation to complete its trajectory.

On the topic of transcendence (Poehner, 2007), Jay indicated he was planning for it. Jay stated he intended to use the model on the IELTS he was planning to take. On a future task in the next level, Jay solicited my advice. After completing Level 4 in December 2011, Jay asked for my feedback on a Level 5 essay assignment he had written on the first day of this level in January 2012. This time gap indicates there was no instruction between these two time points. In the assignment, he did use the rebuttal and response to rebuttal in a separate paragraph, which is clear evidence of transcendence. He reported he received a score of 70% on that assignment,

which is an improvement over my impressionist score of his posttest (5/9= 55%). This is clear evidence for two developmental phenomena: that ability takes time to manifest itself materially and that assessment and development are dialectically related. Jay's dynamic assessment session indicated what future had in store for him, but his summative assessment did not. I provided feedback to Jay on his essay as he had requested.

8.3. Summary

The interview with the four participants indicated that they perceived a change in their cognitive processes of text generation and that this change transcended (Poehner, 2007) to other contexts, which is evidence for internalization of Instruction.

The interview data suggest that the learners experienced both knowledge-telling and knowledge-transforming composing behaviour. The interview data indicate knowledge-telling when the participants mentioned (focused) freewriting had helped them generate content. This indicates knowledge-telling since focused freewriting retrieves topic and genre cues to generate the emerging text (See Chapter 2 for the complete argument). Knowledge-transforming happened when the learners reported the argumentative discourse-schema and prompts mediated their composing processes. This is evidence of knowledge-transforming because it is the rhetorical problem definition, goal setting, and planning that drive the discourse content generation process, which is what Scardamalia et al. (1984) considered the "essence of reflection in writing" (p. 176). They characterized this as the "return trip"' from the rhetorical problem space to the content problem space.

The interview and survey findings enhance those of score analysis in Chapter 5, text analysis in Chapter 6, and DA in Chapter 7. Because the study had an MM design (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009), it allowed for combining the methods to answer the research questions from mutually informative perspectives and paradigms. Whereas quantitative analysis indicated that Max had increased his scores, it did not reveal *how* this happened, from *his* perspective. Sometimes the participants' accounts of the efficacy of Instruction reflected in their interviews conflicted with their actual performance evidence, e.g., through text analysis. Whereas I, as the researcher, would like to believe, all Instructional mediational means had a role

to play, from Max's perspective, the prompts were unnecessary. He believed the discourse schema, which he appropriated to create his own mental model, had the most important effect.

Max indicated a dislike for artefact mediation with prompts; however, the textual evidence from Session III, Task 4 suggests that he actively allowed prompts to mediate his text production processes, thereby allowing the generating and formulating processes to be artefact mediated. However, this evidence can be understood by considering that he could have only been fulfilling the requirements of Task 4 without actually needing this explicit mediation. By contrast, Jay who provided little indication that he was aware of the need for rebuttal and response to rebuttal, both during the interview and at the posttest, did manage to produce them with prompts in Session V, Task 3. This indicates the crucial mediational role prompts played for Jay to generate the discourse features. The interview and DA complemented each other, as well. For example, whereas the DA confirmed that Mohammad both had internalized the argumentative discourse features (since he needed little or no mediation) and had a scientific knowledge of them), the interview indicated which components of the study were salient for him. Mohammad indicated freewriting helped him write much faster. This suggests proceduralization of knowledge-telling as a component of knowledge-transforming.

While evidence for knowledge-transforming reflective processes is strong for Max and Mohammad, it is not so for Natalie and Jay. Jay, however, voluntarily produced a sample of his writing in Level 5 immediately after Instruction in Level 4, thereby exercising his agency in his learning process. He himself initiated contact after the course had ended, which I would like to believe had to do with the emotional bond that was probably made in the DA session. Jay's Level 5 essay included strong evidence of knowledge-transforming since Jay had succeeded to "rise above conflict" (Scardamalia, et al., 1984) to generate a Rebuttal and Response to it. This evidence of transcendence (Poehner, 2007) to a new future context suggests that elements of reflective thought were beginning to be internalized. This can be taken as a delayed-posttest reflecting Jay internalizing the Instruction. This evidence is ecologically valid (Cole, Hood, & McDermott, 1997) because it was produced and presented voluntarily in the natural context of use. Table 8.3 summarizes the four participants' perceptions of Instruction.

The interview also provided evidence for transcendence (Poehner, 2007) to other contexts for Mohammad and Max. This information could be solicited because of the MM design of the study. The evidence for the transfer of instruction in reflective thought to other contexts was not available in the original Scardamalia et al. (1984) study, but the MM design of the present study allowed for soliciting that information. Table 8.1 summarizes the themes that emerged from the interviews. Each interview is organized to reflect the themes that suggest knowledge-transforming, knowledge-telling, and other writing ability developments.

Table 8.3. Summary of Participants' Perceptions of Instruction Reflected in Interviews

Participant	Composing process	Theme
Max	Knowledge-transforming	• Completely aware of argumentative discourse schema • Appropriated discourse schema into discourse generation (internal mediation) • Managed to transfer the discourse knowledge to other writing contexts (Poehner, 2007), research paper and classroom essay
	Knowledge-telling	• Improved his ability to generate text; • Writing became a habit
	Other	• Managed writing apprehension • Attributed 50% of his improvement to Instruction; • Characterized Instruction as "skeleton" and other instruction as "meat" • Cross-cultural rhetorical awareness • Confirmed that culture and language constrain and mediate reasoning. • He emphatically indicated that culture does not inhibit syllogistic reasoning, contrary to Luria (1976) and consistent with Donaldson (1979) • Max indicated artefact mediation with prompts conflicts with, and does not facilitate, cognitive writing processes.
Natalie	Knowledge-transforming	• Reported she was able to write logically connected discourse • Could name the elements of "the process" • Claimed discourse schema facilitated text production • Declarative and procedural knowledge of discourse schema. Despite this, not all elements were realized in her text
	Knowledge-telling	• Freewriting reduced writing processing load • Instruction facilitated idea generation and sequential processing of text production • Improved ability to generate ideas
	Other	• A new-found interest in writing
Mohammad	Knowledge-transforming	• Reported movement in discourse schema knowledge and writing ability; • Meta-discoursal awareness; • Scientific discourse- concepts mediated his writing development. • Transcendence (Poehner, 2007) to a new context, i.e., research paper
	Knowledge-telling	• Internalized/ internal mediation by freewriting • Fluent idea generation as a result of freewriting
	Other	• Genre awareness
Jay	Knowledge-transforming	• Perceived cognitive change: "I have a new mind" • Awareness of overall structure and organization of the essay • Limited command of discourse schema
	Knowledge-telling	• Freewriting was "better" than structure for his writing • Topic knowledge more important than cognitive strategy instruction
	Other	• Planning for transcendence (Poehner, 2007), i.e., IELTS, and *actual* transcendence, i.e., Level 5 writing, which did include knowledge-transforming evidence, i.e., Rebuttal and Response • Negative self-perception about lack of intellectual engagement in writing • Reported improved attitude toward writing

Chapter 9: Summary and Discussion

The present study sought to examine the effect of Instruction in reflective knowledge-transforming composing (Instruction in short) on overall writing quality, argumentative discourse quality, and cognitive composing processes. The motivation arose from my general pedagogical question, "Where do ideas in writing come from?" which echoes the title of the book edited by Torrance and Galbraith (1999): *Knowing What to Write: Conceptual Processes in Text Production.* Answering the question about the source of ideas in writing was also motivated by my English language learners' similar query over the years.

The nexus of the study was located at the intersection of cognitive strategy instruction (CSI), cognitive writing process theory, and sociocultural theory (SCT) of mind, especially systemic theoretical instruction, otherwise known as concept-based instruction (e.g., Negueruela, 2003). The questions were answered by conducting statistical analysis of pretest-posttest essays, analysis of longitudinal textual data, dynamic assessment, interviews, and surveys. The findings are presented in Chapters 5, 6, 7, and 8 and are summarized below.

9.1. Research Question 1: Statistical score analysis

The statistical analysis of the pretest and posttest essays (see Chapter 5) indicated that the experimental group (EG) outperformed the comparison group (CG) in a statistically significant way in the following categories: The Argument trait of overall writing quality, measured with a multiple-trait (MT) rubric, Rebuttal (Opposition), and Response to Rebuttal sub-traits of the argumentative discourse quality, measured with a primary-trait (PT). The comparison of the other traits of the overall writing quality, i.e., Communicative Quality, Organization, Linguistic Accuracy, and Linguistic Appropriacy did not yield statistically significant results between the EG and the CG, when compared from the pretest to the posttest. The comparison of the other sub-traits of the argumentative discourse, i.e., Thesis, Data, Claim, Warrant, and Backing did not yield a significant difference between the EG and CG. There are several observations that explain these findings

Frist, the subtraits Claim and Thesis were presented to both groups both by me in Session Zero and by their classroom instructors throughout the course, as indicated by my classroom

observations. Therefore, it is reasonable to expect no significant difference for elements of Instruction that were taught to both groups. The other three subtraits, Data, Warrant, and Backing, are both under-theorized (see Chapter 2 for a discussion on how they can all be interpreted interchangeably) and could not be sufficiently emphasized during Instruction. The reason for the latter was two-fold. The original Instruction which was planned for eight weeks, but was reduced to six weeks due to institutional constraints eliminating lessons on generating the warrant; also, the Instruction was not fine-tuned enough to demarcate the three sub-traits sufficiently, which is in part related to their under-theorization in the literature.

Second, consistent with Scardamalia et al. (1984), Instruction emphasized rising above "opposing arguments by producing an idea that preserves what is valid on both sides" (p. 181). This strategy was operationalized through explicit instruction and schema building for the construction of Rebuttal and Response to Rebuttal. My observations of EG and CG classes did not indicate that this rhetorical feature was presented to either group. Therefore, they were a salient feature of Instruction that stood out both for the participants in the EG and the raters who rated their essays. These factors must have contributed to the significant differences between groups for these two features.

Third, during the rating process the raters often debated what they perceived to be Data, Warrant, and Backing. To them, these elements could sometimes be interpreted interchangeably. Toulmin (1958/2003) addressed the differences (see Chapter 2), yet Instruction did not sufficiently demarcate them as discussed above. The fluidity of interpretation of these three discourse features, in turn, made their assessment within and between groups dependent upon the raters' mental state at the time of rating.

Fourth, my own longitudinal text analysis (See Research Question 2 below) also indicated the same. For example, Max wrote the following in Session II, Task 4: "No matter the scores are high or low students can understand their merit and stortage [shortage?]." If one accepts the writer's personal experience as factual grounding for the Claim, this sentence qualifies as Data. Similarly, if the sentence is taken to be a general principle that Max believes in, it could be interpreted as Warrant. On multiple readings of the same text, the rater can interpret the same sentence as either Data or Warrant. The same argument applies to the warrant

and backing features. The relationship between data and claim is similar to that between backing and warrant. Data provides factual grounding for the claim, and backing "field specific" facts (Toulmin, 1958/2003) for the warrant. If the data and warrant can be interpreted interchangeably, so can warrant and backing because one deals with a principle and the other factual instances of the principle, and these are sometimes interchangeable.

Fifth, Toulmin et al. (1984) pointed to the possible interchangeable interpretation of data and warrant for evaluation claims. The topics in the present study were not substantiation claims but a combination of evaluation and policy/recommendation (Fulkerson, 1984) claims, which lend themselves to the fluid interpretation of data and warrant.

Sixth, the statistical analysis examined the final texts, and not the process that produced the text. The CG did produce elements of support that the raters interpreted as Data, Warrant and Backing. Additionally, my observations of the CG also confirmed that they started the term with instruction on the "basic opinion essay," which requires providing *support* for the topic sentence. In Session Zero, I instructed both the EG and CG to *produce* support for the topic sentences. CG must have been told to do the same by their main teachers. Therefore, it is possible that CG participants produced these discourse features without a scientific conceptual understanding (Vygotsky, 1978; Lantolf & Thorne, 2006) of them, which was the purpose of Instruction. Theoretically, the EG could have surpassed the CG had they received the instruction on generating warrants, which I had to delete due to the shortened term of intervention from eight to six weeks. The instruction on warrant could have rendered the EG essays substantively stronger than CG's.

Seventh, the overall writing quality was not found to be statistically different between the groups, except for the Argument trait, because Instruction explicitly excluded elements of language such as grammar and vocabulary to keep the independent variable unaffected by extraneous factors. However, it is likely that if grammar and vocabulary were included in Instruction, it would improve the substantive strength (Fulkerson, 1994) of the arguments, which could have improved the writing quality as reflected in Linguistic Accuracy and Linguistic Appropriacy. Formal language features were consciously de-emphasized to keep cognitive

strategy instruction consistent with how it is studied in the literature. A future study can be designed to examine the role of formal language features in cognitive strategy instruction.

In relation to the literature reviewed on the topic of instruction in the Toulmin model (i.e., Yeh, 1998; Hillocks, 2010), the findings of the present study enhance the previous findings. First, as discussed in Chapter 2, Yeh (1998) did not differentiate between the data, warrant, and backing as discrete elements of "support" in instruction. The analysis in the present study, on the other hand, broke down the idea of "support" into its constituent elements, made it scientific (Lantolf & Thorne, 2006; Negueruela, 2003; Vygotsky, 1978, 1988), and offered a componential analysis of whether or not the Instruction yielded significant results for each discrete discourse feature of the support. Second, I evaluated Hillock's (2010) instruction in the Toulmin model to be strong in the use of artifacts and mediational means. However, Hillcock's report was based on observations only, without statistical analysis of the degree to which the model elements were internalized. The present study combines a detailed account of classroom instruction, which can be replicated by classroom teachers and researchers, with a robust and accountable statistical analysis. Finally, in Scardamalia et al.'s (1984) seminal paper, "reflection" was very broadly defined. The present study, on the other hand, locates the nexus of reflection in the argumentative discourse genre, and defines how specifically in can be measured with a rubric that can be validated and used in future studies.

9.2. Research Question 2: Text analysis

Research Question 2 concerned the effect of Instruction on cognitive processes of reflective knowledge-transforming (K-Tr) and rhetorical structure captured in the characteristics of the text produced by the participants. The longitudinal text analysis (Chapter 6) suggested that some participants whose essays showed virtually no improvement in argumentative discourse quality (e.g., Jay's), had in fact demonstrated the construct of reflective knowledge-transforming mediated by prompts in their writing, during Instruction. Going back to the definition of the Construct (Chapter 1), one notice that the requirement for knowledge-transforming was at times satisfied. That is, the participant, aided by an artifact or the instructor, was able to recognize a rhetorical problem and seek a solution for it the content problem space.

I categorized knowledge-transforming behaviour of the students into expansion and concision knowledge-transforming, EK-Tr and CK-Tr, respectively. EK-Tr is when the second draft features substantive additions to the first draft and CK-Tr when the second draft features substantive revisions, including deletions

Expansion Knowledge-transforming is akin to van den Bergh and Rijlaarsdam's (2007) generation-driven generation, when the activity of producing text leads to the generation of more text. They associate this behaviour with higher writing quality.

Four students' longitudinal text data were analysed for evidence of knowledge-transforming, and all of them at some point did display this behaviour. Jay, whose pre- to posttest improvement I judged to be rather flat, demonstrated knowledge-transforming in Session V, Task 3, when mediated by the prompt he was able to acknowledge Rebuttal and Response, two features that were absent in his posttest. A more developmentally advanced student, Max, produced multiple ideas in response to a single prompt, which he later selectively narrowed down, which is an example of CK-Tr. For example, In Session III, in response to the prompt for Data, Max generated seven sentences, and selected one. Max's posttest featured Rebuttal and Response which is overt evidence of knowledge-transforming because that is an example of dialectically reconciling opposite views (Scardamalia, et al., 1984). Another developmentally advanced student, Mohammad, actively used prompts as a rhetorical problem definition tool, and expanded from them on this second draft (an instance of EK-Tr). Natalie, whose cognitive and rhetorical development was clearly hampered by her lower oral proficiency (Hulstijn, 2011), also demonstrated both EK-Tr and CK-Tr. She made substantive changes to the first draft by generating new content and clarifying old content; hence, EK-Tr. She also deleted the prompts from the second draft, i.e., CK-Tr. Natalie's posttest did not feature the rebuttal and response, lacking the most overt realization of K-Tr, yet her longitudinal data did feature developing K-Tr behaviour.

Based on the longitudinal textual data, I observed the phenomenon of focused freewriting in generating discourse content, when students wrote non-stop on a given topic and produced a text which addressed the requirements of audience and purpose. Focused freewriting was used to operationalize knowledge-telling. Focused freewriting was distinct from the freewriting activity

that preceded it during instruction in its specific goal-oriented nature and distinct from general writing, in that content was generated as a result of writing itself. I introduced it as a substitute for students' modelling thought (I did model thought as the Instructor in the form of oral languaging) as an instructional strategy replacing think-aloud protocols as a data collection strategy in the original Scardamalia et al. (1984) because the students in the present study could not produce them due to their lower oral proficiency.

Focused freewriting should be recognized as a specific form of enlisting private speech (Elbow, 2010) to do rhetorical problem solving in writing together with DiCamilla and Lantolf 's (1994) private writing, and the kinds of written languaging Suzuki (2012, p. 113) identifies (e.g., diary writing, journal writing, and blog writing) . Focused freewriting utilizes private speech in that the writer does not wait for a solution to a problem come to his/her conscious attention first in time, but pro-actively uses language to generate a solution.

In relation to the studies reviewed for inferring cognitive-processes form text (see Chapter 2), the present study advances the field by proposing and applying a systematic procedure (see Section 4.7.2) that achieves virtually all of the goals of the previous studies. The procedure for text analysis in the present study identifies the type and amount of information the writer processed (Bereiter & Scardamalia, 1987, pp. 158-162). It does so by labeling argumentative discourse features, which could be tallied for a frequency count and statistical analysis. The present study furthers Mann and Thomson's (1988) Rhetorical Structure Theory's "subject matter relations" (p. 257) by both identifying and relating, to one another, the discourse features, according to the Toulmin model (1953/2003). The entire analysis of the four participants' texts is presented so that it can be verified. Van Wijk's (1999) modelling of "mental decisions" is enhanced, by allowing the analysis to "trace" the conceptual processes involved in generating discourse. A unique feature of the present study is the procedure (see Section 4.7.2 item 6) that uses multiple drafts to infer knowledge-transforming composing (Bereriter & Scardamalia, 1987). Additionally, all of the reviewed studies provided a *snap shot* of cognitive processes, the present study produced a *movie*, by tracing the cognitive and rhetorical development of four participants over time and tabulating the findings on a single page (see Tables 6.1- 6.4). Determining conceptual processes by locating the traces of revisions and the

mediational prompts across the drafts (see Chapter 8) advances cognitive writing theory in that it allows for such an analysis without the use of computers or sophisticated technology.

9.3. Research Question 3: Dynamic Assessment

Dynamic assessment (DA) was conducted to find evidence for knowledge-transforming composing, which I had reason to believe was developing in the learners, but failed to realize on the posttest or the longitudinal textual data (Chapter 7). The DA data of two students who attended a DA session were analysed. Jay and Mohammad were selected for analysis because the posttest, as well as classroom observations, identified them as the least and one of the most rhetorically developed participants, respectively.

Although Jay seemed virtually incapable of K-Tr prior to the DA session, he was able to produce the most overt realization of K-Tr with mediation. In the DA session, Jay produced a Rebuttal and Response with very explicit mediation. Additionally, Jay was able to produce the discourse label backing with explicit mediation, but generated the content for it with a small amount or mediation, and revise it, again, with a small amount of mediation. All three mediated production are examples of knowledge-transforming since, with assistance, Jay was able to identify a rhetorical problem and find a solution for it in the content problem space.

Mohammad's posttest essay and his longitudinal texts contained elements of K-Tr, e.g., a Rebuttal and Response. The goal of the DA was to assist Mohammad improve his posttest. For his posttest rebuttal, he only wrote a counter-claim, whereas Instruction had indicated he could treat rebuttal as a complete argument. One of the goals of the DA was to assist Mohammad to transform his counter-claim to a complete counterargument, which he was able to generate with implicit mediation. He managed to add Data, which indicates he was able to rise above a single counter-claim rebuttal to a counter-argument consisting of a claim and data, thus providing the minimum requirement for an argument. The reason this is an example of K-Tr is that he used the argumentative discourse schema as rhetorical knowledge to formulate a rhetorical problem and generate a solution to it in the content problem space, which is the essence of reflective K-Tr in writing (Scardamalia, et al., 1984).

The DA analysis confirms the Lantolf and Poehner's (2013) argument about the unfairness of equal treatment. In the present study, some participants needed more sociocultural mediation for the realization of the construct in their performance. A half-hour time investment in Jay during the DA session can be attributed to his improved mark in his first Level 5 essay. Therefore, DA proved to be a consequentially valid (Messick, 1991) procedure, because the social consequences of the intervention well justified it. Jay's DA was consequential because it informed both the learner and his teacher-researcher of what was internalized, was developing, and would be potentially developed. The future sociocultural context that Jay was in, i.e., his Level 5 class, afforded his potential level of development to realize itself. Prior to any instruction at the beginning of Level 5, Jay was able to write an essay that contained all the discourse features including a rebuttal and response to it, which indicate knowledge-transforming ability, an example of transcendence

In relation to the DA literature reviewed, the present study advances the field in the following ways: The combination of the summative assessment with DA, allowed for "establishing the individual's zone of actual development … [and] only then moving to developing the zones of proximal development" (Haywood & Lidz, 2007, p. 35). The summative assessment results provided a reliable entry point into the ZPD so that mediation would be gradually and contingently (Aljaafreh & Lantolf, 1994; Rahimi, et al. 2015) adjusted. This combination of methods was possible because of the MM design of the study (Tashakkori & Teddlie, 2003; Teddlie & Tashakkori, 2009) in which one method of measuring the same construct informed and enhanced the other. DA allowed for a more informed answer to the research questions, one which could be answered in the negative for a particular student, such as Jay, but was answered in the positive, for him, after DA. DA of knowledge-transforming composing and rhetorical development enhances the SCT approaches to studying L2 writing. For example, while Anton (2009) applied DA to revisions in writing in general, the present study applied DA to discourse content generation and revision in writing based on a specific discourse model, making the subject matter of assessment in DA scientific (Lantolf & Thorne, 2006; Negueruela, 2003; Vygotsky, 1978, 1968).

9.4. Research Question 4: Interviews and Questionnaires

To collect the participants' perceptions of the Instruction, the EG completed a survey and the same four students whose textual data were analysed were interviewed. Similarly to dynamic assessment and text analysis, the interview data analysis revealed findings about change in cognitive processes of discourse content generation that were not always apparent in pretest-posttest comparisons. Below, I discuss the four participants' perceptions and experiences of Instruction.

Max stated he did not use the prompts in his writing process, because he had "his own model." After direct Instruction, he had internalized and appropriated the model and was able to have it internally mediate the writing process. Although he used the model for the return trip from the rhetorical problem space to the content space, he did not overtly rely on external artifacts mediating the cognitive process. Despite his emic perspective, there were instances in which Max did productively use the prompts to generate discourse content. Max's perception of the conflictual effect of prompts is at odds with the evidence of his successful application of them in Session III, Task 4. The latter is evidence for the utility of the prompts, at least, to complete that task, despite Max's perceptions to the contrary; on the other hand, it could be argued that in Session III, Task 4, Max used the prompts not because he needed them, but because he was instructed to. Future research designs can empirically test this hypothesis (see future studies below).

Natalie stressed many times that Instruction helped her logically connect the parts of her discourse, suggesting the knowledge-transforming role of Instruction for her because rhetorical knowledge mediated her discourse content generation. She demonstrated both declarative and procedural knowledge of the discourse features, because she was able to name and produce them. Interestingly, although she was aware of the function of rebuttal, she failed to generate it in the posttest. When asked about the reason, she speculated it was probably because she had no ideas. This suggests that, for some participants, the knowledge of the need for a feature and its location in the discourse did not necessarily translate to "constituting that knowledge" (Galbraith, 1999). To constitute that knowledge, the relevant information must be present *a priori* in the learner's long term memory for retrieval. If the content knowledge is not available the rhetorical prompt

cannot retrieve an item of knowledge that is non-existent. This speaks to the dual nature of the content-rhetoric dialectic. While it is true that the very act of rhetorical problem solving can help generate discourse content, this production is more akin to retrieval, re-organization, and re-configuration of pre-existing knowledge more than constructing something from scratch. Of course, the re-organized knowledge is new knowledge, while acknowledging that its constituent elements were pre-existing prior to the act of composing. In sum, knowledge-transforming composing is both a tool for the generation of the content and a cue signalling the unavailability of an item of knowledge that can be (re)searched off-line. What triggered this off-line search was the writing process itself. This is consistent with Bereiter and Scardamalia's (1987) definition of knowledge-transforming as "a two-way interaction between continuously developing knowledge and continuously developing text" (p. 12)

Jay's interview confirmed the inference above about the need for pre-existing knowledge for it to be triggered with the prompts. He stated, "Anything I know, I can write. If I have no ideas, I cannot write." Further, Jay provided his emic perception about cognitive change. He stated because of Instruction he had "a new mind, thinking." For Jay, Instruction seemed to have facilitated knowledge-telling because he indicated he could write faster.

Mohammad's interview indicated the transformative effect freewriting and focused freewriting had on generating the content of his discourse. He stated he would "free write in his head" while he was making an outline. Although Instruction had introduced focused freewriting, as part of the writing process itself, Mohammad had appropriated it into his composing process of global planning. The fact that he would free write "in his head" is a manifest instantiation of the cultural law of genetic development (Lantolf, 2002): the other- and artifact-regulation had moved toward self-regulation. Mohammad had appropriated the strategy into his cognition as a cultural way of organizing his writing.

Three of the four interview participants provided evidence for transcendence (Poehner, 2007). Max and Mohammad had used the model in their other course papers and Jay used it his next class, Level 5.Overall, the four participants provided evidence for both reflective knowledge-transforming in differential degrees and knowledge-telling composing, the latter in

their declarative and procedural knowledge of the discourse schema and the former in their reports that they could write faster, and that ideas come to their minds faster.

The questionnaire results indicated that the EG found the Instruction useful, both in its entirety, as one construct, and for its various elements. The various questions solicited perceptions of the participants about both the quality of their final text and reflective knowledge-transforming processes. All the mean scores on a Likert scale were close to 5 out of 6 (except for the usefulness of prompts (M = 3.85) which was affected by one low score. (The interview discussion with Max explains possible reasons for this.) When asked *yes-no* questions about how helpful four aspects of Instruction was, the EG indicated satisfaction levels ranged between 85% and 92%. In summary the interview and survey data suggest that the participants found Instruction effective both to improve their discourse content generation ability and the rhetorical structure of their texts.

In relation to the literature reviewed, the findings of the interviews provide further insights into cognitive process of knowledge-transforming. Hulstijn (2011) posited that a core linguistic competence was required for strategic competence to exist, an instance of which being discourse content generation by way of knowledge-transforming composing. Both the texts that Natalie generated and the interview excerpt transcribed above required many bridging inferences (van Dijk & Kintsch, 1983) to be coherent. This was due to her limited core language proficiency. I was, however, able to make these bridging inferences because I, as the researcher-instructor, was situated in Natalie's "life space," defined as the "the person and the physical environment as it exists for him [sic her]" (Cole et al., 1997, p. 52 citing Lewin, 1943). This makes the assessment ecologically valid (Cole, Hood, & McDermott, 1997). In the absence of such a history with the learner, it would dubious that the findings could be interpreted as above. Second, Max's suggestion that he created his own model after Session I and that he did not need further mediation, might be an instance of what Wertsch (2007) calls implicit mediation; the discourse schema had been internalized quickly and had become an intra-psychological tool (Vygotsky, 1978), which, in Max's view, rendered other mediational artifacts such as the prompts and think-sheets redundant for him. The insights gleaned from the interview were possible because of the MM design of the study (Tashakkori & Teddlie, 2003; Teddlie &

Tashakkori, 2009) that allowed for answering the research questions from different methodological and paradigmatic perspectives.

9.5. Limitations

A classic limitation of the study is that the samples were both small and taken from intact classes. Research in applied linguistics has historically faced this challenge, and this study is no exception. When proper logistical support is in place, random sampling from multiple sites can be conducted to be able to generalize from a small sample representative of a population.

Second, think-aloud protocols could have been used productively to collect evidence for cognitive change (acknowledging their limitations from an SCT perspective, e.g., Smagorinsky (2001) if there was time to train the participants to produce fluent protocols as in Raimes (1987), for example, or if they could have used their first languages. This evidence would demonstrate the planning and goal-setting episodes characteristic of problem definition and discourse content generation, using knowledge-transforming, from the rhetorical problem space, which was evident in the longitudinal textual data and dynamic assessment. If that were the case, then direct evidence for knowledge-transforming would be provided, and such episodes could be coded with a software package such as Nvivo. Also, CG students could have been invited for the TAPs for the comparison of the two groups' composing behaviours. Because of my three-part role as teacher, researcher, and technician (see Chapter 3) and the time constraints of a doctoral study neither scenario materialized. Future studies can integrate sufficient (human) resources into the research design to make this ideal a reality.

Third, I conducted the interviews, textual analysis and dynamic assessment session with a subsample of four and two EG participants, because the data collection and analysis procedures are both time-consuming and labour-intensive, while upholding the standards of a research project. Ideally all EG and CG students ($N = 26$) could have been used for the qualitative stream of the design to be able to solicit more student perceptions, analyse more texts, and mediate more discourse generation episodes (DGEs) (see Chapter 7). The findings would therefore be more generalizable and afford comparison of the groups.

Fourth, the present study was conducted by a teacher-researcher. Its strength was in that I had intimate knowledge of Instruction, and because all the aspects of the study were my brainchild, the implemented curriculum did not differ much from the planned one to the extent that the interactions in the class and the emerging ZPDs allowed it. It would be interesting to train different teachers in future studies to conduct the study and the qualitative data collection and analysis so that the findings could be compared across different teachers as well as different groups. This would introduce a third independent variable as well as Time and Group.

Fifth, no delayed posttest was administered in this study, although three EG participants did provide evidence for transcendence (Poehner, 2007) of the construct of Instruction to new contexts. A future study can include this feature so that there are three time points for comparison. Similarly, Grabe and Kaplan (1996, p. 131) ask if participants can transfer their knowledge to writing situations and contexts beyond what was practised in the classroom. A longitudinal study that tracks the future development of the participants' writing expertise well into their university studies can address the question.

9.6. Methodological Implications

This study demonstrated how a pedagogy can utilize language to generate thought in writing. It appropriated the findings of cognitive writing theory research in an SCT study. SCT is arguably the most suitable framework to inform classroom-based pedagogy and research because it is premised on the dialectical unity of the two (e.g., Lantolf, 2008).

The present study, to my knowledge, is the first attempt to apply SCT principles of concept-based learning to the acquisition and development of argumentative discourse features to L2 writing. Although process writing theory has been researched since the early 1970s, less research has been done on its pedagogical applications, and much less from an SCT perspective. The microgenetic details provided in an SCT research inform the practitioner of the type and nature of the mediational means that can afford cognitive change.

Freewriting and focused freewriting can be considered an option in addition to think-aloud protocols for evidence of the composing behaviours of writers, especially for low proficiency learners who cannot produce fluent protocols. Freewriting enlists speech (Elbow,

2010) and frees participants' working memory of the requirements of phonological encoding (Chenowith & Hayes, 2003) and would, instead, direct the language resources to planning and generating processes. In the present study, focused freewriting provided limited evidence of knowledge-transforming composing in view of the prompts that the participants used and later deleted as well as the revision behaviour. Bereiter and Scardamalia (1987) consider it expert-composing when the think-aloud protocols contain more language than the inscribed text. This is what happened in concision knowledge-transforming.

A feature of this study is its accountability. Every effort was made to make the method transparent and replicable. Because the method required a microgenetic approach, minute details of instruction, assessment, and analysis are available for independent verification. The sociocultural orientation of this study called for this microgenetic approach. The study can easily be replicated because all details of Instruction and research are available. The future researcher is offered a window into the classroom, the researcher and participants' minds.

9.7. Pedagogical Implications

The findings of the present study indicate that reflective knowledge-transforming composing can be taught with uptake. Instruction included no overt formal linguistic elements. Language played the crucial role of mediating and generating thought. It is recommended that this pedagogy be complemented with other elements of instruction in an English language class. Coupled with instruction in grammar and vocabulary, the Instruction in the present study can be even more productive.

The dynamic assessment results provided evidence for the "unfairness of equal treatment" (Lantolf & Poehner, 2013). Jay's summative assessment, for example, indicated virtually no learning throughout the Instruction. However, my teacher-researchers observations motivated me to conduct a DA session to empirically verify this. Although the DA session indicated that Jay needed very explicit mediation to demonstrate knowledge-transforming, he left the DA session feeling empowered and enabled. The extra mediation provided in the DA session enabled him to productively appropriate what he learned to his first Level 5 assignment. Were it not for the DA session, it is unlikely that Jay would have become conscious of the need for

specific discourse features. This nominates DA as an empowering pedagogical tool, one that simultaneously assesses and teaches.

9.8. Future Studies

Instruction in the present study was informed and designed by the three-part approach of Scardamalia et al. (1984): direct strategy instruction, procedural facilitation, and modelling thought. This approach was designed to foster reflective composing processes. I appropriated this into an SCT framework and offered direct instruction on a specific generic form, the Toulmin (1958/2003) model of argument, which I argued to be both universally knowable and teachable because it is based on universal syllogism. Based on this, the mediational artefacts were designed and co-constructed. These artefacts were used for procedural facilitation. I replaced modelling thought with my languaging and participants' (focused) freewriting, which highlight the genesis of thought through language. In other words, there was a three-part mediational "package" that formed the independent variable Instruction. Future research designs can examine the contribution of each of the three components separately to investigate the role of each independent of others, as well as their two-of-three combinations in order to study their interaction. This will answer the unique effect of each component on writing quality, cognitive writing processes, as well as their interaction patterns.

Second, the most salient and observable effect in this study was the rebuttal and response to rebuttal features of texts. Three other discourse features which are critically important are data, warrant, and backing. The statistical analyses did not yield a significant difference for these three, and my independent text analysis revealed that data and warrant can sometimes be used interchangeably as predicted by Toulmin et al. (1984). This, in part, is due to the under-theorized nature of data and warrant in the Toulmin (1958/2003) model. More theoretical work can delineate the essential differences between these three elements and incorporate them into Instruction. An interesting question to ask is whether the argument is enthymematic (with an implicit warrant) or does it have a warrant. In either case, the next question is whether it is structurally sound and/or substantively strong. This micro analysis was not consistently applied in the present study for the theoretical and methodological reasons mentioned.

Third, the present study was informed by *stasis* rhetorical theory (Fulkerson, 1984). The nature of the topics lend themselves to both evaluation and policy claims, but not substantiation claims. The effect of the types of topic on the effectiveness of instruction is another area for future research

Fourth, in addition to argumentative discourse, other rhetorical genres can be the dependent variable. In the present study, the instructional and mediational means were all designed to make arguments strong and sound (Fulkerson, 1984). Another discourse schema which can be fruitfully investigated is Burke's (1962) pentad. Instruction and mediational means can be designed to realize the pentad's elements: act, scene, agent, agency, purpose.

Fifth, the think-aloud protocols that were collected could not be used for analysis in the present study, in large part due to the inability of the participants to produce fluent protocols. If a future researcher is able to rise above the SCT-cognitive paradigmatic issues (see Chapters 2 for a discussion), it would be very interesting to adapt the Instruction for more advanced language learners, who are able to produce fluent TAPs, and compare the cognitive processes before and after Instruction. Note that this does not suggest that thinking and speech are necessarily separate processes, yet it is reasonable to hypothesize that the thinking-speech dialectic captured in pretest TAPs would be different from those in posttest TAPs in Instruction. A future study can empirically examine this hypothesis.

Sixth, the present study used the available non-parametric tests in SPSS. A more sophisticated analysis, with a larger sample size and a design accounting for different writing tasks and proficiency levels, will use a non-parametric multivariate analysis of variance (NP MANOVA). Such an analysis would indicate, in one set of calculations, the interaction effects between the independent variables of Time and Group on Instruction. The present study applied four independent non-parametric tests and the interactions were inferred. With an NP MANOVA, they could be directly observed and plotted.

Seventh, this study was conducted in an SCT framework, with the independent variable of Instruction completely informed by SCT. It would be interesting to compare the findings with

one framed in instructional cognitive psychology or another theoretical framework, then train raters to statically assess the essays and compare the two groups.

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Appendix A: Writing Task Descriptions in Sessions I-VI

Session	Task #	Task Instructions
I	**2**	Write another paragraph to support [or oppose] building a factory in your area. Use the Toulmin model, but develop a different idea.
II	**4**	Write one paragraph following the Toulmin Model on the following topic: *Do you agree or disagree with the following statement? Grades (marks) encourage students to learn. Use specific reasons and examples to support your opinion.*
III **IV** **??**	**4**	Write one paragraph following the Toulmin Model on the following topic: *Do you agree or disagree with the following statement? Parents should make important decisions for their older (15-18 year-old) teenage children. Use specific reasons and examples to support your opinion.*
IV	**2**	Write freely for ten minutes about anything that comes to mind. There is no rule, except that you should never stop. If you don't have an idea simply write, "I have no idea, but an idea will come to me soon" or something like that. If you don't know a word, leave a blank space for it, or write it in your language. DO NOT ERASE ANYTHING. Please use a pen. If you need more paper please ask.
	3	Follow these steps: 1. Free-write one paragraph for 10 minutes following the Toulmin Model on the following topic. Do not stop writing. If you have no ideas, use the prompts to help you create ideas. Never stop writing. If you don't remember a word, write it in your language, or leave it blank (-------). 2. After freewriting for 10 minutes, write your final draft (one paragraph only). Feel free to change any of the ideas in freewriting. You can also change any sentences, words, etc. to make your paragraph better. *The expression "Never give up" means to keep trying and never stop working for your goals. Do you agree or disagree with the following statement? Use specific reasons and examples to support your opinion.*
V	2	Write freely for ten minutes about anything that comes to mind. There is no rule, except that you should never stop. If you don't have an idea simply write, "I have no idea, but an idea will come to me soon" or something like that. If you don't know a word, leave a blank space for it, or write it in your language. DO NOT ERASE ANYTHING. Please use a pen. If you need more paper please ask.

Appendix A (Cont'd)

Session	Task #	Task Instructions
V	3	Follow these steps: 1. Free-write ONE paragraph for 10 minutes following the Toulmin Model on the following topic. Do not stop writing. If you have no ideas, use the prompts to help you create ideas. Never stop writing. If you don't remember a word, write it in your language, or leave it blank (-------). 2. After freewriting for 10 minutes, write your final draft (one paragraph only). Feel free to change any of the ideas in freewriting. You can also change any sentences, words, etc. to make your paragraph better. Do NOT transfer the prompts to the final copy. *Do you agree or disagree with the following statement? Businesses should do anything they can to make a profit. Use specific reasons and examples to support your position.*
	4	Write an essay of four or five paragraphs on the following topic. • Spend only 45 minutes ONLY. • Do not use a dictionary or any other tools. Treat it like an exam. • Make sure you have a rebuttal paragraph. • Try to include as many model elements as you can. • Please use a pen only. • Use the paper provided only. *Do you agree or disagree with the following statement? The best way to travel is in a group led by a tour guide. Use specific reasons and examples to support your answer.*
VI	3	Write an essay of five paragraphs on the following topic. *Do you agree or disagree with the following statement? A person should never make an important decision alone. Use specific reasons and examples to support your answer.* Please follow these steps: • Write freely on this topic non-stop for five minutes. This is your brainstorming session. • Do not use a dictionary or any other tools. Treat it like an exam. • After freewriting for five minutes, use the prompts provided to write the essay. You can ask the teacher for help if you need it. • Please use a pen only. • Use the paper provided only.

Appendix B: Iterations of (Co-)constructed Prompts during Five Instructional Sessions

Development and construction of prompts used as cognitive tools for knowledge-transforming in the rhetorical problem space

Session / Discourse features	**Claim** (ask this both for intro and body paragraphs) C	**Data** D	**Warrant** W	**Backing** B	**Rebuttal** R	**Response to Rebuttal** RR	**Qualification** Q
I	No prompts provided, nor generated						
II pilot prompts provided for a paragraph	-What is my topic? - What is my opinion? - What do I know about the topic? -What are 2 or 3 ways I can support my opinion? -What are my values in relation to the topic?	-what is the evidence for my claim? -How can I support my claim? -What kind of research supports my claim? -What would be the foundation for my claim?	-How is the data related to my claim? -What facts link my data to claim? -How can I relate my data to my claim? -What clarification does my data need? -How do I provide logical support for my data? -What cause-effect relation is there between my data and claim? -The relation between the claim and data is like the relation between X and Y.	-What example can I provide for my warrant? -How can I relate my warrant to my claim? - Are there any statistics about my warrant? -What evidence is there for the warrant?	-What exceptions are there to my data, warrant, or backing? - What is the opposite opinion? - What is another opinion about my claim? -What can weaken my claim, data, warrant, or backing? -What is controversial about the data, warrant, or backing?	-How can I respond to/judge/evaluate the rebuttal? - What are the points that the rebuttal has not covered? -How can I argue to refute the rebuttal? -How can I show the rebuttal in fact supports my claim?	-probably -presumably -likely -potentially -to a certain extent/ to a large extent extent/degree
II ZPD co-constructed for a Paragraph	What's my opinion/main idea? What is my thesis? What is my topic?	How can I explain my opinion? What are the facts the support my opinion? What is the reason for my opinion? What's my evidence for the claim?	How can I make the data related to the claim? How can the data and the claim be related/linked/connected?	What facts lead the reader to understand the warrant? What can I do to make the warrant clearer?	What is the opposite of my opinion? How do people disagree with my view?	What is the opposite of my rebuttal? How can I respond to the rebuttal?	Probably Perhaps Presumably
III	Same as Session II pilot prompts						
IV simplified for a Paragraph	Here is my claim (agree/disagree). My topic is …. My opinion is ….	The reason I think so is based on these facts (data)	These facts support my claim because (warrant)	These other facts support my warrant (backing)	But people may disagree. They may say (rebuttal)	But here is my response to those who disagree	So, my claim is presumably true

Appendix B: Prompts table (cont'd)

Development and construction of prompts used as cognitive tools for knowledge-transforming in the rhetorical problem space

Session / Discourse features	Claim C	Data D	Warrant W	Backing B	Rebuttal R	Response to Rebuttal RR	Qualification Q
V **Expanded for a Paragraph**	1. Here is my claim (agree/disagree). My topic is …. My opinion is ….	2. The reason I think so is based on these facts (data), 3. These facts support my claim (data)	4. These facts support my claim because (warrant) 5. These facts are related to my claim because (warrants) •If these facts (data) are true, then the claim is true because …. (If … then …) •My data cause my claim to be true because … (cause→effect) •My data is linked to my claim true because it is similar to … (a comparison)	6. These other facts support my warrant (backing)	7. But people may disagree. They may say (rebuttal) …	8. But here is my response to those who disagree … 9. But this argument is not strong because …	10. So, my claim is presumably true.
VI **Expanded for an essay**	**Paragraph one** (introduction): thesis + preview 1. Here is my claim (agree/disagree. My topic is … My opinion is … My preview is … (thesis + preview)		**Paragraph two:** Claim, Data, Warrant, Backing, Claim Restated. Write one or two sentences for each part (minimum six sentences for the paragraph) 2. My first claim is (C) 3. These facts support my claim (D) 4.The reason I think so is based on these facts (D) 5. These facts support my claim because (W) 6. These facts are related to my claim because (W) 7. If these facts (data) are true, then the claim is true because …. (If … then …) 8. My data cause my claim to be true because … (cause→effect) 9. My data is linked to my claim true because it is similar to … (a comparison) …...(W) 7. These other facts support my warrant (B) ……(B) 8. Then it seems to be the case that (Restated Claim)	**Paragraph four:** rebuttal and response to rebuttal. 10. But, people my disagree. They may say … (R) 11. They say this because …. (R) ……..(R) 12. But, here is my response to those who disagree … (ResR) 13. But this argument is not strong because … (ResR) ……(ResR)	**Paragraph five** (conclusion): thesis reworded 14. So my claim …. is presumably true 15. So it is probably the case that … 16. So, it seems that …. …(thesis restated)

Appendix C: Think-sheets

Used in Session III

Think-sheets: Task 3 Questions to ask yourself in order to generate the different parts of the argument:

Ask yourself these questions to generate the claim. -What is my topic? - What is my opinion about the topic? - What do I know about the topic? -What are 2 or 3 ways I can support my opinion? -What are my values in relation to the topic?	**Claim**
	Freewrite your answers here:
	Write the final version here:

Ask yourself these questions to generate the data. --what is the evidence for my claim? -How can I support my claim? -What kind of research supports my claim? -What would be the foundation for my claim?	**Data**
	Freewrite your answers here:
	Write the final version here:

Ask yourself these questions to generate the warrant. -How is the data related to my claim? -What facts link my data to claim? -How can I relate my data to my claim? -What clarification does my data need? -How do I provide logical support for my data? -What cause-effect relation is there between my data and claim? -The relation between the claim and data is like the relation between X and Y.	**Warrant**
	Freewrite your answers here:
	Write the final version here:

Appendix C (cont'd)

Think-sheets: Task 3 Questions to ask yourself in order to generate the different parts of the argument:

Ask yourself these questions to generate the backing.	**Backing**
-What example can I provide for my warrant? -How can I relate my warrant to my claim? - Are there any statistics about my warrant? -What evidence is there for the warrant?	Freewrite your answers here: Write the final version here:

Ask yourself these questions to generate the rebuttal.	**Rebuttal**
- What is the opposite opinion? - What is another opinion about my claim? -What can weaken my claim, data, warrant, or backing? -What exceptions are there to my data, warrant, or backing warrant? -What is controversial (causing a lot of disagreement) about the data, warrant, or backing?	Freewrite your answers here: Write the final version here:

Ask yourself these questions to generate the response to rebuttal	**Response to Rebuttal**
-How can I respond to /judge/evaluate the rebuttal? -How can I argue to refute (disprove) the rebuttal? -What is not true about the rebuttal? - What are the points that the rebuttal has not covered? -How can I show the rebuttal in fact supports my claim?	Freewrite your answers here: Write the final version here:

Ask yourself these questions to generate the restated claim.	**Restated Claim**
-How can I restate my claim with qualification? -Probably, presumably, likely, potentially, to a certain extent/ to a large extent extent/degree -It seems/It appears	Freewrite your answers here: Write the final version here:

Appendix D: Questionnaire on Participants' Background and Perceptions about Components of the Study

Please complete this form.

1. Participant name: _____ Pseudonym (for researcher's use):
2. Teacher's name: Henry □ Jerry □
3. Age: _____
4. Gender: Male □ Female □
5. Number of years studying English: _____
6. Education completed- please check the highest level only:
   Junior High school □ High school □
   University-undergraduate □ University-graduate □
7. Field of study at university if applicable:_____
8. Country of origin:_____
9. First language:_____
10. How many months have you been in Canada?_____
11. Did you take an English proficiency test score such as TOEFL, IELTS, MELAB, YELT, Can-Test? Yes □ No □
12. If you did, what was your score? _____
13. When did you take the test? _____
14. How would you rate your academic writing ability?_____
    Poor □ Fair □ Good □ Very good □ Excellent □
    Please see over.

15. How important do you think the following are for your ability to write well?
    On a scale of one to six, with one meaning not very important and six meaning very important please answer the following questions:

a) Ability to produce ideas for writing
   1 2 3 4 5 6
b) Ability to develop ideas into text
   1 2 3 4 5 6
c) Vocabulary knowledge
   1 2 3 4 5 6
d) Grammar knowledge
   1 2 3 4 5 6
e) Organizing ability
   1 2 3 4 5 6

Appendix E: Lesson Plan Zero and Handouts

Date: Nov. 4, 2011
Group size: 30 students
Time required: Two hours
Materials: Handout on four-paragraph essay format
Sources Handout

Goals

1. To identify the format of a four-paragraph essay
2. To produce a four-paragraph essay

Preparation:

1. Set up the video camera so that interactions with the students can be captured
2. Set up the two voice recorders (silver PR-XS400 and black Panasonic PR-XR800). You may want to set them side by side to compare the qualities or at two different spots to capture more of the interaction.
3. Printing:
    a. Print handouts 32 copies (handout 0-1 and 02, Print Bailey and Powel (1987, pp. 60-61) double- Print the first page of handout 0-1 separately from the rest of it so that the students can see it while answering questions.
    b. Print Participant Profile (double-sided)
    c. Print consent forms 64 copies (double sided)

Introduction:

1. Introduce yourself and say briefly about the purpose of the research: help them write better and more easily. Mention that the study has been pilot tested and the students have expressed satisfaction with their ability to write better. Sate that this study will be in addition to their curriculum. Get them to imagine an ice cream cone with an extra scoop on top. That is what this study is about. Mention that you are going to have them read and sign a consent form if they agree with it.
2. Read the consent out to class and ask if they have any questions. Explain the meaning of any words that they may have difficulty with.
3. Distribute the survey and ask that they fill it out.

Process- the four/five paragraph essay:

1. Tell class that they are going to review/learn the structure of an essay and write an essay together.
2. Follow the instructions on the handout
    - Put the two questions to the class and invite discussion
    - Let them know they will read a four-paragraph essay

Task 1: Pre-reading activity

Read the following questions. Discuss them in class.

- What do you know about space exploration? To answer this question, you may want to think about a science fiction movie that you have seen.
- Do astronauts who go on spacecraft face any dangers? What are such dangers?

Reading Activity

Read the following passage and answer the questions that follow it. (Adapted from: http://lrs.ed.uiuc.edu/students/fwalters/fullessay.html)

Introduction

Throughout human history, the physical world has often presented dangers to explorers. For example, when primitive humans left their tribal villages to search for food and water, they risked death or injury from dangerous animals. Later, when people sailed the oceans in search of new lands for settlement or trade, many died in terrible storms. Similarly, the ocean of outer space has several unique challenges for explorers. Two of these challenges are vacuum and space rocks.

First body paragraph

Another difficulty that is unique to outer space is the presence of meteors and micro meteors. These are pieces of rock and metal that are left over from the formation of the solar system. Many of these objects travel at very high speeds. Under the Earth's blanket of air, people are usually protected from meteor impacts. However, in space, people and spaceships are vulnerable to collisions with meteors. It is true that the chance of meteor impacts is relatively small, but if even a small micro meteor happens to collide with a spacecraft, it could cause serious damage. Indeed, meteors are a special difficulty that space explorers have to deal with.

Second body paragraph

One of the challenges that is unique to space is the fact that space is a vacuum, which is a risk for various reasons. First, in a vacuum there is no atmosphere and therefore no air. Without air, the human body has no oxygen to sustain itself. After too many minutes without oxygen, a person would lose consciousness and eventually die. Also, without an atmosphere, the rays of the Sun can cause radiation poisoning because it is the Earth's atmosphere that protects humans against solar radiation, and there is no atmosphere in space. Then, vacuum clearly poses a serious challenge to space explorers.

Conclusion

In Summary, the vacuum and presence of meteors are two of the most important challenges space explorers have to face. Therefore, primitive and modern humans alike should be thankful that they do not have to contend with the difficulties space explorers do, and are well protected by the beautiful blue dome we call the atmosphere.

Task 1 (cont'd): Read the four-paragraph essay on meteors and answer the following questions:

1. What is the passage about? In other words, what is the *topic* of the passage? Write the topic of the passage here: (It consists of five words.)
   --- ----- -- ----- -----
2. What is the *central idea* of the passage? In other words, what idea is expressed about the topic of the passage? This idea is called the *main idea* or *central idea* of the essay? Write the *main/central idea* of the passage here: (It consists of seven words.)
   [it] --- ------- ------ ---------- --- ---------
3. Looking at the introductory paragraph, write the sentence that includes *the topic* and *main idea* of the essay. This sentence is called the *thesis statement* and it appears at the end of the introduction.
4. Look at the sentence that follows the *thesis statement*. What are two new important ideas in it? Write them down here:
   a. ------
   b. ----- -----

   The sentence after the thesis statement is called the *blueprint.*

5. Look at the first body paragraph. Write the sentence that contains the topic and main idea of this paragraph. What are the topic and main idea? This sentence is *the topic sentence* of the first body paragraph. (Note that the *topic* and *topic sentence* are two different things.)

6. Does the first body paragraph have a *reworded topic sentence*? If yes, write it here.

7. Look at the second body paragraph. Write the sentence that contains *the topic* and *main idea* of this paragraph. What are the *topic* and *main idea*?

8. Does the second body paragraph have a *reworded topic sentence*? If yes, write it here.

9. Look at the *concluding paragraph*. Find a sentence in it that restates the *topic* and *main idea* of the entire essay. Write it here. This sentence is called the *reworded thesis statement*.

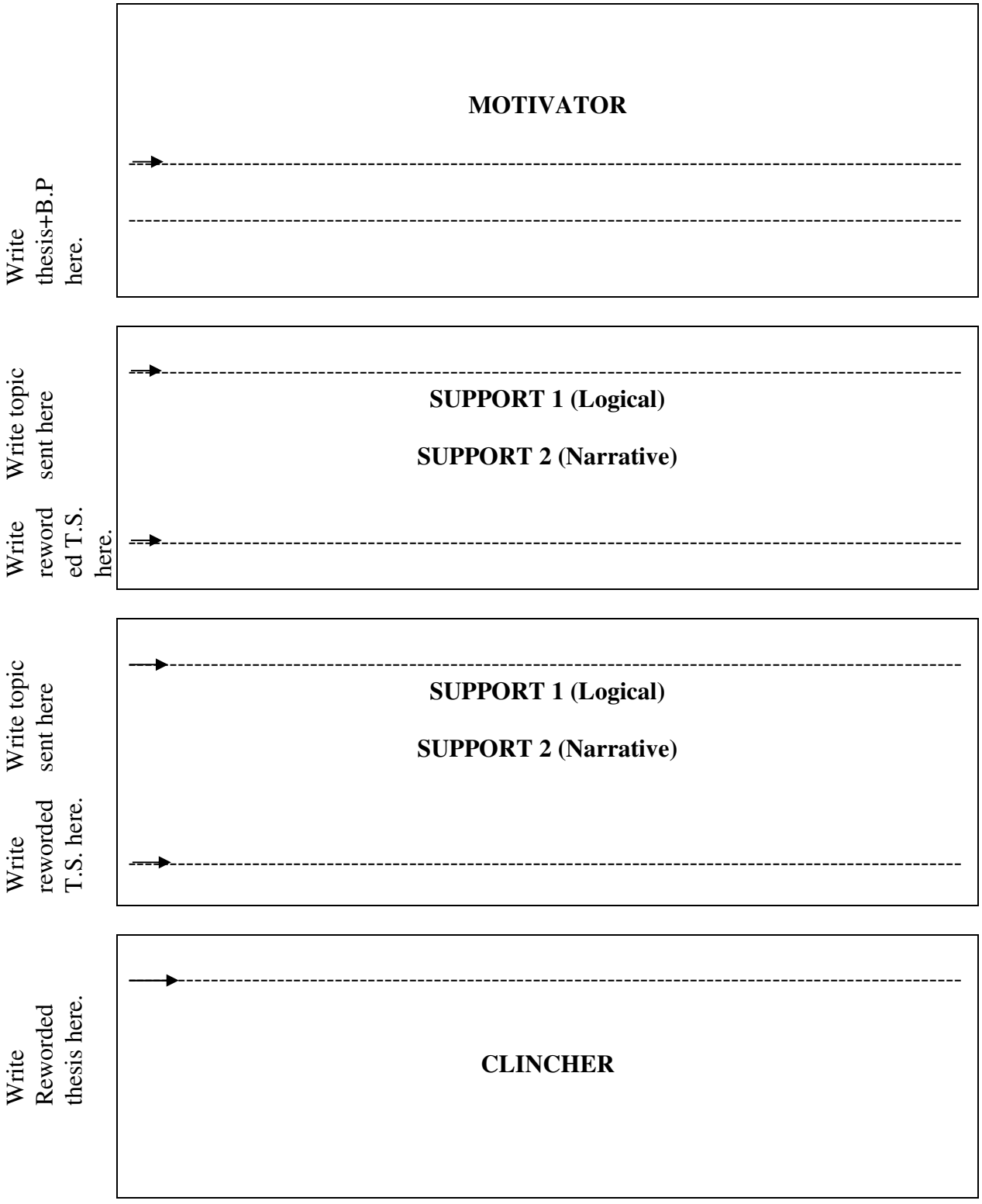
10. Note how the *introductory paragraph* starts. Do the beginning sentences attract your attention? Do they *motivate* you to read the rest of the essay? If yes, those sentences have done their job well. An essay must start with a few sentences that grab your attention. These sentences are called an *attention grabber, hook*, or *motivator*. The motivator gives the reader a reason to want to read your essay. Draw a line around the *motivator.*

11. Note how the *concluding paragraph* ends. Do final sentences leave a good impression with you? Is there a reference in them to the *motivator*? If yes, those sentences have done their job well. An essay must finish with one or more nice sentences referring to the *motivator* and also leaving a good impression with the reader. This last part of the concluding paragraph is called a *clincher.* Draw a line around the *clincher.*

12. Now look at the first body paragraph again. Does the writer provide support for the topic sentence? Draw a line around the sentences that support the topic sentence. Do these sentences answer a *how* question, a *why* question (both, or neither) to support the topic sentence? Explain.

13. Answer the same question about the second body paragraph.

Four-paragraph essay schema



Task 2: Writing activity

Let's work together to write a four-paragraph essay on the following topic:

It has recently been announced that a new movie theatre will be built in your neighbourhood. Do you agree or disagree with the idea of a movie theatre in your neighbourhood. Support your answer with reasons and examples.

Appendix F: Lesson Plan I Nov 9, 2011

Method: Direct strategy training- argumentation instruction
Group size: 15 students
Time required: Two hours
Materials: Handouts and task sheets for Session I
Sources:

Fulkerson, R. (1996). *Teaching the argument in writing*. Urbana, Ill: National Council of Teachers of English

Koch, C., & Brazil, J. M. (1978). *Strategies for teaching the composition process*. Urbana, Ill: National Council of Teachers of English.

Toulmin, S. E. (1958/2003). *The uses of arguments*. Cambridge: Cambridge University Press.

Goals

1. To show students how to provide support for their paragraphs
2. To identify the structure of an everyday argument based on Toulmin (1958/2003).
3. To provide graduated assistance within the group's zone of proximal development to move the learners toward self-regulation to identify and produce written arguments.
4. To generate ideas by way of argumentation.

Process:

1. Tell the class the objective of the lesson: to learn how to write support for their body paragraphs, to produce ideas that support the topic sentence and the thesis.
2. Add a refresher of the four-five paragraph essay format.
3. Ask if they already know *how* to provide support.
4. Tell the class they will be discussing argumentation as a way to provide support and produce ideas (argumentative support).
    - Ask if they can define an argument. To initiate the discussion, write on the board, "What is an argument? Discuss it with a partner and write a definition."
    - Make sure they distinguish between argument as quarrel and argument as reasoning (i.e., argumentative support). For argument structure, they should minimally come up with something such as a claim plus reasons justifying the claim.
5. Explain to class the importance of argumentation for support in academic reading and writing. Mention that even in science and technology, as well as humanities, the trustworthiness of the research findings largely depends on how reasonable the arguments are.
6. As an intro to the Toulmin introduce the basic syllogism (logical deduction), which is the basis of the Toulmin model (source?), do the following:
    - Ask them that they want to solve the following problem.
        - Ask that they write the answer on a piece of paper and NOT say it out loud. The problem:

- They know that Jack has a cat, but their problem is to find out what colour Jack's cat is.
- They also know that all cats in Jack's neighbourhood are black.
- Ask ALL the students in class to the explain their answers (testing Lauria's claim that syllogism is culture dependent).
- Write the following on the board.
    - What colour is Jack's cat?
    - To solve this problem, we have the following information
        a. Jack lives in neighbourhood X.
        b. All cats in neighbourhood X are black.
        c. Therefore, Jack's cat is black.
- Teach the following technical terms:
    Logical deduction
        a. Jack lives in neighbourhood X. (Data)
        b. All cats in neighbourhood X are black. (Warrant)
        c. Therefore, Jack's cat is black. (Claim)
- Explain what the warrant does. For someone who does not know that all cat's in neighbourhood X are black it provides a link, a warrant, to the data.

- Draw the Data→Warrant→Claim chart on the board.
- Explain that they are going to read about a more sophisticated form of argument structure.

7. Distribute sample argumentative essay in Task 1 and ask the students to identify its structure. Walk around the class and offer help if necessary. See if any pair of students is ready to share their findings and provide feedback as necessary.
8. After task 1 draw the expanded Toulmin model diagram:
    - Data→Warrant→backing→rebuttal→Response to rebuttal→qualification→claim restated
9. Go over the model answer in task 2.
10. Ask the students to write on any other topic of their choice (or assign a topic) and support their claim using Toulmin's model. Provide help as necessary.
11. Ask that the students start generating each element of the model one at a time. Draw a table on the board and encourage the student to ask questions that would provide the material for each part of the model.

Variation

- You can have the group write each element of the argument one at a time before moving on to the next so that the larger activity is broken down to smaller, more manageable ones. However, emphasize that the writing process is hardly linear and they become more advanced, they should not hesitate to cross the step boundaries to generate relevant ideas.

Session I handouts

Task 1.1: Read the following paragraph and discover the pattern of argumentative support used in it.

Use the following questions to help you discover the argument structure:

9. Underline the topic sentence of the paragraph. The topic sentence is the claim we want to support in the middle paragraphs.

10. Find an idea after the topic sentence that supports it by providing factual data for the topic sentence. Underline it. We will call it data (D) because it provides data for the claim in the topic sentence.

11. Find an idea after the data that justifies it by showing why the data (D) supports the topic sentence. Underline it. We will call it warrant (W) because it shows how the data is linked to the claim.

12. Find an idea after the warrant that supports or backs up (B) the warrant by showing how the warrant provides evidence for the data. We will call it backing (B).

13. Find an idea after the backing that presents what the opposite opinion is. We will call it rebuttal (R).

14. Find an idea after the rebuttal that is a response to the rebuttal. We will call this response to rebuttal (ResR).

15. Find a *word* that qualifies the claim by reducing its force. We will call this word qualification (Q) because it shows that we are not claiming our conclusion is 100% true in all situations.

16. Find a sentence that restates the claim in the paragraph. We call this the reworded topic sentence or the restated claim.

    Building a factory in my neighbourhood is a good idea. Factories built near residential areas bring employment to the area because residents prefer employment opportunities that reduce travel time. Indeed, time lost in commuting is a major complaint in many societies. Unless residents are from a high-income social class, who do not like industrial jobs, which is not the case in my area, my neighbours would probably want to work in the factory. For this reason, I would support the building of a factory in my area.

Task 1.2: Go over the elements of the argument below based on Toulmin (1958/2003). Present the function of each statement in the argument as below:

> Building a factory in my neighbourhood is a good idea (C). Factories built near residential areas bring employment to the area (D) because residents prefer employment opportunities that reduce travel time (W). Indeed, time lost in commuting is a major complaint in many societies (B). Unless residents are from a high-income social class who do not like industrial jobs (R), which is not the case in my area (ResR), my neighbours would probably (Q) want to work in the factory. For this reason, I would support the building of a factory in my area (ResC).

This model of argument was explained by Toulmin (1958/2003) as follows:

- **Data:** To support a **claim** (C), one needs to provide **facts** as **foundation** for the claim. He calls such facts the **data** (D).
- **Warrant:** The data do not always clearly show the link to the claim; thus, such **a link** should be provided explicitly, which he calls the **warrant** (W).
- **Backing:** The warrant also needs to be supported. To support the warrant, one needs to provide specific backing (B), which provides more facts and shows how the warrant (W) leads to the claim.
- **Qualification:** Because all warrants do not *necessarily* support the claim, a degree of *probability* is needed to reduce the force of the claim. He calls the degree to which data (D) warrant the claim (C) qualification (Q). Adverbs such as *probably* and *presumably* help qualify the claim.
- **Rebuttal:** An argument also needs to take into account what the opposition might say as a rebuttal (R). The rebuttal shows there might be exceptions to the argument.

Task 2:

Write another paragraph to support building a factory in your area. Use the Toulmin model, but develop a different idea.

Task 3:

Write a thesis statement that includes both your topic sentences.

Appendix G: Lesson Plan II Nov 16, 2011

Method: Direct strategy training- argumentation instruction, beginning the procedural facilitation instruction
Group size: 15 students
Time required: Two hours
Materials: Handouts and task sheets for Session II
Sources

Koch, C., & Brazil, J. M. (1978). *Strategies for teaching the composition process*. Urbana, Ill: National Council of Teachers of English.

Toulmin, S. E. (1958/2003). *The uses of arguments*. Cambridge: Cambridge University Press.

Goals

1. To review the Toulmin model, making sure each element can be identified.
2. Begin the procedural facilitation: students asking questions to generate the Toulmin model
3. To provide graduated assistance within the group's zone of proximal development to move the learners toward self-regulation to identify and produce written arguments.

Process:

1. Let the class know about the objective of the lesson: to help them "think on their feet" To produce argumentative content on the spot. To enhance their thinking processes.
2. Discuss the difference between a fact and opinion. Say that this is necessary so that they know the difference between Claim and Warrant on the one hand and Data and Backing on the other hand:

    a. Ask the class if they know what a fact is and what an opinion is.

    b. Write the following definitions from LDCE on the board:

    Fact (n): a piece of information that is known to be true→(adj) factual
    Opinion: your ideas or beliefs about a particular subject

    Read the following examples at random and ask if they can say if they are fact or opinion:

    Fact:

    a. *York University is located in Toronto, Canada.*
    b. *The Mona Lisa is by Leonardo da Vinci.*
    c. *A hand has five fingers.*

    Opinion:

    a. *That picture is beautiful.*
    b. *He is the best teacher in school.*
    c. *The German soccer team plays better than the Brazilian soccer team.*

3. Review the Toulmin model. Distribute pages 1and 2 and Lesson II handout.
4. Read or present the review of the model and ask the students to follow the schematic Toulmin chart (Handout 1, Figure 3.3) and answer the questions in Task 1 as they listen:

- Academic writing is generally about making an argument. To make an argument, you need to have a clear Claim, which consists of two parts: a topic and a main idea.
- To support the Claim, you need to provide Data. Data are facts that support the Claim. But providing facts or Data alone is not enough to support the Claim, so you need to show HOW your Data supports your claim. In other words, you need to show how your Data is linked to your Claim. To make this connection, you provide a Warrant. A Warrant establishes the connection between the Data and the Claim.
- Next, the Warrant itself may need to be further supported. To provide support for your Warrant, you MAY need to provide Backing. Backing like Data is a factual statement. As Data supports the Claim, Baking supports the Warrant.
- Next you need to show that you understand people may oppose your Claim, Data, Warrant, or Backing. You show this opposition in a Rebuttal. A Rebuttal states what the opposition says.
- Then, you need to show that the Rebuttal does not weaken your argument, so you need to provide a response the Rebuttal.
- Before you conclude, you need to show that you understand that your Claim may not be true 100% of the time. So, you need to qualify your Claim. This is called qualification.
- Finally, you restate your claim so that the reader remembers it well before leaving your text.

5. Go over the answers to Task 1:

- How can I write a good Claim? A good claim should have two clear parts a topic and a main idea.
- What does the Data do? It provides facts to support the Claim.
- What does the Warrant do? It shows how the Data is related/linked to the Claim.
- What does the backing do? It provides support for the Warrant.
- What does the rebuttal do? It acknowledges the opposite opinion.
- Why is a rebuttal necessary? To indicate that the writer is aware of opposition and prepare to respond to it.
- Why should the rebuttal be responded to? To indicate that it does not weaken the argument much.
- Why should there be a qualification? To acknowledge that the Claim is not absolute and can be challenged.
- Why should the Claim be restated? To make the Claim memorable.

6. Distribute Task 2 (People who go to college ...) and ask that they identify the

7. Distribute the key to Task 2.
8. Distribute Handout 2 (Blank Prompts Table (Table 3.2)) and draw the chart on the board. Ask the class to produce questions that would generate each component of the model. Write their responses on the board.
9. Distribute Handout 3(previously co-constructed prompts table (Table 3.1)) for their reference.
10. Assign the topic on page 7. Ask that they use the questions to generate the argument. Collect their assignments. Ask that they write in pen.
11. Ask how they found the use of the argument generating prompts.

Handout 1: Toulmin model Figure 3.3 provided to class. **"**How to provide support for your body paragraphs in argumentative writing. Look at the following model as the teacher reviews last week's lesson."

Handout 2: Blank Prompts Table (Table 3.2) provided to class.
Handout 3: Previously co-constructed prompts table (Table 3.1) provided to class.

Task 1: Listen to the teacher reviewing the Toulmin model of argument and as you listen take notes to answer the following questions:

- How can I write a good Claim?
- What does the Data do?
- What does the Warrant do?
- What does the Backing do?
- What does the Rebuttal do?
- Why is a Rebuttal necessary?
- Why should you respond to the Rebuttal?
- Why should you qualify your Claim?
- Why should the Claim be restated?

Task 2: Read the following paragraph and identify the elements of argument in it.
Adapted from:
http://www.grinnell.edu/files/downloads/Analyzing_arguments_using_Stephen_Toulmins_scheme.pdf

> People who go to college are generally smart. We know that people who go to college are smart because getting into college requires high test scores and excellent high school performance, both of which are evidence for intelligence. This is true because high marks and good performance have been statistically correlated with intelligence. Those who disagree may argue they have met college students who did not appear smart; however, it must be recognized that almost everyone has met individuals who do not act as intelligently as expected, but those examples cannot outweigh the evidence of consistently high test scores and years of good school performance. This leaves the general impression that college students are by and large smart.

Use the following questions (if necessary) to help you discover the argument structure:

1. Underline the topic sentence of the paragraph. The topic sentence is the claim we want to support in the middle paragraphs.
2. Find an idea after the topic sentence that supports it by providing base-line data for the topic sentence. Underline it. We will call it data (D) because it provides base-line data for the claim in the topic sentence.
3. Find an idea after the data that justifies it by showing why the data (D) supports the topic sentence. Underline it. We will call it warrant (W) because it provides warrant or justification for the data.
4. Find an idea after the warrant that backs up (B) the warrant by showing how the warrant provides evidence for the data. We will call it backing (B).
5. Find an idea after the backing that presents what the opposition might say. We will call it rebuttal (R).
6. Find an idea after the rebuttal that is a response to the rebuttal. We will call this response to rebuttal (ResR).
7. Find a word that qualifies the claim by reducing its force. We will call this word qualification (Q) because it shows that we are not claiming our conclusion is 100% true in all situations.

8. Find a sentence that restates the claim in the paragraph. We call this the reworded topic sentence.
   Task 2 key Suggested answer:

   People who go to college are generally smart (C). We know that people who go to college are smart because getting into college requires high test scores and excellent high school performance (D), both of which are evidence for intelligence (W). This is true because high marks and good performance have been statistically correlated with intelligence (B).Those who disagree may argue they have met college students who did not appear smart (R); however, it must be recognized that almost everyone has met individuals who do not act as intelligently as expected, but those examples cannot outweigh the evidence of consistently high test scores and years of good school performance (ResR). This leaves the general impression that college students are by and large smart (CR).

Task 3: What questions can you ask yourself to generate the different parts of the argument [on the blank prompt sheet]? Write the questions in each column of the blank prompts table. [Handout 2: Blank Prompts Table (Table 3.2) provided to class.). Handout 3 (previously co-constructed prompts table, Table 3.1, was provide to class after the activity)]

Task 4:

Write one paragraph following the Toulmin Model on the following topic:

Do you agree or disagree with the following statement? Grades (marks) encourage students to learn. Use specific reasons and examples to support your opinion.

Appendix H: Lesson Plan III Nov 23, 2011

Method: Direct strategy training- argumentation instruction practice, continuing the procedural facilitation
Group size: 15 students
Time required: Two hours
Materials: Handouts and Task Sheets for Session III.
Sources

Koch, C., & Brazil, J. M. (1978). *Strategies for teaching the composition process*. Urbana, Ill: National Council of Teachers of English.

Toulmin, S. E. (1958/2003). *The uses of arguments*. Cambridge: Cambridge University Press.

Goals

1. Procedural facilitation: to present the cue cards for argument generation in an interventionist DA framework
2. Introducing languaging
3. To review the Toulmin model, making sure each element can be identified.
4. Continue the procedural facilitation: students asking questions to generate the Toulmin model with prompts
5. To provide graduated assistance within the group's zone of proximal development with the prompts (artifact-mediation) to move the learners toward self-regulation to identify and produce written arguments.

Process:

1. Let the class know that this lesson builds on the previous lesson to help them think quickly about the argument structure, to produce ideas for an argumentative essay on the spot.
2. Remind them of the difference between fact and opinion for the Data and Backing component of the essay (facts) and warrant and claim (opinion).
3. Elicit the following (from LDCE and Knat's a priori and analytic propositions)

   Fact (n): a piece of information that is known to be true→(adj) factual. This fact may be based on their experience of the world (a priori and analytic propositions Kant)
   Opinion: your ideas or beliefs about a particular subject. This is something that is not directly relevant to their experience of the world.

   Read the following examples at random and ask if they can say if they are fact or opinion:

   Fact:

   a. *Washington DC is the capital of America.*
   b. *Spain won the 2010 Soccer World Cup.*
   c. *Canada has a population of about 31 m.*

Opinion

d. Cars should use electric power instead of gasoline.
e. The cause of global warming is that the world's forests are being cut down.
f. The best way to learn English is to learn a lot of grammar

4. Distribute Handout 1 (Fig 3.3., Toulmin Model). Review the Toulmin model. Cover the following points:

- To make an argument, you need to have a clear Claim, which consists of two parts: a topic and a main idea.
- To support the Claim, you need to provide Data. Data are facts that support the Claim. Facts are usually based on your experience of the world.
- To link your Data to your Claim you need a Warrant. A Warrant shows how the Data is connected to the Claim.
- To provide support for your Warrant, you MAY provide Backing. Backing like Data is a factual statement (based on your experience of the world) that supports the Warrant.
- But, people may disagree with your Claim, Data, Warrant, or Backing.
- You show this opposition in a Rebuttal. A Rebuttal states what the opposition says.
- Then, you respond to the rebuttal to show that the rebuttal does not weaken your argument.
- You need to show that you understand that your Claim may not be true 100% of the time. So, you need to qualify your Claim. This is called qualification.
- Finally, you restate your claim with qualification to show that your Claim may not be true 100% of the time.

5. Distribute Task 1 and ask that they identify the components of the model:
6. Distribute the key to Task 1.
7. Distribute the think-sheets (See Appendix C) (the argument generation question prompts and blank boxes).
8. Review the prompts with them and ask if they have questions. Let them know they will be using the blank pages to generate the contents of an argument.
9. Assign the Task 2topic. Ask that they use the questions on the think-sheets to generate the argument.
    a. Ask that they freewrite the answers in the top portion of the box. They should not worry about grammar or words.
    b. Ask they write a final version of the answer to each prompt in the bottom portion of the box. Now they fix their first versions for grammar and vocabulary.
    c. Ask that they transfer the final version to the assignment sheet. Instruct them to feel free to revise the sentences, add to them, or delete them.

10. Collect their writing. Ask that they write in pen.
11. Ask how them to write on the back of the assignment sheet how they found the use of the argument generating prompts and how it compares to last week.

Handout 1: Toulmin model Figure 3.3 provided to class. **"**How to provide support for your body paragraphs in argumentative writing. Look at the following model as the teacher reviews last week's lesson."

Handout 2: The think-sheets (Appendix C).
Handout 3: Previously co-constructed prompts table (Table 3.1)

Task 1: Read the following paragraph and identify the elements of argument in it.

Adapted from http://schlbus.belmont.edu/english/pdf/Argument.pdf

Prozac, a drug used to treat depression, has done more harm than good. Violent behaviors, including murder and suicide, have been directly linked to Prozac use. Many doctors and patients blame Prozac for terrible side-effects and mind-altering experiences. They support their claim by showing correlations between taking Prozac and extreme behaviour. Therefore, while the drug may be useful in isolated cases, much medical evidence suggests that Prozac is potentially dangerous to one's mental and physical well-being, and should presumably be banned from use to treat depression.

Use the following questions (if necessary) to help you discover the argument structure:

1. Find the Claim in the topic sentence.
2. Find the sentence that provides Data (factual support or evidence) for the Claim.
3. Find the sentence that provides the Warrant for the Data. It provides justification for the Data. The Warrant links the Data to the Claim.
4. Find a sentence that backs up (B) the Warrant by showing how the Warrant provides evidence for the data. We will call it backing (B).
5. Find an idea after the backing that presents what the opposition might say. We will call it rebuttal (R).
6. Find an idea after the rebuttal that is a response to the rebuttal. We will call this response to rebuttal (ResR).
7. Find a word that qualifies the claim by reducing its force. We will call this word qualification (Q) because it shows that we are not claiming our conclusion is 100% true in all situations.
8. Find a sentence that restates the claim in the paragraph. We call this the reworded topic sentence.

Task 1 key suggested answer:

Adapted from http://schlbus.belmont.edu/english/pdf/Argument.pdf
Prozac, a drug used to treat depression, has done more harm than good (C). Violent behaviors, including murder and suicide, have been directly linked to Prozac use (D). Many doctors and patients blame Prozac for terrible side-effects and mind-altering experiences (W). They support their claim by showing correlations between taking Prozac and extreme behaviour (B).

Therefore, while the drug may be useful in isolated cases (R), much medical evidence suggests that Prozac is potentially dangerous to one's mental and physical well-being (ResR), and should presumably be banned from use to treat depression (CR).

Task 2:

Write one paragraph following the Toulmin Model on the following topic:

Do you agree or disagree with the following statement? Parents should make important decisions for their older (15-18 year-old) teenage children. Use specific reasons and examples to support your opinion.

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Appendix I: Lesson Plan IV, Part 1 Nov 30, 2011

Method: Direct strategy instruction to identify discourse schema for an essay
Group size: 15 students
Time required: Two hours
Materials: Handouts for lesson IV
Sources:

Koch, C., & Brazil, J. M. (1978). *Strategies for teaching the composition process*. Urbana, Ill: National Council of Teachers of English.

Toulmin, S. E. (1958/2003). *The uses of arguments*. Cambridge: Cambridge University Press.

Goals

1. To expand the Toulmin model from a single paragraph to an essay
2. To emphasize that a rebuttal is necessary.
3. To provide mediation (artifact and self) to identify elements of model.

Process:

1. Begin the class by stating that you reviewed their last week writing, that they are good, but most did not include a rebuttal. Then present the following about a rebuttal:

   Adapted from http://owl.english.purdue.edu/owl/resource/588/3/

   - *Don't avoid the opposite side of an argument.*
   - *Instead, include the opposite side as a rebuttal.*
   - *Find out what the other side is saying and respond to it in your own argument.*
   - *This is important so that your readers do not change their view by weak arguments.*
   - *If you include a rebuttal and respond to it, you find more common ground with your readers.*
   - *It also makes you look more credible because you appear to be knowledgeable about the overall debate rather than just being biased or uniformed.*
     - *You may want to include several counterclaims to show that you have thoroughly researched the topic.*
2. Assign Task 1 (Hybrid cars jigsaw reading) to order the sentences and paragraphs and identify elements of the Toulmin model, .
   a. Cut up each paragraph on the handout into sentences. Print each paragraph in a different colour, and ask that they put each paragraph in the correct order.
   b. Give each group four paragraphs: the introduction, one middle paragraph, the rebuttal paragraph, and the concluding paragraph. Because there are three middle paragraphs, divide the class into three groups of relatively equal ability.
      i. Consider the following distribution of students:

Group 1	Group 2	Group 3
Max	Chelsea	Ian
Jay	Sibley	Majid
Wanda	Mohammad	Natalie
Zena	Ellen	Peter
Linda	Zak	Alexandra

	Group 1	Group 2	Group 3	Colour
Intro	Par1	Par1	Par1	Purple
Claim +support	Par2	Par3	Par4	Yellow
Rebuttal	Par5	Par5	Par5	Green
Conclusion	Par6	Par6	Par6	Orange

c. Let them know they can use the handouts from last week (The Toulmin model chart, Figure 3.3.)
d. Ask that they order the sentences and the three paragraphs.
e. Walk around the room and provide mediation as appropriate.

3. Give them the answer key to each group (Handout page 1).
4. Go to the next lesson plan (Modeling thought through freewriting by students and freewriting/languaging by instructor)

Task 1 (Hybrid cars colour-coded jigsaw reading) with key incorporated

Hybrid cars combine a gasoline engine with a battery-powered electric motor. Using hybrid cars is an effective strategy to fight air pollution.

Hybrid cars reduce air pollution because driving a private car is a typical citizen's most air polluting activity (Claim + Data). Driving hybrid cars can have a large impact on fighting pollution since cars are the largest source of pollution produced by a private individual (Warrant). A look at the busy highways and city streets during the rush hour confirms the contribution of private cars to air pollution. (Backing)

The second reason concerns the fact that cars generally have a long lifespan (Claim + Data). Each vehicle that is produced will stay on the road for approximately 12 to 15 years (Data). This means that using a hybrid car will have a long-term effect on pollution levels (Warrant).A quick survey of the cars on Toronto streets, for example, indicates a large number of old cars are still running in the city, and they are a source of pollution. (Backing)

Furthermore, because hybrid cars run on both gasoline and electric power, this combination of technologies means that less pollution is produced (Claim+ Data). The vehicle can switch between gas and electricity, so its exhaust does not always release pollutants (Warrant). According to sources [look this up later], some hybrid cars produce 90 percent fewer harmful emissions than a comparable gasoline engine (Backing). If one adds up the reduced amount of pollution for all hybrid cars on the road, it will result in a large reduction of air-pollution due to private cars (Support for the Backing).

On the other hand, some argue that focusing on cars encourages a culture of driving even if it reduces pollution (Rebuttal).They suggest a country should focus on building and encouraging the use of public transit systems instead of cars (Reason for the rebuttal).Although using mass transit is an environmentally-friendly idea that should be encouraged, it is not possible in many

suburbs and rural areas (Response to rebuttal). Also, it may not be useful for people who must drive a car as part of their job (Another response to rebuttal).

In summary, hybrid cars seem to be a reasonable solution to the air pollution problem.

Appendix J: Lesson Plan IV, Part 2 (Used in Session V, too)

Method: continuing the procedural facilitation; freewriting and focused freewriting, modelling though
Group size: 15 students
Time required: 1:30
Materials and equipment: Board or flipchart, OHP or LCD projector connected to a computer, audio and video recorders (in all sessions). Handouts and task sheets for Session IV.

Sources

Cumming, P. (1977). Beginning II: Freewriting. In J. S. Brown (Ed.), *Freewriting! A group approach toward a new and simple method of learning and teaching writing* (pp. 6-8). Rochelle Park, N.J: Hayden Book Co.

Elbow, P. (1973). *Writing without teachers.* New York: Oxford University Press.

Elbow, P. (1981). *Writing with power: Techniques for mastering the writing process*. New York: Oxford University Press.

Koch, C., & Brazil, J. M. (1978). *Strategies for teaching the composition process*. Urbana, Ill: National Council of Teachers of English.

Goals

1. To generate content freely without concern for grammar and vocabulary and to demonstrate that they can still write with the amount of grammar or vocabulary they know.
2. To learn that freewriting has been shown to help with the writer's block (the feeling that you have nothing to say or are too afraid to start writing).
3. To have the students free-write, to get around the writing apprehension that gets in the way of idea production.

Process

1. Explain to the group the goals of the process- to prime the pump, to practice fluency, to generate ideas.
2. Present the requirements of freewriting: write non-stop about *anything* that comes to mind, no revision or editing for grammar, mechanics, etc. no going back over text produced so far, when stuck, say, "I am going to come up with an idea" till you do, write for 10 minutes, write for yourself and no other audience. Emphasize to them that they *always* know more than they think.
3. Demonstrate freewriting by doing so on the board, overhead transparency, or computer screen connected to a computer for 5 minutes or as long as you feel you have the group's attention, but not more than 10 minutes. You are their "mastery model" here.
4. Ask the whole class to start freewriting for 10 minutes. Walk around the room. If you notice someone is stuck, say, "Keep writing, please." If they respond, "I have nothing to say", ask that they keep writing, "I am going to come up with an idea," till they do.

5. If they ask you for a word, ask them to think of any other word, phrase, or sentence that means a similar thing. If they cannot think of anything, they can use the equivalent in their L1 or leave a blank for the word.
6. Collect their writing and read them all to have a sense of their ability to write, but do not respond to this piece of freewriting at all as it will defeat the purpose.
7. In another part of the class (after a break, for example) have a volunteer to do freewriting in front of a class. He or she will be their "coping model."

Variation

8. If there is time, you may want to assign a topic (Task 2) to do focused freewriting and ask them to follow the same directions as above. Distribute the handouts on the prompts to generate ideas. They should also incorporate the prompts in their freewriting: this would be the procedural facilitation incorporated into modeling thought.
    a. Model this for them first with the prompts (mastery model).
    b. Ask the students give you a topic to write on.
    c. Then ask if anyone can volunteers to do (coping model).

Task 1: (Repeated for Session V)

Write freely for ten minutes about anything that comes to mind. There is no rule, except that you should never stop. If you don't have an idea simply write, "I have no idea, but an idea will come to me soon" or something like that. If you don't know a word, leave a blank space for it, or write it in your language. DO NOT ERASE ANYTHING. Please use a pen. If you need more paper please ask.

Task 2 (for Session IV):

Follow these steps:

3. Free-write one paragraph for 10 minutes following the Toulmin Model on the following topic. Do not stop writing. If you have no ideas, use the prompts to help you create ideas. Never stop writing. If you don't remember a word, write it in your language, or leave it blank (-------).
4. After freewriting for 10 minutes, write your final draft (one paragraph only). Feel free to change any of the ideas in freewriting. You can also change any sentences, words, etc. to make your paragraph better.

The expression "Never give up" means to keep trying and never stop working for your goals. Do you agree or disagree with the following statement? Use specific reasons and examples to support your opinion.

Handout: Prompts to generate ideas

Here is my claim (agree/disagree). My topic is …. My opinion is ….
……
The reason I think so is based on these facts (data)
……
These facts support my claim because (warrant)
……
These other facts support my warrant (backing)
……
But people may disagree. They may say (rebuttal)
……
But here is my response to those who disagree
……
So, my claim is presumably true
……

Task 1 (for Session V):

Write freely for ten minutes about anything that comes to mind. There is no rule, except that you should never stop. If you don't have an idea simply write, "I have no idea, but an idea will come to me soon" or something like that. If you don't know a word, leave a blank space for it, or write it in your language. DO NOT ERASE ANYTHING. Please use a pen. If you need more paper please ask.

Task 2 (for Session V):

Follow these steps:

5. Free-write ONE paragraph for 10 minutes following the Toulmin Model on the following topic. Do not stop writing. If you have no ideas, use the prompts to help you create ideas. Never stop writing. If you don't remember a word, write it in your language, or leave it blank (-------).
6. After freewriting for 10 minutes, write your final draft (one paragraph only). Feel free to change any of the ideas in freewriting. You can also change any sentences, words, etc. to make your paragraph better. Do NOT transfer the prompts to the final copy.

Do you agree or disagree with the following statement? Businesses should do anything they can to make a profit. Use specific reasons and examples to support your position.

Toulmin model of argument (adapted from Scanlon, 2006):
This is my claim (C), because _____ (D), [and] since _____ (W), because _____(B); however, the opposition argues _____ , because _____(R), A response is _____ (ResR). Therefore, X is probably (Q) the case (ResC).

Prompts to generate ideas. Please use these prompts in your freewriting. Use them to generate ideas only. Do not transfer them to your final copy.

1. Here is my claim (agree/disagree). My topic is …. My opinion is ….
2. The reason I think so is based on these facts (data),
3. These facts support my claim (data)
4. These facts support my claim because (warrant)
5. These facts are related to my claim because (warrants)
   - *If* these facts (data) are true, *then* the claim is true because …. (If … then …)
   - My data *cause* my claim to be true because … (cause→effect)
   - My data is linked to my claim true because it is *similar* to … (a comparison)
6. These other facts support my warrant (backing)
7. But people may disagree. They may say (rebuttal) …
8. But here is my response to those who disagree …
9. But this argument is not strong because …
10. So, my claim is presumably true.

Appendix K: Lesson Plan V Dec 7, 2011

Method: Direct strategy instruction to identify discourse schema for an essay
Group size: 15 students
Time required: Two hours
Materials: Handout for lesson V
Sources:

Corbett, E. P. J. (1990). *Classical rhetoric for the modern student* (3rd ed.). New York: Oxford University Press.

http://www.ets.org/Media/Tests/TOEFL/pdf/989563wt.pdf

Goals

1. To alert students to the argument errors they made on their last classroom writing activity
2. To expand the Toulmin model from a single paragraph to an essay
3. To emphasize that a rebuttal is necessary.
4. To provide mediation (artifact and self) to identify elements of model.
5. Administration:
    a. Identify the students for interview and schedule appointments (Dec. 21?)
    b. Confirm the TAP appointments with the other three candidates

Process:

1. Give feedback to the students on the types of errors they made on their last paragraph writing activity (Never give up topic). Discuss the following:
    a. Confusing freewriting with paragraph writing or essay writing (topical writing).
        i. With freewriting you write ALL that goes through your mind 100%.
        ii. Use freewriting to prepare for paragraph writing or essay writing, but NEVER transfer all of your freewriting to your final draft. Only choose the ideas that are related to the topic.
        iii. During freewriting, whenever you use the prompts copy the prompts in your freewriting, but DO NOT transfer the prompts to your paragraph or essay.
            - Make sure they understand what you mean by prompts: show them the prompts they used last week.
    b. Always make a claim at the beginning of all middle paragraphs:
        i. It is the case the X is Y (X=topic; Y=opinion)
        ii. Repeat the topic and opinion in your essay
    c. Ask that they make sure they always have the opposite opinion (rebuttal) and the response to rebuttal
        - Make sure they understand “rebuttal.”
        - Ask someone to say what “rebuttal” means.
        - Write on the board “rebuttal=opposite opinion”

- Make sure they understand “response to rebuttal.”
- Ask someone to define “ response to rebuttal.”
- Write on the board “response to rebuttal=response to opposite opinion.”
- Then repeat the following about a rebuttal:
- Adapted from http://owl.english.purdue.edu/owl/resource/588/3/
    - ❖ Don't avoid the opposite side of an argument.
    - ❖ Instead, include the opposite side as a rebuttal.
    - ❖ Find out what the other side is saying and respond to it in your own argument.
    - ❖ This is important so that your readers do not change their view by weak arguments.
    - ❖ If you include a rebuttal and respond to it, you find more common ground with your readers.
    - ❖ It also makes you look more credible because you appear to be knowledgeable about the overall debate rather than just being biased or uniformed.
    - ❖ You may want to include several counterclaims to show that you have thoroughly researched the topic.

2. Give them Task , the jigsaw reading activity to analyze an argument with a rebuttal
3. Let them know that they each have three paragraphs: intro, body, and conclusion.
4. Let them know they all have a different middle paragraph, and in total there are six paragraphs.

    a. Cut up each paragraph on the handout into sentences. Print each paragraph in a different colour. Ask that they put each paragraph in the correct order.
    b. Give each group four paragraphs: the introduction, one middle paragraph, the rebuttal paragraph, and the concluding paragraph. Because there are three middle paragraphs, divide the class into three groups of relatively equal ability.
        i. Consider the following distribution of students:

Group 1	Group 2	Group 3
Max	Chelsea	Ian
Jay	Sibley	Natalie
Wanda	Mohammad	Peter
Zena	Ellen	Alexandra
Zak		

	Group 1	Group 2	Group 3	Colour
Intro	Par1	Par1	Par1	Purple
Claim +support	Par2	Par3	Par4	Yellow
Rebuttal	Par5	Par5	Par5	Green
Conclusion	Par6	Par6	Par6	Orange

    c. Let them know they can use the handouts from last week (The Toulmin model chart, Figure, 3.3)

   d. Ask that they order the sentences and the three paragraphs.
   e. Walk around the room and provide mediation as appropriate.

5. Give them the answer key to each group (Handout page 1).
6. Go to the next lesson plan (Modeling thought. See Session IV, Part 2) Assign Tasks 2 and 3.

Task 1 (Hybrid cars colour-coded jigsaw reading) with key incorporated Adapted from http://www.belmont.edu/english/pdf/Writing%20an%20Argument.pdf

Chain gangs are a group of prisoners who are chained together while they perform hard labour. Chain gangs used to exist in American prisons, but not anymore. Currently, there is an argument that is made to reintroduce chain gangs in the American prison system (Thesis).

Advocates of chain gang believe that the American prison system is in serious need of reform (C). They argue that prisons are no longer places of punishment and reform, but are places where prisoners can receive free medical care, free college education, and even yoga classes (D). The facilities the prisoners enjoy are not the punishment that they deserve for their crimes (W). Chain gangs, when executed humanely, can prevent crime by making the prison experience more unwelcoming (B).

Another argument for reintroducing chain gangs is that those who leave the current prison systems can commit crimes again (C). They are called repeat offenders (D).They continue with a life of crime because their experience in prison was not severe enough (W). Some of these people do not think twice about committing a crime because their punishment was too soft (B1). They may think if they are caught again, the punishment will not be very severe (B3). However, with chain gangs, criminals can see the difficult future that awaits them if they commit a crime (ResC).

Third, putting prisoners in chains can make them think of the old times, when people were tortured in prisons (C). Of course, there will be no torture in modern prisons (D), but the similarity between the images of the old, dark prisons of the past and modern chain gangs can frighten people so that they think twice about committing a crime (W). Psychological research has shown the link between the fear of punishment and the reduced possibility of committing a crime (B). Frightening people out of the possibility to commit a crime can be an effective strategy to control crime (ResC).

The opponents of chain gangs believe this is a form of cruel and unusual punishment. They argue that chaining human beings together violates their civil rights. They believe the prisoners' dignity should always be maintained (R). However, because convicts made the community suffer, chain gangs can offer some kind of restitution to the victims and may also play an important part in rehabilitating criminals by putting them to work. Of course, chain gangs should be practised humanely without abusing the prisoners (ResR).

Therefore, it seems the merits of reintroducing chain gangs outweigh its drawbacks (CR) despite what the opposition might argue.

Restitution*: the act of giving back or of paying for a crime*

Rehabilitate: *to help someone to live a healthy, useful, or active life again after they have been in prison*

Appendix L: Lesson Plan VI Dec 14, 2011

Method: Pecedural facilitation with prompts
Group size: 15 students
Time required: Two hours
Materials: Handout for lesson VI

Sources:

http://www.ets.org/Media/Tests/TOEFL/pdf/989563wt.pdf

Goals

1. Give feedback on participants' prompt-mediated paragraph written in Session V, specifically on
    a. Not transferring the prompts to the final draft
    b. Providing a warrant
    c. Providing a rebuttal
2. Students write a full essay mediated by prompts and the instructor
3. Administration Confirm the TAP sessions with the four participants
4. Give the post-instruction assessment survey

Process:

1. Begin by class by saying the following:
    a. Congratulations on a job well done toward improving your writing
    b. I carefully read all of paragraphs last week and want to give you some feedback.
    c. First, I want to say that you are doing very well with thinking critically to write an argument to support a claim. Well done everyone! Give yourselves a big round of applause.
    d. There are two areas that I want to specifically focus on:
        i. How to use the prompts. Ask if they know what prompts are. If nobody volunteers, give the following definitions,
            - "Prompts are thinking tools. You say them or write them to remember or create what you want to write next. They are informal and are not suitable for formal writing."
        ii. How to write a warrant
        iii. How to write a rebuttal
    e. because even when some of you who wrote well, you still need help with these areas.
    f. Very quickly: remember the following:
        i. the prompts go only in your FIRST draft. They are thinking tools. They are informal. They are not academic enough for your final draft.
        ii. Remember that the warrant links the data (or facts) to your claim. You should always demonstrate how your data or facts are related to your claim.
        iii. To write a rebuttal follow these steps:

- Say what the opposition may say
- Say why he or she says so
- And then respond to it

2. *Task 1-Feedback: Deleting prompts, adding warrant*- Hand out student's paragraph with prompts carried over to the final draft and the revisions. Ask that students compare the drafts. Mediate the process by asking the questions on the handout to make them "notice" the additions and deletions. The objective is for them to see
    i. what the prompts can be replaced with
    ii. how to write a warrant
    a. Follow the directions on the handout. The answers to the questions are indicated in a different font.
    b. Let them notice they can delete the sentences that do not add to the argument
    c. Alert them to the writing frame to write a warrant at the bottom of Task 1: "How to think about the warrant? My data is related to the claim because ...."
3. *Task2- Feedback: Adding a rebuttal*- Hand out student's paragraph (without an explicit rebuttal) and the revised version with an explicit rebuttal. The objective is that they know the rebuttal must be explicit (direct and clear)
    a. Follow the directions on the handout
    b. Direct them to the writing frames at the bottom of the Task 2: "How to think about the rebuttal? Those who disagree claim .... They say this because ...."
4. Present the prompts for a five paragraph essay. Explain that these prompts help to create content for a complete essay. An introduction, two paragraphs in favour of the thesis, one paragraph as a rebuttal, and one paragraph for the conclusion.
5. *Task3*- Assign the writing task in the handout. Time 45 minutes.

Task 1- practise with revisions and warrants:

With a partner, compare the following drafts of the same paragraph written by your classmate (and edited by your teacher) and answer the questions that follow.

First draft with the prompts included:

Here is my claim. My topic is I agree businesses should do anything they can to make a profit. **My opinion is** if people want to do business, their first goal is profit. **The reason I think so is that** many businessmen can do any logical thing to keep their profit. **These facts support my claim** because businessmen just want profit for their business, as sportsmen want to win games. **These other facts support my warrant.** Many people also do illegal things to keep their profit at any time. **But people may disagree**. **They may say** businesses should take care of people and not just money. **But this argument is not strong** because looking after profit means responsibility to a company, and businessmen should be held responsible to make a profit for their company. So, my claim is presumably true.

- What are the prompt words?

Task1-Second draft: revised with the prompts deleted:

Businesses should do anything they can to make a profit. If people want to do business, their first goal is profit. A look at the business world shows that business people do any logical thing to keep their profit. As sports people want to win, business people want to make a profit. Also, many people do illegal things to keep their profit at any time. Those who disagree argue that businesses should take care of people and not just money. However, this argument is not strong because looking after profit brings responsibility to a company, and businessmen should be held responsible to make a profit for their company. Therefore, it is presumably the case that businesses should do all they can to make a profit.

- What are the words that are deleted?

Task1-Third draft: revised with warrant added and a sentence moved.

Businesses should do anything they can to make a profit. A look at the business world shows that business people do any logical thing to keep their profit. *Because they want to remain competitive, businesses should do all they can to make a profit.* Then, if people want to do business, their first goal should be profit. As sports people want to win, business people want to make a profit. Also, many people do illegal things to keep their profit at any time. Those who disagree argue that businesses should take care of people and not just money. However, this argument is not strong because looking after profit means responsibility to a company, and businessmen should held be responsible to make a profit for their company. Therefore, it is presumably the case that businesses should do all they can to make a profit.

- What is the warrant?
- What is the sentence that is moved?

Task1-Fourth draft with labels and deleting extra sentences

Businesses should do anything they can to make a profit (C). A look at the business world shows that business people do any logical thing to keep their profit (D). Because they want to remain competitive, businesses should do all they can to make a profit (W). ~~Then, if people want to do business, their first goal should be profit~~. As sports people want to win, business people want to make a profit (B). ~~Also, many people do illegal things to keep their profit at any time~~. Those who disagree argue that businesses should take care of people and not just money (R). However, this argument is not strong because looking after profit brings responsibility to a company, and businessmen should be held responsible to make a profit for their company (ResR). Therefore, it is presumably the case that businesses should do all they can to make a profit (ResC).

- What are the sentences that are deleted?

Please note the following prompts:

How to think about the warrant?

My data is related to the claim because ……

Task 2-practise with rebuttals:

With a partner, compare the following drafts of the same paragraph and answer the questions that follow.

First draft without an explicit (clear and direct) rebuttal:

I disagree with the statement that a business should do anything to make a profit. If a business loses morality in order to make money, it will fail. Now, many companies use a lot of immoral methods to make money. They will not say how they make their product, but they like to say how others' products are bad. These companies will eventually fail because they are too busy to improve their own product. Only after a business has earned the customers' trust, will customers be willing to buy its products. Although some businesses can make money in a bad way, it cannot remain so for a long time. Once people know that, nobody will buy their product and they have to close. So, I think it is perhaps a bad idea to do anything they can to make a profit.

- **Is there an explicit (clear and direct) rebuttal?**
- **Is there a response to rebuttal?**

Task 2-Second draft with an explicit rebuttal:

I disagree with the statement that a business should do anything to make a profit. If a business loses morality in order to make money, it will fail. Now, many companies use a lot of immoral methods to make money. They will not say how they make their product, but they like to say how others' products are bad. These companies will eventually fail because they are too busy to improve their own product. Only after a business has earned the customers' trust, will customers be willing to buy its products. Some argue that businesses should only try to make money. They claim this because doing business is competitive. However, when people know that businesses do bad things, they will not buy their products, and these businesses have to close. So, I think it is perhaps a bad idea for a business to do anything to make a profit.

- **Is there an explicit rebuttal?**
- **Is there a response to rebuttal?**

Please not the following prompts:

How to think about the rebuttal?

Those who disagree claim …….
They say this because ……

How to think about the response to rebuttal?

However, here is my response ……..
I say this because ……..

Task 3

Write an essay of five paragraphs on the following topic.

Do you agree or disagree with the following statement? A person should never make an important decision alone. Use specific reasons and examples to support your answer.

Please follow these steps:

- Write freely on this topic non-stop for five minutes. This is your brainstorming session.
- Do not use a dictionary or any other tools. Treat it like an exam.
- After freewriting for five minutes, use the prompts provided to write the essay. You can ask the teacher for help if you need it.
- Please use a pen only.
- Use the paper provided only.

Prompts to generate ideas

Please use these prompts in your essay writing. Use them to generate ideas only. Do not transfer them to your final copy. *Please state the number of the prompt you use to come up with an idea.*

Toulmin model of argument (adapted from Scanlon, 2006):
This is my claim (C), because _____ (D), [and] since _____ (W), because _____(B); however, the opposition argues _____ , because _____(R), A response is _____ (ResR). Therefore, X is probably (Q) the case (ResC).

- **Paragraph one** (introduction): thesis + preview
  - Here is my claim (agree/disagree. My topic is … My opinion is … My preview is …
    …….. (thesis + preview)
- **Paragraph two**: Claim, Data, Warrant, Backing, Claim Restated. Write one or two sentences for each part (minimum six sentences for the paragraph)
  2. My first claim is (C)……
  3. These facts support my claim (D)
  4. The reason I think so is based on these facts (D)……
  5. These facts support my claim because (W) ……
  6. These facts are related to my claim because (W)
     a) *If* these facts (data) are true, *then* the claim is true because …. (If … then …)
     b) My data *cause* my claim to be true because … (cause→effect)
     c) My data is linked to my claim true because it is *similar* to … (a comparison)
  7. These other facts support my warrant (B).....
  8. Then it seems to be the case that (Restated Claim)
- **Paragraph three**: the same format as paragraph two
- **Paragraph four:** rebuttal and response to rebuttal.
  9. But, people my disagree. They may say (R).....
  10. They say this because (R).....
  11. But, here is my response to those who disagree (ResR) .....
  12. But this argument is not strong because (ResR).....
- **Paragraph five** (conclusion): thesis reworded
  13. So my claim …. is presumably true
  14. So it is probably the case that …
  15. So, it seems that …. (thesis restated)

If anybody asks or if there is time provide the following examples for the different types of arguments:

If p then q:

Be neither a borrower nor a lender" (Shakespeare)

Expansion:

"Don't borrow or lend stuff, because if you lend stuff to a friend, lots of times you don't get it back and that breaks up the friendship. And borrowing makes you a careless manager."

Analysis:

Don't borrow or lend stuff (C) because if you lend stuff to a friend, lots of times you don't get it back (D), and that breaks up the friendship (W).

Argue by analogy for the proposition that, "Deregulating (privatizing) hydro-electricity in Ontario is a bad idea."

Suggested answer:

Deregulating hydro-electricity in Ontario will lead to higher energy production costs (X is the case). California followed a deregulation model and electricity bills increased (Y is the case). California is similar to Ontario in many respects. It follows a free-market economy model. Its economy is based on manufacturing and high technology. Its demographic make-up and hence electricity consumption are similar to Ontario's (X and Y both have properties a, b, and c) Therefore, it is highly likely that deregulating electricity in Ontario will result in higher energy production costs.

Use the causal argument method to argue FOR increasing corporate tax.

Suggested answer:

Effect 1: the government revenue will increase, which it can spend on social services

Effect 2: the public will see the government as being on their side, which boosts their confidence in the government, which makes the government more popular.

Effect 3: it teaches a lesson to corporations to do business responsibly

Rebuttal: the companies will go to other parts of the world which is more competitive.

Response to rebuttal. Canada has one of the lowest corporate tax rates in among industrial countries. It is about 16% in Canada and about 30% in the US, for example. Therefore, tax increase will not drive the corporations away.

Appendix M: Post-instruction Self-assessment Questionnaire

Participant name: _____

On a scale of one to six, with one indicating *not useful* and six indicating *very useful* please answer the following questions about the part of your writing instruction that involved teaching you about argumentation, prompts, freewriting. Please do not include your thoughts about other components of the course such as grammar, vocabulary, organization.

1. How useful was your training on *argumentation: the Toulmin Model (C,D,W,B,R, ResR)*?
   1 2 3 4 5 6
2. How useful was your training on *freewriting*?
   1 2 3 4 5 6
3. How useful was it when *the teacher* modeled freewriting WITHOUT a topic?
   1 2 3 4 5 6
4. How useful was it when *your classmate* modeled freewriting WITHOUT a topic?
   1 2 3 4 5 6
5. How useful was it when *the teacher* modeled freewriting WITH a topic?
   1 2 3 4 5 6
7. How useful was your training on argumentation to improve the general quality of your writing?
   1 2 3 4 5 6
8. How useful was your training on the use of *prompts*?
   1 2 3 4 5 6
9. Your training was designed to help you with I-don't-know-what-to-write problem. How useful was the training to solve this problem?
   1 2 3 4 5 6
10. How useful was your training to help you think better when you write an essay?

    1 2 3 4 5 6

11. Did the writing lessons (prompts, freewriting, and argument) help you to improve your writing quality in general? Yes □ No□ Please explain.

12. Did the writing lessons (prompts, freewriting, and argument) help you to improve you to improve your argument quality in general? Yes □ No□ Please explain.

13. Did the writing lessons (prompts, freewriting, and argument) help you to change your thinking process while you write an essay? Yes □ No□ Please explain.

14. Did you like the six writing lessons you received (prompts, freewriting, and argument)?
15. If you have any other thoughts about the six lessons you received, please write them down here.

Appendix N: ELTS/IELTS Multiple-trait Rubric (Rating Scale)

	Communicative Quality	Organization	Argumentation	Linguistic Accuracy	Linguistic Appropriacy
9	The writing displays an ability to communicate in a way that gives the reader full satisfaction. *presents a fully developed position in answer to the question*	The writing displays a completely logical organizational structure, enabling the message to be followed effortlessly	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader sees no errors of vocabulary, spelling, punctuation, or grammar. *Uses a wide range of vocabulary and structures.*	There is an ability to manipulate the linguistic system with complete appropriacy. **(e.g., contractions, pronoun use, formal/informal register)** **No colloquialism**
8	The writing displays an ability to communicate without causing the reader any difficulties. *presents a well-developed response to the question*	The writing displays a logical organizational structure that enables the message to be followed easily.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader sees no significant errors of vocabulary, spelling punctuation, or grammar. *Uses a wide range of vocabulary and structures with rare inaccuracies.*	There is an ability to manipulate the linguistic systems appropriately. **Almost no colloquialism**
7	The writing displays an ability to communicate with few difficulties for the reader. *Develops ideas,* *but there may be a tendency to overgeneralise*	The writing displays good organizational structure that enables the message to be followed throughout.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader is aware of but not troubled by occasional errors of vocabulary, spelling, punctuation, or grammar. *Sufficient range of vocabulary and structures with occasional inaccuracies.*	There is limited ability to manipulate the linguistic systems appropriately, but this intrudes only occasionally. **Very few colloquialisms**
6	The writing displays an ability to communicate although there is occasional strain for the reader. *Presents relevant main ideas but some may be inadequately developed/unclear*	The writing is organized well enough for the message to be followed throughout.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader is aware of errors of vocabulary, spelling, or grammar- *but only occasionally. Adequate range of vocabulary with some inaccuracies* ~~that do not impede communication.~~	There is limited ability to manipulate the linguistic systems appropriately, but this intrudes only occasionally. **Occasional colloquialisms**

Notes. (Adapted From Hamp-Lyons, 1991c, pp. 149-151, and IELTS (2012)) Font key: regular: ELTS; *italic*: IELTS; **bold**, additions in this study, ~~strikethrough~~, deleted in this study

Appendix N:(Cont'd)

	Communicative Quality	Organization	Argumentation	Linguistic Accuracy	Linguistic Appropriacy
5	The writing displays an ability to communicate although there is often strain for the reader. *presents some main ideas but these are limited and not sufficiently developed*	The writing is organized well enough for the message to be followed most of the time.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader is aware of errors of vocabulary, spelling, punctuation, or grammar that intrude frequently. *Limited range*.	There is limited ability to manipulate the linguistic systems appropriately, which intrudes frequently. **Several colloquialisms**
4	The writing shows a limited ability to communicate, which puts a strain on the reader throughout. *presents some main ideas but these are difficult to identify and may be repetitive, irrelevant or not well supported*	The writing lacks a clear organizational structure and the message is difficult to follow.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader finds the control of vocabulary, spelling, punctuation, and grammar inadequate. *Basic vocabulary and structures.*	There is inability to manipulate the linguistic systems appropriately, which causes severe strain for the reader. **Frequent colloquialisms**
3	The writing does not display an ability to communicate although meaning comes through spasmodically. *presents few ideas, which are largely undeveloped or irrelevant*	The writing has no discernable organizational structure, and a message cannot be followed.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader is aware primarily of gross inadequacies of vocabulary, spelling, punctuation, and grammar. *Very limited range.*	There is little or no sense of linguistic appropriacy, although there is evidence of sentence structure. **Ridden with colloquialisms**
2	The writing displays no ability to communicate. *may attempt to present one or two ideas but there is no development*	No organizational structure or message is recognizable.	*The argumentation trait was redesigned based on the Toulmin model of argument*	The reader sees no evidence of control of vocabulary, spelling, punctuation, or grammar. *Extremely limited range.*	There is no sense of linguistic appropriacy.
1	A true non-writer who has not produced any assessable strings of English writing. An answer that is wholly or almost wholly copied from the input text or task is in this category.				
0	This rating should be used only when a candidate did not attend or attempt this part of the test in any way.				

Appendix O: Multiple-trait Rubric (Rating Scale) Argument

Note to raters:	• Opposition and response to it may be present in all middle paragraphs or in a separate paragraph. Either type should carry the same weight with all else being equal. • To identity the data, ask if the sentence (which you suspect is data) provides factual evidence for the claim. Data may be a real world observation or personal experience. • To identify the warrant, ask if the sentence (which you suspect is warrant) links the data to the claim. • To identify the backing, ask if the sentence (which you suspect is backing) provides factual evidence for the warrant. Backings may be real world observations or personal experience.
9	• There is a main argument that is *always* relevant, clear, and complete. • Thesis, claims, data, warrants, backings, opposition, and response to opposition are *always* relevant, clear, and complete. • The connection between all argument elements is *always* clear. • The reader *readily* accepts the link among the argument elements.
8	• There is a main argument that is *generally* relevant, clear, and complete. • Thesis, claims, data, warrants, backings, opposition, and response to opposition are *generally* relevant, clear, and complete. • The connection between argument elements is *generally* clear. • The reader *generally* accepts the link among the argument elements.
7	• There is a main argument that is *generally* relevant, clear, and complete. • Thesis, claims, data, warrants, opposition and response to opposition are *generally* relevant, clear, and complete , ***but*** backings may be *sometimes* absent or unclear. • The connection between argument elements is *generally* clear. • The reader *generally* accepts the link among the argument elements.
6	• There is a main argument that is *almost* relevant, clear, and complete. • Thesis, claims, data, warrants are *almost* relevant and clear, ***but*** opposition and response to opposition ~~*are*~~ *maybe both absent*, ***and*** backings may be absent or unclear. • The connection between all argument elements is *almost* clear. • The reader *almost* accepts the link among the argument elements.
5	• There is a main argument that is *somewhat* relevant, clear, and complete. • Thesis, claims, data, warrants are *somewhat* relevant and clear, ***but*** opposition and response to opposition *are both absent*, ***and*** backings are *often* absent or unclear. • The connection between argument elements is *somewhat* clear. • The reader *somewhat* accepts the link among the argument elements.
4	• There is a main argument that is *hardly* relevant, clear, and complete. • Thesis, claims, data, warrants are not present *or hardly* relevant, ***and*** opposition and response to opposition *are both absent*, ***and*** backings are absent or unclear. • The connection between argument elements is *hardly* clear. • The reader *hardly* accepts the link among the argument elements.
3	• There is a main argument that is *often ir*relevant, *un*clear, and *in*complete. • Thesis, claims, data, warrants are not present or [are] often *ir*relevant and *un*clear, ***and*** opposition and response to opposition *are both absent*, ***and*** backings are completely absent or unclear. • The connection between argument elements is *most often un*clear. • The reader *cannot see* the link among the argument elements.
2	• There is a main argument that is *completely ir*relevant, *un*clear, and *in*complete. • Thesis, claims, data, warrants are not present or [are] *completely ir*relevant and *un*clear, ***and*** opposition and response to opposition *are both absent*, ***and*** backings are absent or unclear. • The connection between argument elements is *completely un*clear. • The reader *can see no* link among the argument elements.
1	• There is *not* a main argument *at all.* • The essay includes *no* thesis, claims, data, warrants, opposition and response to opposition, ***and*** backings.
0	This rating should be used only when a candidate did not attend or attempt this part of the test in any way.

Appendix P: Primary-trait Rubric (Rating Scale) Argument

Note to raters:		• Opposition and response to it may be present in all middle paragraphs or in a separate paragraph. Either type should carry the same weight with all else being equal. • To identity the data, ask if the sentence (which you suspect is data) provides factual evidence for the claim. Data may be a real world observation or personal experience. • To identify the warrant, ask if the sentence (which you suspect is warrant) links the data to the claim. • To identify the backing, ask if the sentence (which you suspect is backing) provides factual evidence for the warrant. Backings may be real world observations or personal experience.
Thesis	5	• Thesis is ***always*** relevant to the **task**, is ***always*** clear and complete. The connection with other argument elements is ***always*** clear. • The reader ***always*** accepts the link with other argument elements.
	4	• Thesis is ***generally*** relevant to the **task**, is ***generally*** clear and complete. The connection with other argument elements is ***generally*** clear. • The reader ***generally*** accepts the link with other argument elements.
	3	• Thesis is ***somewhat*** relevant to the **task**, is ***somewhat*** clear and complete. The connection with other argument elements is ***somewhat*** clear. • The reader ***somewhat*** accepts the link with other argument elements
	2	• Thesis is ***hardly*** relevant to the **task**, is ***hardly*** clear or complete. The connection with other argument elements is ***hardly*** clear. • The reader ***hardly*** accepts the link with other argument elements.
	1	• There is no thesis.
Claims	5	• Claims are ***always*** relevant to the **thesis**, are ***always*** clear and complete. The connection with other argument elements is ***always*** clear. • The reader *always* accepts the link with other argument elements.
	4	• Claims are ***generally*** relevant to the **thesis**, are ***always*** clear and complete. The connection with other argument elements is ***generally*** clear. • The reader ***generally*** accepts the link with other argument elements.
	3	• Claims are ***somewhat*** relevant to the **thesis**, are ***somewhat*** clear and complete. The connection with other argument elements is ***always*** clear. • The reader ***somewhat*** accepts the link with other argument elements.
	2	• Claims are ***hardly*** relevant to the **thesis**, are ***hardly*** clear or complete. The connection with other argument elements is ***hardly*** clear. • The reader ***hardly*** accepts the link with other argument elements.
	1	• There are no claims.
Data	5	• Data are ***always*** relevant to the **claims**, are ***always*** clear and complete. The connection with other argument elements is ***always*** clear. • The reader ***always*** accepts the link with other argument elements.
	4	• Data are ***generally*** relevant to the **claims**, are ***generally*** clear and complete. The connection with other argument elements is ***generally*** clear. • The reader ***generally*** accepts the link with other argument elements.
	3	• Data are ***somewhat*** relevant to the **claims**, are ***somewhat*** clear and complete. The connection with other argument elements is ***somewhat*** clear. • The reader ***somewhat*** accepts the link with other argument elements.
	2	• Data are ***hardly*** relevant to the **claims**, are ***hardly*** clear or complete. The connection with other argument elements is ***hardly*** clear. • The reader ***hardly*** accepts the link with other argument elements.
	1	• There are no data.

Appendix P (Cont'd)

Warrants	5	• Warrants are ***always*** relevant to the **data**, are ***always*** clear and complete. The connection between warrants and data is ***always*** clear. • The reader ***always*** accepts the link with other argument elements.
	4	• Warrants are ***generally*** relevant to the **data**, are ***generally*** clear and complete. The connection between warrants and data is ***generally*** clear. • The reader ***generally*** accepts the link with other argument elements.
	3	• Warrants are ***somewhat*** relevant to the **data**, are ***somewhat*** clear and complete. The connection between warrants and data is ***somewhat*** clear. • The reader ***somewhat*** accepts the link with other argument elements.
	2	• Warrants are ***hardly*** relevant to the **data**, are ***hardly*** clear or complete. The connection between warrants and data is ***hardly*** clear. • The reader ***hardly*** accepts the link with other argument elements.
	1	• There are no data.
Backings	5	• Backing is provided and is ***always*** relevant to the **warrant**, is clear, and complete. The connection with warrant and/or other argument elements is ***always*** clear. • The reader ***always*** accepts the connection with warrant and/or other argument elements.
	4	• Backing is provided and is ***generally*** relevant to the **warrant**, is clear, and complete. The connection with warrant and/or other argument elements is ***generally*** clear. • The reader ***generally*** accepts the connection with warrant and/or other argument elements.
	3	• Backings ***may appear*** *to* be provided and *may be* relevant to the **warrant**, but they are not complete, or are somewhat unclear. The connection with warrant and/or other argument elements is ***somewhat*** *un*clear. • The reader ***may be able to*** accept the connection with warrant and/or other argument elements.
	2	• Backings ***may appear*** *to* be provided and *may be* relevant to the **warrant**, but they do not directly address the warrant, or they lack clarity. The connection with warrant and/or other argument elements is ***un*clear**. • The reader ***does not*** accept the connection with warrant and/or other argument elements.
	1	• There are no backings.
Opposition	5	• Writer recognizes opposition and it is ***always*** relevant to the **thesis** or **claims**, is *always* complete, and is *always* clear.
	4	• Writer recognizes opposition and it is ***generally*** relevant to the **thesis** or **claims**, is *generally* complete, and is *generally* clear.
	3	• Writer *may appear to* recognize opposition and it ***may be*** relevant to the **thesis** or **claims**, but it is ***not complete***, or is ***somewhat*** unclear.
	2	• Writer *may appear to* recognize opposition and it ***may be*** relevant to the **thesis** or **claims**, but it does ***not directly*** address the claims or thesis, or it ***lacks clarity***.
	1	• Writer **does not** recognize opposition
Response to opposition	5	• Writer offers a response to **opposition** and it is ***always*** relevant to the **opposition**, is *always* complete, and is *always* clear.
	4	• Writer offers a response to **opposition** and it is ***generally*** relevant to the **opposition**, is *generally* complete, and is *generally* clear.
	3	• Writer *may appear to* offer a **response** to opposition and it ***may be*** relevant to the **opposition**, but it is not complete, or is somewhat unclear.
	2	• Writer *may appear to* recognize a response to **opposition** and it ***may be*** relevant to the **opposition**, but it does not directly address the opposition, or it lacks clarity.
	1	• Writer does not offer a response to opposition

Appendix Q: Interview Questions

Interview questions for Jay:

1. Questions one: Tell me about your experience of the training you received over the past six weeks. How did you like it? How did you not like it? Was there something that you liked a lot? Was there something that you did not like at all? Please provide examples.
2. Did MY teaching of thinking to write an argument improve your *overall/general writing quality*? Is so, how did it help you? Please provide examples.
3. Did MY teaching of thinking to write an argument improve the *quality of your arguments*? Is so, how did it help you? Please provide examples.
4. Did MY teaching of thinking to write an argument change *the way you think* while you write? If so, how did your thinking change? Did your thinking improve? Please provide examples.
5. For Jay: Did you use the elements of the model in your post-test essay? Can you identify them for me, please?
6. **For Jay**: Question two: Your writing shows that you have not improved your ability to generate ideas. *Same number of words, same structure, why do you think there was no improvement?*
7. **For Jay:** Why did you not use a rebuttal?
8. Did the training to generate an argument help you write your term papers, the cause-effect term paper, for example? In what way?
9. **For Jay:** Your writing did not show all the elements of writing that I taught. Do you think you will use them in your future writing?

Interview questions for Max:

1. Questions one: Tell me about your experience of the training you received over the past six weeks. How did you like it? How did you not like it? Was there something that you liked a lot? Was there something that you did not like at all? Please provide examples.
2. Did MY teaching of thinking to write an argument improve your *overall/general writing quality*? Is so, how did it help you? Please provide examples.
3. For Max How much of your improvement is because of what you learned in Henry's class and how much of it is because of what you learned in my class?
4. Did MY teaching of thinking to write an argument improve the *quality of your arguments*? Is so, how did it help you? Please provide examples.
5. Did MY teaching of thinking to write an argument change *the way you think* while you write? If so, how did your thinking change? Did your thinking improve? Please provide examples.
6. **For Max**: Question two: Your writing shows that you have improved your ability to generate ideas. *What element or elements of the instruction* have helped you to better generate ideas? Please provide examples.
7. Did you use the elements of the model in your post-test essay? Can you identify them for me, please?
8. **For Max:** You have also used rebuttal in your pre-test. Did you learn about rebuttals before this course?
9. Did the training to generate an argument help you write your term papers, the cause-effect term paper, for example? In what way?

Interview questions for Mohammad:

1. Questions one: Tell me about your experience of the training you received over the past six weeks. How did you like it? How did you not like it? Was there something that you liked a lot? Was there something that you did not like at all? Please provide examples.
2. Did MY teaching of thinking to write an argument improve your *overall/general writing quality*? Is so, how did it help you? Please provide examples.
3. For Mohammad: How much of your improvement is because of what you learned in Henry's class and how much of it is because of what you learned in my class?
4. Did MY teaching of thinking to write an argument improve the *quality of your arguments*? Is so, how did it help you? Please provide examples.
5. Did MY teaching of thinking to write an argument change *the way you think* while you write? If so, how did your thinking change? Did your thinking improve? Please provide examples.
6. **For Mohammad**: Question two: Your writing shows that you have improved your ability to generate ideas. *What element or elements of the instruction* have helped you to better generate ideas? Please provide examples.
7. Did you use the elements of the model in your post-test essay? Can you identify them for me, please?
8. Did the training to generate an argument help you write your term papers, the cause-effect term paper, for example? In what way?

Interview questions for Natalie:

1. Questions one: Tell me about your experience of the training you received over the past six weeks. How did you like it? How did you not like it? Was there something that you liked a lot? Was there something that you did not like at all? Please provide examples.
2. Did MY teaching of thinking to write an argument improve your *overall/general writing quality*? Is so, how did it help you? Please provide examples.
3. Did MY teaching of thinking to write an argument improve the *quality of your arguments*? Is so, how did it help you? Please provide examples.
4. Did MY teaching of thinking to write an argument change *the way you think* while you write? If so, how did your thinking change? Did your thinking improve? Please provide examples.
5. **For Natalie**: Question two: Your writing shows that you have improved your ability to generate ideas. *What element or elements of the instruction* have helped you to better generate ideas? Please provide examples.
6. Did you use the elements of the model in your post-test essay? Can you identify them for me, please?
7. **For** Natalie**:** Why did you not use a rebuttal?
8. Did the training to generate an argument help you write your term papers, the cause-effect term paper, for example? In what way? I forgot to ask this.
9. **For** Natalie**:** Your writing did not show all the elements of writing that I taught. Do you think you will use them in your future writing?

Appendix R: Managing a Procedural Error

During Instruction of the EG, I made an error which at first may appear to have affected the results[26], but with further analysis and reference to literature, I demonstrate that the error did not affect the results. The problem arose in Session V, when I mistakenly assigned an essay topic for homework, which would later be assigned for the posttest. Six of the students from the EG submitted the Session V homework, henceforth HW5. These essays were also rated together with the pre- and posttest essays. In order to understand the effect of the error on the findings, the question to be answered was which of these two sets of scores, HW5 or posttest, should be used for statistical analysis.

There are three theoretical issues which are relevant and should be discussed: the extra time the HW5 students might have used beyond the 45 minutes allotted at the posttest, the fact that the topic was revealed to them in advance of the posttest, and the practice effect. Regarding the extra time, Kroll (1990) studied if time had an effect on linguistic and rhetorical quality of 25 ESL students, who represented five linguistic backgrounds, each producing four essays: two timed essays written in 60 minutes in class and two written at home over a 10- to 14- day period. She found the extra time had no statistically significant effect on writing performance, although the home essays were marginally better. As far as the topic disclosure problem is concerned, Powers and Fowles (1997) examined the effect of disclosing essay topics to GRE candidates, and found no significant effect either on the test scores or the meaning of the scores as related to other factors defining writing skill. The problem of practice effect should be addressed empirically with the actual data in the study. The four raters assessed these six essays with the same multiple-trait and primary-trait rubrics for overall writing quality and argumentative discourse quality.

The descriptive statistics for overall writing quality for the six HW5 students are reported in Table R1. Compared with HW5, the posttest shows higher means for Communicative Quality and Organization. The means were lower at the posttest compared to HW5 for Linguistic Accuracy, Linguistic Appropriacy, and Argument.

Table R1. Descriptive Statistics for Overall Writing Quality based on the Multiple-Trait Rating for HW5 students

		HW5 (n = 6)					Posttest (n = 6)				
Group	Variable	*M*	*SD*	*Mdn*	*Min*	*Max*	*M*	*SD*	*Mdn*	*Min*	*Max*
EG	Communicative Quality	5.92	1.26	5.75	4.25	7.5	6.54	0.84	6.50	5.5	8
	Organization	5.33	1.32	5.00	4	7.5	6.17	0.52	6.00	5.5	7
	Linguistic Accuracy	5.58	0.65	5.63	4.75	6.5	5.50	0.47	5.50	4.75	6
	Linguistic Appropriacy	6.29	0.98	6.25	5.25	7.5	5.75	1.07	5.38	4.75	7.5
	Argument	6.38	0.79	6.63	5	7.25	5.71	0.86	5.75	4.25	6.75
	Total Average Score	5.90	0.82	5.58	5.05	7.05	5.93	0.61	5.88	5.25	6.85

Note. Scores are out of a total of 9 possible points on a continuous scale. EG = Experimental Group. HW5 = Homework 5: essay assigned for home work in Session V.

[26] Multi-tasking, wearing multiple hats as a researcher, instructor, and audio-visual technician, got the better of me at this point, leading to this error. However, it did not seem to have affected the results in a significant way.

The descriptive statistics for argumentative discourse quality for the six HW5 students are reported in Table R2. Compared with HW5, the posttest shows higher means for Thesis, Claims, Data, and Backing, and lower means for Opposition and Response to Opposition.

Table R2.Descriptive Statistics for Argumentative Discourse Quality based on the Primary-Trait Rating for HW5 students from the EG

	HW5 (n = 6)					Posttest (n = 6)				
Variable	*M*	*SD*	*Mdn*	*Min*	*Max*	*M*	*SD*	*Mdn*	*Min*	*Max*
Thesis	4.29	0.58	4.38	3.5	5	4.50	0.32	4.50	4	5
Claims	3.46	0.58	3.50	2.5	4.25	3.54	0.19	4.50	3.25	3.75
Data	3.08	0.68	3.38	2	3.75	3.46	0.71	3.38	2.5	4.5
Warrant	3.00	0.99	3.13	1.5	4.5	3.25	0.32	3.13	3	3.75
Backing	1.92	1.19	1.38	1	3.75	2.92	0.52	2.75	2.5	3.75
Opposition	3.67	1.53	4.25	1	5	3.00	1.39	3.63	1	4.25
Response to Opposition	3.04	1.44	3.13	1	4.5	3.08	1.55	3.38	1	4.75
Total Average Score	3.21	0.67	3.20	2.32	4.36	3.39	0.47	3.48	2.64	3.89

Note. Scores are out of a total of 5 possible points on a continuous scale. EG = Experimental Group. HW5 = Homework 5: essay assigned for homework in Session V.

To test if the differences between the posttest and HW5 scores of the six participants were statistically significant, I conducted a related samples Wilcoxon signed-rank test. The test compared the two related samples for the five traits of overall writing quality and seven sub-traits of argumentative discourse quality. The results are displayed in Table R3. Of all the five traits of overall writing quality and seven sub-traits of argumentative discourse quality, only Linguistic Appropriacy had significantly changed from HW5 (*Mdn* = 6.25) to posttest (*Mdn* = 5.38), $T = 15.00$, $p = .03$, $r = .61$. However, the median and the mean decreased at the posttest. Therefore, these findings suggest that HW5 and posttest belong to the same population of scores, and, thus, the posttest scores could be used for both between- and within-subject comparisons, as per Table AA. Additionally, the posttest scores are the more conservative scores because their means are lower for the main construct of MT argumentative discourse quality, and the PT constructs of Opposition and Response to Opposition.

Table R3. Related Samples Wilcoxon Signed Rank HW5-Posttest comparison for six EG students (n = 12)

		Mdn HW5	*Mdn post*	*T*	*p*	*Z*	*r*
Overall Writing Quality (MT)	Communicative Quality	5.75	6.50	5.5	.30	-1.05	NA
	Organization	5.00	6.00	3.5	.14	-1.47	NA
	Linguistic Accuracy	5.63	5.50	10.00	.49	.68	NA
	Linguistic Appropriacy	6.25	5.38	15.00	.03*	2.12	0.61
	Argument	6.63	5.75	18.00	.011	1.58	NA
	Total	5.58	5.88	10.000	.92	-.10	NA
Argumentative Discourse Quality (PT)	Thesis	4.38	4.50	4.50	.42	-.81	NA
	Claims	3.50	4.50	3.00	1.00	.00	NA
	Data	3.38	3.38	2.50	.18	-1.35	NA
	Warrant	3.13	3.13	8.00	.60	-.53	NA
	Backing	1.38	2.75	3.00	.12	-1.57	NA
	Opposition	4.25	3.63	10.00	.07	1.83	NA
	Response to opposition	3.13	3.38	5.00	1.00	.00	NA
	Total	3.20	3.48	7.00	.46	-.734	NA

Note. Scores are out of a total of 9 possible points on a continuous scale for overall writing quality and out of 5 for argumentative discourse quality. EG = Experimental Group. HW5 = Homework 5: essay assigned for homework in Session V. MT=Multiple-trait; PT= Primary-trait

In addition to the quantitative analysis, I also conducted qualitative comparison of the six HW5 and posttest essays, to see evidence for practice effect in the actual texts. I compared ideas, grammar, and the total score the raters had assigned HW5 and posttest. I specifically looked to see if changes from HW5 to posttest would reflect the topics of Instruction in Session VI, which could have contributed to the students' knowledge and performance on the posttest. If the posttest featured elements of Session VI Instruction, then there would be a weaker case for the practice effect as the cause of improved quality.

Chelsea wrote a longer essay on the posttest, which indicates she might not have taken the entire 45 minutes to write her essays, and thus did not expend as much effort on it as she would in a classroom situation. Her total MT score increased from 5.35 on HW5 to 6.25 on the posttest, and her total PT score from 2.89 on HW5 to 3.65 on the posttest. She acknowledged opposition on both essays.

Natalie seemed to have benefitted from the practice effect because she generated the same ideas on the posttest as HW5. However, these ideas seem to be clichés that are not particularly challenging to generate. For example, she wrote, "With the developing of society, people's living standard has improved," in both HW5 and posttest. She corrected some language errors on the posttest test. However, her total scores were almost identical between HW5 (5.5/9; 3.25/5) and posttest (5.5/9; 3.11/5).

Max's posttest showed correction of some grammatical errors from HW5. Both essays featured opposition and response to opposition. Posttest developed them more by adding Data

and Backing. He, however, made the same grammatical errors in both essays, e.g., “in the other hand,” and “a free time.” His posttest also featured a hedged claim with “probably.” Although it appears that there is a case for practice effect, a look at the lesson plan for Session VI weakens this argument. For example, the improvements to Max’s essay are consistent with Session VI instruction on writing a rebuttal. The reason his Opposition on the posttest features data and backing is likely the result of instruction, which is unrelated to a practice effect. His total score on the overall writing quality did not change (6.8/9 for HW5 and 6.89/9 for posttest). But his argumentative discourse quality did increase from HW 5 (3.28/5) to posttest (3.89/5), which, as argued above, is likely because of instruction not practice effect.

Jay wrote one long paragraph for HW5, which he extended to an essay on the posttest. Because Jay had already demonstrated the ability to write an essay as early as the pretest, it is highly unlikely that practice would have enabled him to expand his HW5 paragraph to an essay. He used some of the same words on the posttest manipulating the grammar; however, they became errors on the posttest. For example, he used the adjective “convenient” in error in the following sentence, which he had accurately used as a noun in HW5: “They are price, convenient, and knowledge.” Jay used the metadiscoursal word “claim” in the posttest, which suggests the effect of Session VI instruction more than practice. His total score on the overall writing quality changed slightly from 5.05/9 for HW5 to 5.25/9 for posttest. But his argumentative discourse quality increased more sharply from 2.32/5 for HW 5 to 2.64/5 to posttest, which might be a result of both Session VI instruction and his decision to extend his paragraph to an essay.

Mohammad acknowledged opposition and response to opposition on both HW5 and posttest. The grammatical accuracy of the opposition on the posttest clearly declined, coupled with a spelling error, that makes the posttest harder to interpret than HW5. He used the same idea, but either consciously wanted to paraphrase it, or frames it in the form available to him in the moment. The idea in his response to opposition is different in the posttest than that in HW5. In the posttest, he added the hedging verb “seem” to his restated claim. Mohammad’s total score for overall writing quality almost remains the same on the posttest (5.5/9) as HW5 (5.6). His argumentative discourse quality increases considerably from 3.14/5 on HW5 to 3.75/5 in the posttest .

Zahra’s HW5 essay has a rebuttal paragraph with two rebuttals and two responses to rebuttal. By contrast, her posttest rebuttal paragraph has one rebuttal and response to rebuttal. In these paragraphs, she uses the same ideas in both in HW5 and posttest. It is likely that Zahrah wrote at least two drafts for HW5 because of its appearance, which was free of traces of edits and revisions. Her posttest did feature edits, self-correcting grammatical error. For example, in one sentence she corrects the location of the modal “can” in an embedded noun clause by moving it from before the subject to after it. She writes, “how ~~can~~ they can ….” Overall, both pairs of raters evaluated her posttest less favourably than HW5. Zahara’s scores dropped from 7.05/9 and 4.35/ 5 on HW5, for overall writing quality and argumentative discourse quality, respectively, to 6.25 and 3.21/5 on the posttest. This might be a token of the fact that her HW5 was longer text than posttest, and essay length has been shown to correlate with its score.

In summary, to manage the procedural error, I consulted literature for guidance, conducted quantitative and qualitative analyses and found there was no significant differences

between the HW5 and posttest results for the students (n = 6). Therefore, I continued with the analysis of the data from the posttest only.

Appendix S: Transcription Conventions

(Adapted from Thornborrow, 2002, pp. ix-x)

Symbol	
[---]	previous or subsequent talk not included
(.)	pause of less than .5 seconds
(2.3)	length of pause in seconds
Maybe= =I think it is a Warrant	latching: when the subsequent turn latches on to the previous turn without a discernable pause
[we need to provide] [yeah, okay]	overlapping talk: the two adjacent conversational turns overlap. Both the onset and end of overlap are indicated with brackets.
[[M points at text]]	Description of non-verbal behaviour and the analyst's commentary
(Rebuttal)	the transcriber's best effort at indistinct talk
(xxx)	indistinct talk
((chuckles))	paralinguistic features
thing <u>backs</u> up the Warrant	Marked stress
BUT	increased volume
°quiet speech °	quiet speech
.hh	marked intake of breath
hh.	marked outbreath
.	falling tone
?	rising tone
,	level tone
Ca-	truncated syllable or word
↑Oh ↓	marked pitch movement