The Cognitive Processes of ESL Writers Responding to an Integrated Argumentative Writing Task

Ibtissem Knouzi

Designed to gauge the actions, skills, and strategies that students use to identify, extract, and synthesize information from multiple source materials, integrated writing tasks are particularly challenging for ESL writers. Previous research tended to focus on a limited number of integrated tasks, mostly summaries of one or two sources, thus limiting our understanding of L2 learners' performance on more demanding integrated writing tasks. This study, part of a larger validation study of the the Canadian Academic English Language (CAEL) Test, extends this line of research by examining the cognitive processes that ESL learners engage in when responding to a source-based argumentative writing task and how, if at all, these cognitive processes vary depending on students' English language proficiency (ELP). Eight undergraduate ESL students at two levels of ELP (high and low) provided stimulated recalls (SRs) about their writing processes immediately after completing an integrated writing task that involved listening to a lecture, reading a passage about a related topic, and writing an argumentative essay using ideas from both sources. Analyses of the SRs and in-depth analysis of the writing process of one high and one low ELP students revealed the various cognitive and metacognitive processes and strategies that the participants used and the language and discourse aspects they attended to. Generally, participants with higher ELP tended to interact with the sources and task and to engage in planning and organizing, generating and retrieving, and revising and editing more frequently than did participants with lower ELP. The findings and their implications for the teaching and assessment of source-based writing in Canadian L2 writing classrooms and beyond are discussed.

Conçues pour évaluer les actions, les compétences et les stratégies utilisées par les étudiants pour identifier, extraire et synthétiser des informations provenant de sources multiples, les tâches intégrées d'écriture constituent un défi particulier pour les scripteurs d'anglais langue seconde (ALS). Les recherches antérieures ont eu tendance à se pencher sur un nombre limité de tâches intégrées, souvent des résumés basés sur une ou deux sources, limitant ainsi notre compréhension de la performance des apprenants L2 sur des tâches intégrées d'écriture plus exigeantes. La présente étude, qui fait partie d'une étude de validation plus large du test CAEL (Canadian Academic English Language), enrichit cet axe de recherche en examinant les processus cognitifs que les apprenants d'ALS mettent en œuvre lorsqu'ils répondent à une tâche d'écriture argumentative basée sur des sources et comment, le cas échéant, ces processus cognitifs varient en fonction de la compétence en anglais des apprenants (CA). À l'aide de rappels stimulés (RS), huit apprenants d'ALS, étudiant au premier cycle et ayant deux niveaux de compétence différents (élevé et faible) ont fourni des clarifications sur leurs processus d'écriture immédiatement après avoir effectué une tâche d'écriture intégrée qui impliquait l'écoute d'une conférence, la lecture d'un passage sur un sujet connexe et la rédaction d'un texte argumentatif sur la base des deux sources. L'analyse des RS ainsi que l'analyse approfondie du processus d'écriture d'un étudiant ayant une CA de niveau élevé et d'un étudiant ayant une CA faible ont permis de relever les divers processus et stratégies cognitifs et métacognitifs utilisés par les participants, ainsi que les aspects

linguistiques et discursifs auxquels ils ont prêté attention. De manière générale, les participants ayant un niveau de compétence élevé ont eu tendance à interagir avec les sources et la tâche et à s'engager dans la planification et l'organisation, la génération et l'extraction, et la révision et l'édition plus fréquemment que les participants ayant un niveau plus faible. Les résultats et leurs implications pour l'enseignement et l'évaluation de l'écriture basée sur les sources dans les classes d'écriture en L2 dans le contexte canadien et au-delà sont discutés.

Keywords: integrated writing task, L2 proficiency, second language writing, stimulated recall, writing processes

This study aimed to examine the cognitive processes used by ESL writers while they complete an argumentative integrated writing task and the extent to which these processes vary across writers' language proficiency levels. Integrated or source-based writing tasks are tasks that require learners to "read … and comprehend … a source text and then integrate … its relevant content into one's own text through paraphrasing and conventional citation practice" (Liu et al., 2016, p. 37). These tasks can vary in terms of the sources used (e.g., number and modality of source texts) and the discourse mode of the writing component of the task (e.g., to write a summary, a response, or an argumentative essay) (Abrams, 2019; Plakans & Gebril, 2017; Qin & Liu, 2021). Regardless of their requirements, integrated tasks tend to be more challenging to novice and second language (L2) writers than independent writing tasks because they necessitate the effective use and coordination of multiple language skills and strategies (e.g., writing, reading, and sometimes listening), the extraction and synthesis of information from multiple sources, and an understanding of ethical textual-borrowing conventions and practices (Cho et al., 2013; Plakans & Gebril, 2017). In this article, I report the findings of a study that examined the integrated writing performance of ESL students at different levels of language proficiency to understand the range of strategies they use, the challenges they experience, and the quality of the texts they produce. Findings have implications for our conceptualization of L2 (integrated) writing proficiency and can inform efficient instruction and assessment approaches in Canadian L2 writing contexts and beyond.

Supporting arguments for the adoption of source-based writing in L2 instruction and assessment come from needs-analysis studies that have shown that ESL students are regularly assigned tasks that require the integration of source texts into new original writing such as summaries, critical responses, interpretations, and syntheses (e.g., Carson, 2001). These findings led to substantial revisions to the format of major internationally recognized tests, such as the TOEFL iBT, that now includes an integrated task that requires test takers to read a passage, listen to a lecture, and then summarize the main points from both sources (e.g., Gebril & Plakans, 2016). In this respect, Cumming et al. (2005) argued that adding integrated tasks to L2 writing tests can "diversify and improve measurement of examinees' writing abilities, improve the washback effects of the test on teaching and learning practices internationally, and require examinees to write for the test in ways that more authentically resemble the types of performance needed in academic studies" (p. 6). When designed properly, these tasks can be used to train students in the myriad of complex decisions they have to make when tackling academic tasks such as reading a text as a source of information for writing (as opposed to reading a text to answer comprehension questions), distinguishing major ideas and details in accordance with the overall purpose of reading and subsequent writing, adapting the newly acquired information to their writing goals, and restructuring their existing knowledge about the topic at hand (cf. Grabe, 2003).

Effect of Integrated Tasks on L2 Writers' Performance

Research on how integrated writing tasks affect students' performance and how performance on source-based writing compares to performance on independent tasks shows that composing from sources affects the reading strategies, writing processes, and features of the final product. For instance, Bråten and Samuelstuen (2004), who compared three groups of 10th graders who read the same text for three different reasons (to take a test, have a discussion with peers, and write a summary) found that reading to answer test questions and to prepare for a debate resulted in more memorization and monitoring, while reading to summarize made the learners focus more on organization. Furthermore, Cumming et al. (2005) found significant textual differences between independent and integrated essays written by the same L2 students. They also noted important differences between responses to reading-for-writing and listening-for-writing tasks.

Studies of the processes of composing in a second language (L2) have provided detailed accounts of the complex cognitive skills (e.g., planning, organizing, revising, editing) needed to write effectively from sources. Ruiz-Funes (2001) and Yang and Shi (2003), for instance, documented L2 learners' sequences of planning, writing, revising, and editing texts as well as their thinking processes of synthesizing, commenting on, monitoring, structuring, and elaborating ideas. Plakans (2010) broadened these descriptions by categorizing them as the interplay of cognitive processes including organization, selection, connecting, monitoring, and handling language difficulties. Beaufort (2004) detailed the multidimensional mental complexities of writing from sources, acknowledging that students may not grasp them comprehensively or consistently and underscoring the need for extensive practice. Beaufort identified "five knowledge domains that writers must draw upon: discourse community knowledge, subject matter knowledge, genre knowledge, rhetorical knowledge, and writing process knowledge" (p. 136). In a similar vein, Li (2013), within the framework of activity theory, discussed the tensions and contradictions that students need to resolve as they write course papers from sources. Given these challenges, a commonly documented phenomenon is that students tend to interpret (from written instructions, teachers, or assignments) tasks that involve writing from sources in different ways, thereby engaging in different composing processes and producing different types and qualities of written texts (McCulloch, 2013; Wolfersberger, 2013).

More recently, in a study investigating the shared processes of reading and writing in integrated writing assessment, Plakans et al. (2019) examined the writing processes of 11 ESL learners when responding to an iterative integrated task including a pre-writing task, reading passages, reading-based questions, and a source-based writing task. Participants used five main processes during the task: focusing on the word level, drawing on background knowledge, metacognitive monitoring for comprehension, rereading, and summarizing. The comprehension-related processes (e.g., monitoring comprehension and rereading) were the most frequently occurring operations in the reading, writing, and reading-into-writing processes. These five process categories provide insight into the reciprocal nature of L2 reading and writing skills in integrated writing tasks.

Variables That Impact Integrated Writing

Several empirical studies suggest that individual and textual variables interact with the task type and impact L2 learners' writing performance. Variations in integrated writing performance stem from the inherent difficulties in establishing source relevance and credibility, choosing between source ideas,

determining what to emphasize, making citation decisions, articulating personal viewpoints, and reconciling contradictions (e.g., Petrić & Harwood, 2013; Thompson et al., 2013). Individual variables that have been found to affect L2 learners' performance in synthesis/summary writing tasks include prior knowledge about the topic discussed in the text and epistemological beliefs about the nature of knowledge. In a study on L1 writers, Bråten and Strømsø (2006) found that only readers holding sophisticated epistemological beliefs, (i.e., beliefs that knowledge is tentative and evolving, involves interrelated concepts, and is derived from reason) demonstrated a deeper understanding of multiple, partly conflicting texts than readers with naïve epistemological beliefs (i.e., beliefs that knowledge is absolute and unchanging and can be obtained from authority figures). To my knowledge, no studies have examined the effects of L2 writers' epistemological beliefs on their reading and writing processes when responding to integrated writing tasks.

L2 proficiency level is another variable that has attracted much research interest. Research findings suggest that it affects the processes of reading and composing from textual sources. Plakans (2009b) analysed the think-aloud protocols, interviews, and texts of six ESL students at different ELP levels who wrote an argumentative essay after reading two source texts with conflicting views on the same topic. The findings indicated that students with higher ELP tended to spend more time on discourse synthesis processes (i.e., organizing the structure of their emerging text, selecting pertinent ideas from source texts, and connecting ideas within and across sources, including self-generated ideas), while the two low-proficiency students attended more to resolving language-related difficulties and relied mostly on their own ideas and experiences in connection to the topic, with source-text idea units representing less than 10% of the total units in their essays (compared to 60–70% of the more proficient students' texts). In a related study, Plakans (2009a) found that 12 ESL students at different language-proficiency levels used different types of reading strategies during the pre-writing stage of source-based writing. High-proficiency participants used more mining strategies (e.g., re-reading and scanning source texts for ideas) and employed more metacognitive strategies such as setting goals in relation to the task requirement. The low-proficiency group, on the other hand, seemed more concerned with word-level comprehension, which, combined with misunderstanding the task requirements, led to a limited ability to use mining strategies.

The complex interactions of multiple individual and task variables and their impact on the process and product of source-based writing point to the importance of investigating L2 writers' processes and strategies under specific integrated task requirements. The review suggests that the process and product of source-based writing depends to a large extent on the features (e.g., topic, rhetorical organization), number, and sequence of source texts assigned to students, and the type of writing specified in the task, as well as several individual variables, such as student ELP (e.g., Abrams, 2019; Cho et al., 2013; Plakans & Gebril, 2017; Qin & Liu, 2021). Previous research has focused especially on L2 writers' performance on integrated writing tasks that require summarizing one or two source texts, following the adoption of an integrated summary task in the TOEFL iBT in 2005 (e.g., Plakans, 2008, 2009a, 2010; Plakans et al., 2019). While these studies have been instrumental in revealing the distinct processes that characterize integrated writing, a focus on one rhetorical mode (i.e., summary) limits our understanding of integrated writing. Plakans (2009b) is one of a few studies that have examined L2 learners' argumentative writing in response to two print-based texts. The current study aimed to expand the extant research by examining L2 writers' performance on integrated writing tasks that involve writing an argumentative essay based on two source texts of different modalities (print-based and aural texts). It also analyzed the extent to which the writing processes vary depending on the writers' L2 proficiency. The study addressed the following research questions (RQs):

RQ1: What cognitive processes do ESL students engage in when responding to an integrated argumentative writing task?

RQ2: How and to what extent do these cognitive processes vary across students' ELP levels?

Context and Method

This study is part of a large validation study that aimed to examine the texts and writing processes elicited by the integrated tasks of the Canadian Academic English Language (CAEL) test (www.paragontesting.ca), an English proficiency test used by many Canadian universities for student admissions (see Barkaoui, forthcoming). The CAEL includes two integrated writing tasks: a long task that requires test takers to listen to a lecture, read a passage about a similar or related topic, and then write an argumentative essay using ideas from both sources; and a short task that requires a brief written response to a question based on one of the two sources. This study focuses on the writing processes engaged by the CAEL long integrated writing task since it requires tests takers to use both sources.

Participants

The study included eight ESL students at a large university in southern Ontario, divided into two groups: the high-proficiency group (HP) included five students who had met the cut score for admission (83 on the TOEFL-iBT or 6.5 on the IELTS), and the low-proficiency group (LP) included three students who had scores lower than the cut score and were therefore offered a conditional admission contingent on the completion of pre-admission ESL courses. All HP students were undergraduate students in their first or second year of university study at the time of data collection.

Data-Collection Tools

Three data-collection tools were used in the study:

Writing Task: The CAEL integrated task used in this study included a reading passage (792 words) and a recorded lecture (754 words; 5 mins), both about Speech Recognition Technology (SRT). Participants had 20 minutes to read the text and answer 11 reading comprehension questions and another 20 minutes to listen to the lecture and complete 11 listening comprehension questions. Next, they had 35 minutes to use information from the text and lecture notes to write a 250-word argumentative essay. During the writing task, participants had access to the reading text and to lecture notes provided as part of the task, but not the lecture itself. They were informed that their responses would be evaluated in terms of the content and structure of the response, the accuracy of their language, and their use of the source material. (See https://www.cael.ca/take-cael/overview/ for more information on the task.)

Stimulated Recalls: The eight participants participated in stimulated recalls (SR) about the processes they engaged in while completing the integrated writing task (see below).

Follow-up Interview: The eight participants answered follow-up interview questions about their reactions to the listening, reading, and writing sections of the task and about whether and how they used the source texts in their essays.

Data-Collection Procedures

Eight students (three with LP and five with HP) were randomly selected from a list of 59 ESL students who volunteered to participate in the larger study. Each of the eight SR participants received detailed instructions, training, and practice on how to perform the stimulated recall task. During the training, I explained to the participant the purpose and process of SR, modeled how to do the SR, answered participants' questions, and then the participant practiced SR using a short independent writing task. Next, each participant was video-recorded as they completed the CAEL long integrated task on the computer. The participant then watched the video of their writing session and provided a SR—that is, they described what they were thinking before, while, and after completing the writing task. The participant was allowed to choose which segments to comment on. The SRs were video-recorded. Next, the student responded to the follow-up interview.

The essays were rated holistically (out of 90) by two independent, trained Paragon raters using the rating scale for the writing section of the CAEL. Interrater reliability was 89.2% (Paragon, 2021). The final score for each writing sample is the average of the scores assigned by two raters.

Coding of the Stimulated Recalls

To address RQ1, the eight SRs were transcribed and segmented into idea units, and each unit was coded (using *NVivo*) in terms of the aspects of writing and the cognitive processes that the participants mentioned (cf. Mateos et al., 2008; Sasaki, 2000). The coding scheme built on models and schemes from the literature (e.g., Barkaoui, 2015; Cumming, 1989; Knouzi, 2020; Plakans, 2008; Sasaki, 2000; Shaw & Weir, 2007) and preliminary analyses of data from this study. The final coding scheme consisted of 43 writing strategies under eight main categories: interacting with the task, interacting with sources, planning and organizing, generating and retrieving, evaluating and monitoring, revising and editing, detecting and solving writing difficulties, and procedural (see Appendix for definitions and examples of codes). The interviews were analyzed qualitatively to identify themes related to the research questions of the study.

To address RQ2, I compared the writing processes reported in the eight SRs across the two proficiency levels. Finally, to complement these group-level analyses, provide a more detailed description of the writing processes engaged by the integrated tasks, and illustrate how these processes vary across proficiency levels, I purposefully selected two participants, one from each proficiency level, and conducted an in-depth qualitative analysis and comparisons of their SRs and their written responses.

Findings

The first section of the findings describes the writing processes reported in the SR (RQ1), while the second section compares these processes across the two proficiency levels (RQ2).

RQ1: Cognitive Processes Observed in the Stimulated Recalls

Table 1 reports descriptive statistics for all the codes from the SRs of the eight participants. The eight participants reported a total of 1,217 strategies (average: 152.13 per SR/student, range: 103 to 227). The table shows that the most frequently reported category of strategies was evaluating and monitoring (28.81%), followed by interacting with sources (19.80%), planning and organizing (16.86%), detecting and solving writing difficulties (10.59%), generating and retrieving (9.97%), revising and editing (7.24%), interacting with the task (3.66%), and procedural (3.07%). The following paragraphs describe each of these categories.

Table 1

Frequencies and Percentages of Strategies Reported in the Stimulated Recalls (*N* = 8 students)

	N students who used the strategy	Frequency of each strategy in 8 SRs		Percentage of times each strategy was used in 8 SRs
Code		**Total**	**Average**	**Average**
Interacting with the task	*8*	*48*	*6.00*	*3.66*
Reading test instructions	6	9	1.13	0.70
Reading or rereading the writing task	4	10	1.25	0.69
Reflecting on writing task	6	18	2.25	1.40
Checking comprehension of writing task	3	6	0.75	0.53
Checking language used in writing task	3	5	0.63	0.35
Interacting with sources	*8*	*250*	*31.25*	*19.80*
Reading/listening to source texts	8	33	4.13	2.77
Processing source texts	4	13	1.63	0.98
Reflecting on or analyzing source texts	5	19	2.38	1.48
Integrating sources	7	177	22.13	13.90
Mining	8	129	16.13	9.99
Reacting to sources	6	8	1.00	0.66
Planning and organizing while writing	*8*	*205*	*25.63*	*16.86*
Goal setting	8	82	10.25	6.51
Macro planning	8	34	4.25	2.58
Micro planning	8	46	5.75	4.01
Organization	8	43	5.38	3.74
Generating and retrieving	*8*	*123*	*15.38*	*9.97*
Retrieving an already constructed plan	4	15	1.88	1.06
Self-based generating	8	61	7.63	5.43
Text-based generating	6	10	1.25	0.76
Task based generating	2	2	0.25	0.15
Source-based generating	6	35	4.38	2.58
Detecting and solving writing difficulty	*8*	*130*	*16.25*	*10.59*
Difficulty with Content	7	22	2.75	1.87
Difficulty with Language	8	46	5.75	3.84
Difficulty with Rhetoric	4	6	0.75	0.53
Evaluating and monitoring	*8*	*342*	*42.75*	*28.81*
Reading to monitor	8	64	8.00	5.51
Evaluating Local text	8	92	11.50	7.64
Evaluating Global text	6	24	3.00	1.95
Evaluating Content	6	20	2.50	1.51
Evaluating Language	8	83	10.38	6.96
Evaluating Rhetoric	7	17	2.13	1.40
Evaluating own essay in relation to source use	5	12	1.50	0.88
Evaluating Text length	4	12	1.50	1.18

Reacting to own writing	3	7	0.88	0.64
Judgement of own competence	4	11	1.38	1.15
Revising and editing	*8*	*86*	*10.75*	*7.24*
Content	3	8	1.00	0.60
Language	8	52	6.50	4.48
Rhetoric	2	2	0.25	0.15
Source use	1	2	0.25	0.11
Typography or spelling revision	7	18	2.25	1.53
Difficulty revising	3	4	0.50	0.37
Procedural	7	33	4.13	3.07
Describing actions	6	16	2.00	1.52
Verbalizing a proposition	5	11	1.38	0.95
Checking the time	1	4	0.50	0.49
Making notes	1	2	0.25	0.12
Grand Total		*1217*	*152.13*	*100.00*

Interacting with the Task*:* Table 1 shows that all participants reported interacting with the task (reported 48 times by the eight participants). This involved reading the test instructions ($n = 8$, $f = 9$[1]), reading and rereading the writing task ($f = 10$), reflecting on and analyzing the writing task in terms of its requirements ($f = 18$), checking or confirming comprehension of the writing task ($f = 6$), and/or checking language used in the writing task ($f = 5$).

Interacting with Sources: Interacting with sources was reported 250 times by the eight participants, accounting for about one-fifth (19.80%) of all the reported strategies. The participants reported using reading and listening strategies while reading or listening to the sources (reported 33 times). Four participants reported processing the source texts in more depth by monitoring, checking, and/or confirming their comprehension of the lecture and/or the reading text, detecting problems or difficulties comprehending the source texts, and/or using comprehension strategies to address these difficulties. Five participants reported reflecting on, evaluating, and/or analyzing the source texts by identifying the rhetorical structures of the source texts, stating the main ideas of the source texts, and/or drawing conclusions that go beyond the information provided in the source texts.

Almost all participants ($n = 7$) reported trying to integrate ideas from the source texts as well as establishing connections between ideas in the reading and the lecture and/or connecting ideas from the text or lecture to their own ideas and experiences either before or while they were writing. All participants also engaged in mining the source texts. As Table 1 shows, mining was reported 129 times by the eight participants and accounted for one-tenth (9.99%) of all the reported strategies. Specifically, the participants engaged in reading and mining the source texts for ideas to use in their essays; rereading the reading text and/or lecture notes to get ideas for their essay; using the sources to support their opinion or position on the topic, to gain language support from the sources, and/or to use the sources as a model for organizing their essays. In doing so, the participants reported taking and referring to their notes from the sources and to engaging in copying, summarizing, paraphrasing, and/or citing the source texts. Note here that, out of eight SR participants, only two students reported that they engaged in copying, citing, or summarizing, while four reported engaging in paraphrasing material from the source texts. Finally, most of the participants ($n = 6$) reacted in personal and affective ways to the reading and/or the lecture.

[1] *n* refers to the number of students (out of 8) who reported using a given strategy, while *f* refers to the number of times (frequency) those students reported using that strategy.

Planning and Organizing: Planning and organizing accounted for 16.86% of all the reported strategies. All participants engaged in planning and organizing to some extent ($n = 8$, $f = 205$). Setting goals related to audience (e.g., how to convince the reader), content (e.g., what to write about), and/or form (i.e., the language and organization of the essay) was the most frequently reported planning strategy, accounting for 6.51% of all the processes reported in the study ($n = 8$, $f = 82$ occurrences).

All SR participants engaged in macro-planning ($n = 8$, $f = 34$), micro-planning ($n = 8$, $f = 46$), and thinking about the organization of their essays, including the planning of the introduction and/or the conclusion ($n = 8$, $f = 43$).

Generating and Retrieving: The retrieval and generation of ideas accounted for 9.97% of all the processes reported by the eight participants. Four sources of generating and retrieving ideas were reported: self-based, text-based, task-based, and source-based. Self-based generating (i.e., retrieving relevant information from long-term memory and/or generating an idea without any stimulus) was the most frequently reported strategy ($n = 8$, $f = 61$), followed by source-based generating (i.e., retrieving information from and/or generating an idea based on the source texts, $n = 6$, $f = 35$), text-based generating (i.e., rereading text written so far and generating ideas, $n = 6$, $f = 10$), and task-based generating (i.e., generating ideas after (re)reading the task instructions, $n = 2$, $f = 2$).

Detecting and Solving Writing Difficulties: The participants reported experiencing some writing difficulties ($n = 8$, $f = 130$; 10.59%) related mainly to language (e.g., grammar, vocabulary, $n = 8$, $f = 46$), content (e.g., not knowing what to write/say, $n = 7$, $f = 22$), and, to a lesser extent, rhetoric (i.e., organization and coherence, $n = 4$, $f = 6$). The participants reported solving some of these of problems but not all of them.

Monitoring: All participants reported monitoring their writing to some extent and almost third of all the reported processes related to monitoring ($n = 8$, $f = 342$, 28.81%). All participants reported reading or rereading their essays to evaluate them at various points during the writing process ($n = 8$, $f = 64$). They evaluated their essays at the local level, that is, part of the generated text (e.g., a sentence, word, $n = 8$, $f = 92$) more frequently than they evaluated them at the global level (i.e., paragraph and above; $n = 6$, $f = 24$).

In terms of writing aspects reviewed, the participants reviewed language (grammar, vocabulary/lexis, word forms, spelling, punctuation; $n = 8$, $f = 83$), content ($n = 6$, $f = 20$,), rhetoric (organization and coherence; $n = 7$, $f = 17$), source use ($n = 5$, $f = 12$), particularly appropriate citation and source integration (i.e., whether and how sources are integrated), and text length ($n = 4$, $f = 12$). Some participants also reacted in personal and affective ways to their own writing overall ($n = 3$, $f = 7$,) and made judgements about their own competence ($n = 4$, $f = 11$).

Revising and Editing: As a result of monitoring activities, the writer may decide to revise and/or edit their text (Field, 2004). Editing and revising accounted for 7.24% of the reported processes ($n = 8$, $f = 86$). Most revisions ($n = 8$, $f = 52$) related to language (i.e., spelling, grammar, vocabulary, punctuation and format, or phrasing) followed by typography and spelling ($n = 7$, $f = 18$). Few revisions were made in relation to content ($n = 3$, $f = 8$), rhetoric ($n = 2$, $f = 2$), or source use ($n = 2$, $f = 2$). Some participants also reported experiencing difficulties with revising their essays ($n = 3$, $f = 4$).

Procedural: The participants also reported some procedural activities (3%) such as describing their actions, verbalizing prepositions (i.e., what has been written or they intend to write), making notes, and checking the time.

RQ2: Variation in Cognitive Processes by ELP Level

Table 2 reports descriptive statistics for the percentage of the main strategy categories reported by the eight SR participants by ELP level. Given the small sample size (n = 8), no statistical tests were conducted. Table 2 shows that, in general, HP participants tended to interact with the sources and the task, engaging in planning and organizing, generating and retrieving, and revising and editing more frequently than the LP participants. The latter group tended to report evaluating and monitoring, experiencing difficulties with writing, and procedural activities more often than the HP students.

Table 2

Means Percentage of Main Strategy Categories by ELP Level (N = 8 students)

	ELP Level	
Category	***Low*** *(n = 3)*	***High*** *(n = 5)*
Interacting with the task	3.34	3.85
Interacting with sources	17.30	21.30
Planning and organizing	14.18	18.46
Generating and retrieving	7.18	11.65
Evaluating and monitoring	31.79	27.02
Revising and editing	6.85	7.47
Detecting and solving writing difficulty	14.37	8.33
Procedural	4.99	1.92

To better understand the choices and constraints that mediated the participants' writing, I purposefully selected two SRs for further in-depth analysis to complement the group-level comparisons reported above, provide a more detailed description of the writing processes engaged by the integrated tasks, and illustrate how these processes vary across proficiency levels. The following analyses show how two students, Hana,[2] a HP participant, and Lea, a LP participant, approached the writing task, and they reveal the sequence of decisions they made, the difficulties they encountered, the aspects of writing they prioritized, and the joint effect of all these factors on the quality of their essays. Hana's listening and reading comprehension scores were 8/11 and 9/11, respectively; she obtained a score of 90 (out of 90) on her essay. Lea's listening and reading comprehension scores were 5/11 and 6/11, respectively; she obtained a score of 50 on her essay.

Table 3 presents the frequency and ratio of each of the eight categories of cognitive processes coded in the SRs of Hana and Lea. It shows that Hana attended equally to planning and organizing, generating, and retrieving, and evaluating and monitoring, while Lea focused mostly on evaluating and monitoring and, to a much lesser degree, on generating and retrieving, solving writing difficulties, and revising and editing. Hana referred to the task (i.e., writing prompt) three times and to the source texts ten times, while Lea reread the task five times and checked the source texts only four times.

[2] All names are pseudonyms.

Table 3

Number and Ratio of Cognitive Strategies Reported by Hana and Lea

	Hana		Lea	
	n	%	*n*	%
Interacting with the task	3	4.35	5	6.10
Interacting with sources	10	14.49	4	4.88
Planning and organizing while writing	16	23.19	9	10.98
Generating and retrieving	17	24.64	13	15.85
Detecting writing difficulty	2	2.90	11	13.41
Evaluating and monitoring	14	20.29	21	25.61
Revising and editing	4	5.80	10	12.20
Procedural	3	4.35	9	10.98
Total	69		82	

Hana

Hana's relatively high listening and reading comprehension scores suggest that she understood the main ideas of the two sources, which in turn facilitated her interaction with and integration of pertinent ideas from the listening notes and the reading passage. In fact, in the pre-writing stage, Hana's references to the two source texts were strategic and effective, guided by a good recollection of the rhetorical structure and idea map of each text. She started by translating the writing prompt into a writing goal that subsequently directed her source-based idea generation. After reading the prompt, she established that the topic "is not about the history of speech recognition technology and I think I can find the information of this topic of this in the uh in the last paragraph of the reading passage and the lecture notes." She proceeded to reread the introduction of the passage and then skimmed the rest to the text and reread the topic sentence of each paragraph as she "was trying to recall … recall the topic of … paragraphs." Having confirmed that the relevant sections are located towards the end of the passage and lecture notes, she then reread these two parts "line-by-line … to find some points [she] can use in the essay." This mining of the source text for ideas then changed into mining for sentences she could copy or paraphrase (e.g., "I think the second sentence can be used in the essay"), suggesting that she was actively formulating an outline for her essay and already "composing" chunks of text in her mind.

This careful rereading at the pre-writing stage led Hana to revise her initial writing plan. She first set out to write about "the advantages and risks" of SRT, but when she could not "find too much" in the texts about these two points, she abandoned this plan and decided to expand two ideas from the source texts (i.e., that SRT will make interactions *easier* and more *natural*). She navigated several times between the two source texts, "trying to connect the future directions of the lecture notes, uh with the paragraphs in reading passage … trying to find some similarities and connections between reading passages and lecture notes." The idea of SRT making human interaction *easier* in the future was mentioned explicitly in both source texts: the passage points out that SRT made hands-free interactions with computers easier, which is especially convenient for people with limited physical ability, while the lecture (notes) refer to smart home technologies as an example of easy human–computer interactions. The idea of *natural* interactions was mentioned in the passage explicitly to describe the quality of spoken language and how it

inspires future human–computer interaction research direction. The lecture referred to automated speech translation and the growing ability of computers to recognize and respond to human speech but did not use the word "natural." Hana explained that she borrowed the idea of speech-translation from the listening notes but mined the reading passage to find the word "natural." This lengthy mining process (17 minutes of prewriting word-search and idea generation) culminated in a one-sentence introduction: "With the development of speech recognition technology, we will be able to interact more easily and naturally with other people."

Hana wrote two body paragraphs, one to explain the "easy" aspect of future SRT-supported interactions and the second about the "natural" aspect. Her first paragraph, built on the idea unit (borrowed from the passage) of the convenience of SRT-supported technology for people with limited physical abilities, was interrupted by several pauses and revisions. While the idea seemed clear in her mind, she re-evaluated it several times to ensure it responded to the task requirements. She set several local goals and reread her emerging text to evaluate its coherence and flow, but also its appropriateness. For instance, she first decided to explain in her own words the concept of hands-free technology. She then took a long pause, reread her own text, and stated,

> This may be a distraction from the first sentence because it, because [it] focuses on interaction with other people. uh if I talk, talk more about how people were will not rely on their hands to interaction with technology it's a distraction [so I] try trying to uh move the concentration of the sentence uh from technology to interaction with people.

During the writing stage, Hana referred to the source texts (mainly the reading passage) at transition points (i.e., between paragraphs) mainly for word searches and specific ideas. Having gained increasing control over her ideas and the organization of her text, she needed only source text vocabulary to complete her sentences. For instance, while editing her first body paragraph, she struggled to finish one sentence, so she skimmed through the reading passage "searching for some words … some verbs." This search led to the borrowing of the verb "control," which Hana used in a slightly different context. While the source text referred to a person *controlling* a mouse and pointer to operate and interact with a computer, Hana highlighted one of the advantages of the new SRT, where "people will not rely on their hands and eyes to *control* the devices." At another point in her writing, Hana considered borrowing an example from the listening notes but decided not to because "it's not good way to explain [her] views." These deliberate choices suggest that Hana was able to use the source texts as a resource and to transform the language and content she gained from them to better meet the rhetorical goals she set.

Lea

Lea stated at the beginning of the SR that she did not understand the reading passage and did not answer some reading and listening comprehension questions. Upon reading the writing prompt, she reviewed the lecture notes hoping they would help her better decode and process the text: "I didn't uh really understand the text. So, I tried to [go] through the lecture notes uh let me more uh understand of the text, was the ... that's the (reason) … the [lecture] note is more clear than the reading text." Following this brief review of the lecture, Lea started writing the introduction to her essay.

Lea's writing process was fragmented, as she proceeded by adding short stretches of text (usually phrases or clauses) and then stopping to think "what's next." There was no evidence of global or local planning in her SR while she focused on evaluating local lexical choices. For example, Lea started her essay by typing "In our life, cell phones." A long pause followed during which Lea searched for a more academic way of expressing her idea, but she could not think of an alternative. She therefore decided to keep the text

and simply complete the clause ("In our life, cellphone totally change our daily life"). This pattern (writing sentence parts, stopping to think of what to write next, abandoning goals because of lack of resources) characterized Lea's writing for the rest of the essay ("I stop for long time for many times because I don't know what should I say yeah what should say what should I write"). She explained that grammatical and lexical decisions were the most challenging to make. She often lacked the grammatical knowledge and lexical repertoire to solve these language difficulties. She stated,

> I already know what I want to say but I don't know what I should explain clearly. so, I think of how to how to write but due to my yeah you can say my grammar is bad so the grammar is my biggest problem for uh during my writing. So meantime, I stop my writing as the most part because of my I'm thinking about grammar and think about the vocabulary.

In most cases of language difficulties, Lea resolved the issue with the limited resources she had (self-generated solution). In one instance, however, she glanced at the lecture notes and copied a few words verbatim.

The detailed description of Hana's and Lea's SRs suggests that the two participants' level of source-text comprehension determined to a large extent their ability to recall and integrate source-text material in their emerging texts. Because Lea struggled with understanding the vocabulary in the text and therefore did not have a good grasp of the ideas or rhetorical organization of the passage, her comprehension was limited, and she relied almost entirely on self-generated ideas. Lea's approach exemplifies the "knowledge telling" writing process typical of novice or low-proficiency writers where thematically related ideas/sentence are strung together without much attention to audience expectations, rhetorical organization, or using and connecting the source texts as the task requires. During the writing phase, Lea's limited lexical repertoire and partial understanding of the topic of SRT continued to complicate her writing process and led to a cognitive overload triggered by language (word- and sentence-level) difficulties. Hana, on the other hand, showed greater level of control and resourcefulness. She was able to make connections between the two source texts and with her own ideas. She formulated clear rhetorical goals but revised them to better meet the task requirements.

Summary and Discussion

The stimulated recall data indicated that the eight participants engaged in a range of relevant cognitive processes while completing the task, including interacting with the task and the sources, planning and organizing, generating and retrieving, evaluating and monitoring, detecting and solving writing difficulties, and revising and editing. These processes are consistent with expectations regarding the processes that writers would engage in when writing from sources as described in the literature (e.g., Field, 2004; Plakans et al., 2019).

The stimulated recall data also indicated that the HP participants tended to interact with the sources and task more often than did the LP students. In addition, the HP students tended to engage in planning and organizing, generating and retrieving, and revising and editing more frequently than did the LP participants, who tended to report difficulties with writing and procedural activities mor often. The discrepancy between the group-level analysis of SRs (i.e., some ELP-related differences), and the patterns revealed in the two case studies (i.e., substantial differences in overall approach and range and type of

processes engaged by HP and LP participants) may be due to the sample size in the study, which is too small to detect real differences across groups.

The findings corroborate the results of similar studies (e.g., Gebril & Plakans, 2009; Yang & Plakans, 2012) that show a direct effect of the number and type of strategies applied to the comprehension of the source text by students at different proficiency levels on their writing strategies and text features. Gebril and Plakans (2009) found that HP EFL students wrote longer essays and showed more overall source use compared to LP students, with the greatest difference registered between students at the lowest and the highest proficiency levels. The authors suggested that there seems to be a proficiency threshold that students should pass before successfully integrating reading sources in their writing. Similar to the findings reported above, the LP participants in Gebril and Plakans (2009) reported having trouble with numerous vocabulary items and structures in the two reading texts.

The findings of the study can be used to guide the development of teaching resources and planning instructions for completing integrated writing tasks in Canadian EAP/L2 writing classrooms and beyond. In light of the SR analysis, it seems essential that instructors guide students through all stages of completing an integrated task. Two types of questions can support students' understanding of source texts. Guiding questions, assigned during reading, can help students locate and appraise important claims in the source texts. Post-reading comprehension questions can be used to monitor students' understanding of the source texts before they start writing. Modeling strategies for purposeful reading or listening such as note-taking and completing discourse-structure graphic organizers can support students' understanding of the rhetorical organization and idea map of source texts, which in turn should facilitate recalling and integrating pertinent ideas and/or language from the source texts into their writing. Modelling and practicing metacognitive strategies that students can use when navigating between the reading and the writing spaces of the task also appear to be crucial. These strategies, as observed in Hana's SR for instance, helped her make effective decisions on when and why to refer to or use the source texts. In this case, Hana's high proficiency allowed her to allocate cognitive resources to the recalling and mapping of relevant content in the source texts without needing to take notes or draw a graphic organizer, as often recommended in the literature (e.g., Dovey, 2010). However, for Lea, who had to attend to solving language- and discourse-level issues at both the comprehension and production stages, the lack of these strategies proved detrimental.

It is interesting to note that neither Hana nor Lea acknowledged the source texts in their essays. Hana, who drew on source ideas and language, did not use language of attribution (e.g., quotation, paraphrasing), possibly because she did not perceive this as a task requirement. Lea, on the other hand, appears to be below the ELP threshold that would allow her to capitalize on the passage and lecture notes as useful resources. This draws attention to two different reasons for students' transgressive intertextual practices, which could be addressed differently in the classroom by explicitly explaining the expectations of academic writing and the function of citation in establishing author credibility and voice and teaching the assessment criteria of integrated tasks.

Limitations and Future Research

The study has some limitations. First, the small sample size may explain the lack of significant differences across ELP levels (see Table 2). Unfortunately, due to the effects of the COVID19 pandemic on registration in ESL courses, it was not possible to recruit more participants even after extending the study by several months. Second, self-report methods of writing processes, including stimulated recalls, have their limitations. For example, participants might have reported only some of the writing activities they engaged in during the test and/or reported other activities that they thought of during, or because of, the process of being asked about these activities. However, it is important to note that the use of two methods allowed

for depth (through the analysis of SR and two case studies) of analysis, which provided a rich description of the processes used by the integrated task and indicated that mixed integrated tasks do engage L2 writers in relevant and important writing processes, including planning and revising their texts and consulting and using the provided sources. There is also evidence that these processes vary depending on learner proficiency level. Further research should consider how students' understanding of the integrated task requirements and their epistemological beliefs about text authority and knowledge construction affect their interpretation of and response to integrated writing tasks that include different types of sources and different requirements.

Acknowledgements

This study was funded by Paragon Testing. I would like to thank the participants of the study and Khaled Barkaoui, the co-investigator on the project. The opinions expressed in the paper are those of the author.

The Author

Ibtissem Knouzi is an assistant professor at York University. Her research interests include second language reading and writing, classroom discourse, and activity theory.

References

Abrams, Z. I. (2019). The effects of integrated writing on linguistic complexity in L2 writing and task-complexity. *System*, *81*, 110–121. https://doi.org/10.1016/j.system.2019.01.009

Barkaoui, K. (2015). Candidates' writing activities during *TOEFL-iBT*® writing tasks: A stimulated recall study. (TOEFL iBT Research Report No. 25, ETS Research Report No. RR-15-04). Educational Testing Service. https://doi.org/10.1002/ets2.12050

Barkaoui, K. (Forthcoming). Examining performance on an integrated writing task from a Canadian English language proficiency test. *The Canadian Modern Language Review*.

Beaufort, A. (2004). Developmental gains of a history major: A case for building a theory of disciplinary writing expertise. *Research in the Teaching of English*, *39*(2), 136–185. http://www.jstor.org/stable/40171658

Bråten, I., & Samuelstuen, M. S. (2004). Does the influence of reading purpose on reports of strategic text processing depend on students' topic knowledge? *Journal of Educational Psychology*, *96*(2), 324–336. https://doi.org/10.1037/0022-0663.96.2.324

Bråten, I., & Strømsø, H. I. (2006). Effects of personal epistemology on the understanding of multiple texts. *Reading Psychology*, *27*(5), 457–484. https://doi.org/10.1080/02702710600848031

Carson, J. G. (2001). Second language writing and second language acquisition. In T. Silva & P. Matsuda (Eds.), *On second language writing* (pp. 191–199). Routledge.

Cho, Y., Rijmen, F., & Novák, J. (2013). Investigating the effects of prompt characteristics on the comparability of TOEFL iBT™ integrated writing tasks. *Language Testing*, *30*(4), 513–534. https://doi.org/10.1177/0265532213478796

Cumming, A. (1989). Writing expertise and second language proficiency. *Language Learning*, *39*(1), 81–141. https://doi.org/10.1111/j.1467-1770.1989.tb00592.x

Cumming, A., Kantor, R., Baba, K., Erdosy, U., Eouanzoui, K., & James, M. (2005). Differences in written discourse in independent and integrated prototype tasks for next generation TOEFL. *Assessing Writing*, *10*(1), 5–43. https://doi.org/10.1016/j.asw.2005.02.001

Dovey, T. (2010). Facilitating writing from sources: A focus on both process and product. *Journal of English for Academic Purposes*, *9*(1), 45–60. http://dx.doi.org/10.1016/j.jeap.2009.11.005

Field, J. (2004). *Psycholinguistics: The key concepts*. Routledge.

Gebril, A., & Plakans, L. (2016). Source-based tasks in academic writing assessment: Lexical diversity, textual borrowing and proficiency. *Journal of English for Academic Purposes*, *24*, 78–88. https://doi.org/10.1016/j.jeap.2016.10.001

Gebril, A., & Plakans, L. (2009). *Investigating source use, discourse features, and process in integrated writing tests* (Vol. 7, No. 1, pp. 47–84). Spaan Fellow Working Papers in Second or Foreign Language Assessment.

Grabe, W. (2003). Reading and writing relations: Second language perspectives on research and practice. In B. Kroll (Ed.), *Exploring the dynamics of second language writing* (pp. 242–262). Cambridge University Press.

Knouzi, I. (2020). The writing processes and problem-solving strategies of advanced L2 writers when responding to different writing tasks In M. Riazi, L. Shi, & K. Barkaoui (Eds.), *Studies and essays on learning, teaching and assessing second language writing in honour of Alister Cumming* (pp. 126–151). Cambridge Scholars Publishing.

Li, Y. (2013). Three ESL students writing a policy paper assignment: An activity-analytic perspective. *Journal of English for Academic Purposes*, *12*(2), 73–86. https://doi.org/10.1016/j.jeap.2012.11.006

Liu, G.-Z., Lin, V., Kou, X., & Wang, H.-Y. (2016). Best practices in L2 English source use pedagogy: A thematic review and synthesis of empirical studies. *Educational Research Review*, *19*, 36–57. https://doi.org/10.1016/j.edurev.2016.06.002

Mateos, M., Martín, E., Villalón, R., & Luna, M. (2008). Reading and writing to learn in secondary education: Online processing activity and written products in summarizing and synthesizing tasks. *Reading and Writing: An Interdisciplinary Journal*, *21*, 675–697. https://doi.org/10.1007/s11145-007-9086-6

McCulloch, S. (2013). Investigating the reading-to-write processes and source use of L2 postgraduate students in real-life academic tasks: An exploratory study. *Journal of English for Academic Purposes*, *12*(2), 136–147. https://doi.org/10.1016/j.jeap.2012.11.009

Petrić, B., & Harwood, N. (2013). Task requirements, task representation, and self-reported citation functions: An exploratory study of a successful L2 student's writing. *Journal of English for Academic Purposes*, *12*(2), 110–124. https://doi.org/10.1016/j.jeap.2013.01.002

Plakans, L. (2008). Comparing composing processes in writing-only and reading-to-write test tasks. *Assessing Writing*, *13*(2), 111–129. https://doi.org/10.1016/j.asw.2008.07.001

Plakans, L. (2009a). Discourse synthesis in integrated second language writing assessment. *Language Testing*, *26*(4), 561–587. https://doi.org/10.1177/026553220934019

Plakans, L. (2009b). The role of reading strategies in integrated L2 writing tasks. *Journal of English for Academic Purposes*, *8*(4), 252–266. https://doi.org/10.1016/j.jeap.2009.05.001

Plakans, L. (2010). Independent vs. integrated writing tasks: A comparison of task representation. *TESOL Quarterly*, *44*(1), 185–194. https://www.jstor.org/stable/27785076

Plakans, L., & Gebril, A. (2017). Exploring the relationship of organization and connection with scores in integrated writing assessment. *Assessing Writing*, *31*, 98–112. https://doi.org/10.1016/j.asw.2016.08.005

Plakans, L., Liao, J.-T., & Wang, F. (2019). "I should summarize this whole paragraph": Shared processes of reading and writing in iterative integrated assessment tasks. *Assessing Writing*, *40*, 14–26. https://doi.org/10.1016/j.asw.2019.03.003

Qin, J., & Liu, Y. (2021). The influence of reading texts on L2 reading-to-write argumentative writing. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.655601

Ruiz-Funes, M. (2001). Task representation in foreign language reading-to-write. *Foreign Language Annals*, *34*(3), 226–234. https://doi.org/10.1111/j.1944-9720.2001.tb02404.x

Sasaki, M. (2000). Toward an empirical model of EFL writing processes: An exploratory study. *Journal of Second Language Writing*, *9*(3), 259–291. https://doi.org/10.1016/S1060-3743(00)00028-X

Shaw, S. D., & Weir, C. (2007). *Examining writing: Research and practice in assessing second language writing*. Cambridge University Press.

Thompson, C., Morton, J., & Storch, N. (2013). Where from, who, why and how? A study of the use of sources by first year L2 university students. *Journal of English for Academic Purposes*, *12*(2), 99–109. https://doi.org/10.1016/j.jeap.2012.11.004

Wolfersberger, M. (2013). Refining the construct of classroom-based writing-from-readings assessment: The role of task representation. *Language Assessment Quarterly*, *10*(1), 49–72. https://doi.org/10.1080/15434303.2012.750661

Yang, H.-C., & Plakans, L. (2012). Second language writers' strategy use and performance on an integrated reading-listening-writing task. *TESOL Quarterly*, *46*(1), 80–103. https://doi.org/10.1002/tesq.6

Yang, L., & Shi, L. (2003). Exploring six MBA students' summary writing by introspection. *Journal of English for Academic Purposes*, *2*(3), 165–192. https://doi.org/10.1016/S1475-1585(03)00016-X

Appendix: SR coding scheme with examples from this study

A. Interacting with the task		
	Reading test instructions	I actually read the question first [reads question] and after reading this thing I went to the entire like you know the guidelines taking us and they said to refer to the reading passage and the notes, so one time done this, I open the reading passage and lecture notes one each. (H5)
	Reading or rereading the writing task	like I read the questions and I I'm just going back and forth to see what note should I have (H3)
	Reflecting on writing task	I uh like for most of the reason I I uh I still need to understand the question and so I need to read and read understand it deeply (L3)
	Checking comprehension of task	I went back to instruction because I have to know what I supposed to do like I don't want to write 200 words and realized I wrote a wrong topic so, that's what I did before start writing. (H2)
	Checking language used in writing task	I was thinking how to s- how to write the first sentence [background noise] uh, I started with describing the the phenomena of the, not phenomena just just try to write down the words from the ... uhm write down the words [background noise] from the subject [question]. (H1)
B. Interacting with sources		
	Reading/listening to source texts	I was thought like read maybe four or three words from a sentence. so that's that way I can read it faster and maybe it's easier together like keywords (H2)
	Processing source texts	I would read it the first sentence and the last sentence. So, I can see what is the topic about. So look through the passage and realized that's I already seen before the same topic (H2)
	Reflecting on or source texts	[Looking at lecture notes] Uh yeah I want to check because this looks like outline and this part smartphones and next part it is uh that home system and also first one is connect with readings try this to get information what I need (L1)
	Integrating sources	Uhm I was trying to connect the future directions of the lecture notes, uh with the paragraphs in reading passage. I was trying to find some s- similarities and connections between pa- between reading passages and lecture notes. (H1)
	Mining	Uh yeah. I realized this is my third time come back to the reading. still looking for the information. I'm still ''m still gathering information and thinking sometimes I just look through passage over and over again the information maybe the topics and also look through what I can extract from article. (H2)
	Reacting to sources	The (follow) reading task is not related to my ideas and this harder to find something really (L3).
C. Planning and organizing while writing		
	Goal setting	I have I haven't typed it out because I still need a good topic sentence to attract audience that's why thinking of what is good (H3)
	Macro planning	First, I just write cons what do I think of the cons because this segment it doesn't have much cons now conclusion so in conclusion I just like overall summarize my ideas at the end (H3)

Micro planning	So I was thinking an example So I write this statement that was in my opinion It is a good thing but I come back to here and I get to give an example (H5)
Organization	I was thinking to write down two paragraphs. The first is to explain how to interact easily the second is how to interact naturally (H1)
D. Generating and retrieving	
Retrieving an already constructed plan	So I discussed three points in my mind right so I was like OK which one to put first so I was confused that whether it should be spoken language one or better it should be the gesture, eye tracking one (H5)
Self-based generating	Yeah and also connect with eh real life like on like on it can be replaced in our daily life and I can see most of people can live without the phone yeah, I was thinking about what phone can be used on our daily life and also what did I hear form the listening test (L1)
Text-based generating	uh still thinking what should I say. what should I write next? I think I reread again. yeah, my my text my yeah my writing. (L2)
Task based generating	Maybe I add more I add more of the stuff something Oh yeah I added because I reread the question saying that effective way interact with other people. (H3)
Source-based generating	I used the uh in the first [coughs] in the first sentence I used the the history of basically the evaluation of the technology yes it was in the reading passage yeah, I remember yeah memory yeah (H4)
E. Detecting and solving writing difficulty	
Difficulty with Content	Like for you when you just finish a sentence and suddenly you don't know what to say next so I was thinking how do I continue, what do I say next? so I was thinking. yeah, still thinking (H2)
Difficulty with Language	I at that time I I don't want write down the our life I want to write more some more academic words but, I don't know how to write [laughs] (L2)
Difficulty with Rhetoric	So I discussed three points in my mind right so I was like OK which one to put first so I was confused that whether it should be spoken language one or better it should be the gesture, eye tracking one (H5)
F. Evaluating and monitoring	
Reading to monitor	I came here I'm reading the entire thing [essay] it sounds good so I'm going back (H5)
Evaluating Local text	Reading I was reading the sentence at the does it make sense or not and I find that the spelling of humans is wrong so just correct it (H4)
Evaluating Global text	I came here I'm reading the entire thing [essay] it sounds good so I'm going back (H5)
Evaluating Content	I think I thought it may be a distraction from the first sentence because its uh because focuses on interaction with other people. uh if I talk talk more about how people were will will not really on their hands to interaction with technology it's it's a distraction (H1)

Evaluating Language	I wri- wrote for example but in my article, I wrote too many for example for example for example so let me change maybe with another expression (H2)
Evaluating Rhetoric	Sorry this sentence that this sentence that maybe more independent stuff like that so uh sure makes sense we take the preceding paragraph so jump back to the (succeeding) and then I just put it there (H4)
Evaluating own essay in relation to source use	I didn't used the exact words I just used banks and school because we are not supposed to copy the entire paragraph so I was screening the statement here to how to include banks and schools and everything (H5)
Evaluating Text length	I will I just the word count and see I wrote too much (H2)
Reacting to own writing	I came here I'm reading the entire thing it sounds good so I'm going back (H5)
Judgement of own competence	I have been learning English for like seven years, plural and tense is still something I have to think about every time (H2)
G. Revising and editing	
Content	
Language	I think it's a (past) word and then try to correct the word (H1)
Rhetoric	I actually like I I split my though into different statements independent with people and one with that again I just just like speak to the machine and get your work done (H5)
Source use	I was like going in through through that if I put out something in here I just want to rephrase this question so I added in such a situation this is my try to make my statements look good actually sounds good and I changed the statements totally I removed such situation and I add researchers and so I tried to come up with the that the researchers caught up with this statement that researchers called this (x) because I wanted to use the (xx) in modern communication (H5)
Typography or spelling revision	I find that the spelling of humans is wrong so just correct it (H4)
Difficulty revising	I don't know how to replace that so that the problem (L1)
H. Procedural	
Describing actions	I'm reread- because it also is my personal habit, I reread everything that I write(H2).
Verbalizing a proposition	I write on the cellphone can change our live yeah, cellphones are really change our life (L2).
Checking the time	I was trying to think more reasons before I before I forced of mmm, but the the time is not enough (L3)
Making notes	so I have example example and example here [laughs] [takes notes] so I write down so I remember later yeah (H3)