Journal of Modern Research in English Language Studies
Vol. 4, No.3, pp. 95-118, 2017

The Role of Increasing Task Cognitive-complexity in Quality of L2 Writing and Learners' Distribution of Metacognitive Sub-processes

Niloofar Daneshkhah[*]
Lecturer in the Language department of Petroleum University of Technology of Ahvaz, Khuzestan,
Ahmad Alibabaee
Assistant Professor of Applied Linguistics, Sheikhbahaee University, Baharestan, Esfahan

Abstract

The importance of task-based instruction for developing writing as one of the most demanding tasks within SLA field is neglected in many EFL/ESL contexts. The researchers in this study intended to investigate the role of task manipulation in developing EFL learners' grammatical accuracy and lexical complexity of argumentative writing. Furthermore, the task-manipulation effects on the frequency of three meta-cognitive sub-processes of generation, elaboration and organization of ideas were explored. To this end, 50 Iranian EFL learners from Sheikhbahaee University of Esfahan were selected based on their availability and their performance on the Oxford Placement Test. Then, they were randomly assigned to three experimental groups, and one control group. The data were collected individually through a task of writing, think-aloud protocol and retrospective interview. The results showed positive effects of task manipulation along resource-dispersing dimension on the grammatical accuracy and the positive effects of task manipulation along resource-directing dimensions on the lexical complexity. However, the results of the frequency of meta-cognitive sub-processes were indicative of the positive effects of task manipulation on the generation and elaboration of ideas but not on the organization of ideas. The study suggests that there is a trade-off effect at work which is responsible for the quality of the writing and the frequency of the metacognitive sub-processes.

Keywords: cognitive processes; frequency; task-manipulation; resource-directing; resource-dispersing

---

[*] Lecturer in the Language department of Petroleum University of Technology of Ahvaz, Khuzestan, Iran; affiliated to Iran Language Institute (ILI).
Received on:26/10/2017 Accepted on: 31/12/2017
Email: *niloofar.daneshkhah@gmail.com*

1. Introduction

Writing, one of the most important and demanding modes of communication, has found its place in the history of language research as it has always been the issue of investigation (Byrnes & Manchon, 2014; Ruiz-Funes, 2015). However, developing the writing skill is downgraded in many educational programs and is not recognized as an end in itself in many EFL and/or ESL teaching contexts (Al-Jarrah & Al-Ahmad, 2013; Mazdayasna & Tahririan, 2008; You, 2004). Writing tasks in most foreign and/or second language teaching classes serve the secondary role of developing lexical and grammatical knowledge of students, or at best, checking learners' reading comprehension (Zen, 2005). This is while the state of affairs has changed in the contemporary globalized world. Educational advancements and also the increasing desire of studying abroad all accentuate the necessity of improving writing ability (Reichelt, 2005).

One reason for such a setback appertains to the complex nature of writing skill. Writing is a cognitively complicated and dynamic process. It is a misleading mistake to view writing-task completion as a simple linear process of text production in three distinct phases of planning, writing and revision (Bereiter & Scardamalia, 1987; Flower & Hayes, 1980, 1981; Galbraith, 1999, 2009; Hayes, 1996). In fact, the writers do gear to these phases during the writing task as three main cognitive processes, but it is the recursive nature of these three processes and the blurry boundaries which make it hard to distinguish when the writer has finished one stage and when has entered the other stage (Flower & Hayes, 1980). In other words, the writer has to manage a number of cognitive processes simultaneously while doing the task itself (Torrance & Galbraith, 2006). It means, to achieve a high quality text, the writer is engaged in highly complex cognitive processes of planning ideas, translating plans into text, reviewing of ideas and the text, and absolutely, the transition among these stages (Kellogg & Raulerson, 2007; Ong, 2014). The writer has to be able to use his/her cognitive repertoire and linguistic knowledge to coherently link the line of ideas with accurate language use and appropriate structure in order to achieve his/her given communicational and rhetorical goals through the writing task (Frear, 2015). Looking in this way, producing a high quality text needs a high degree of self-regulation of cognition, emotion and behavior to reduce the cognitive load and the momentary demands of writing imposed on the writer (Kellogg, 1996). Mirroring such a complex picture of the writing task, one can well understand why developing learners' writing ability lags behind the numerous existing research works in the same field.

It is however wise to remind that it's not merely a matter of cognitive complexity which makes writing skill underdeveloped among EFL and/or ESL students. Indeed, traditional views on pedagogical policies and instructional methods also the subsidiary role considered for the writing skill constitute a major part of the problem (Zen, 2005). Writing instruction in most of foreign/second language teaching contexts does not go far from practicing lexicon and grammar. The

communicative and purposeful nature of this skill is overlooked. This is while, the students need to write for real-life, academic and vocational purposes. It is not very uncommon to find students with years of language learning who have made little progress in their writing ability due to inappropriate, one-size-fits-all instructional programs also the very fact of frustration caused by writing complexity (Xiao, 2009).

To deal with such a complicated case, one needs to first redefine writing ability and instruction based on its principal and primary role in developing language knowledge and in redirecting the learners towards their realistic purposes. Secondly, one has to remember that no one-size-fits-all method of teaching writing can be a response to the inherent complexity of writing and to the diversity of situations and purposes that FL and/or SL learners have to deal with (Norris & Manchon, 2012). As such, instructional programs need to allow for those new ways of writing instruction which show promises in considering the complexity of writing, its primary position and the uniqueness of the given instructional situations and purposes (Silva & Matsuda, 2010). In this regard, then, task-based pedagogy, with its emphasis on developing learners' communicative competence and the strong affinity for process-oriented approaches and human's cognition and information processing theories of learning seems to be able to provide appropriate answers to the existing skepticism about writing position and instructional policies (Cook, 2000; Ellis, 2003).

2. Literature Review

Task-based research of writing, though very young with respect to L2 writing research (Cho, 2015), developed primarily under the effects of cognitive models of L1 and L2 writing (Bereiter & Scardamalia, 1987; Flower & Hayes, 1980, 1981; Galbraith, 1999; Hayes, 1996). In these models writing task is dynamic and recursive (Flower & Hayes, 1980). There is no borderline to distinguish the different phases involved in writing tasks and the writer has to manage a number of cognitive processes simultaneously (Torrance & Galbraith, 2006). According to Kellogg (2001), a successful writing process is primarily influenced by learner's control over his/her cognition, memory, access to domain-specific knowledge resources, and thinking ability. The conception of simultaneous cognitive processes and the intrusion of phases shifted the tendency of task-based line of research into writing towards more abstract notions of process, individuals' cognition, memory, etc., which were deeply rooted in human conceptual and cognitive system and psychology. This body of knowledge and beliefs indeed led the stream to expand its roots into new trends of research.

First of all, exploring the nature of the processes which happen during a writing task and investigating the underlying layers of human cognition received due attention. One of the most important findings of this line of research was, in short, that there is always a 'monitoring process' or a 'central executive' at work in the human's short-term memory to control and switch the attention, retrieve

representations from long-term memory hence enable task performance (Flower & Hayes, 1980; Hayes, 1996; Kellogg, 1990). There are speculations about the capacity of the monitoring process and its effects on language users' performance. It is conjectured that this memory resource is limited, therefore, the language user cannot fully control all the aspects of performance (Skehan, 1996). Put it another way, there may be a trade-off between aspects of production; i.e. language user's focus on some aspects of production occupies most of the capacity of attentional resources thus other aspects undergo deficiencies (Skehan, 1998, 2003). Lots of studies in this domain sought to investigate the validity of this trade-off effect yet no consistency in results has been situated (Ong, 2014; Ong & Zhang, 2013; Ruiz-Funes, 2015).

Secondly, the linkage between cognitive processes and the quality of aspects of production leads the direction of investigations towards the very concept of aspects of language performance (Ellis, 2003; Skehan, 1996). Ellis indicates that complexity, accuracy and fluency are the three main aspects of language production. Complexity is understood as the scope of language use and the variety of vocabularies. Accuracy is defined as the correctness of lexical or grammatical choices and fluency as the speed with which the language user produces the language (Ellis, 2003; Skehan, 1996). The supposition is that the quality of these aspects is under the influence of different factors during task completion process one of which, as mentioned above, is the limited capacity of mental and attentional resources.

According Robinson (2003), task complexity is another factor which influences language users' aspects of productions. Task complexity is in fact the cognitive load and demand of a task imposed on the one(s) in charge of task performance. When the task becomes cognitively demanding and complex the language user experiences a mounting pressure which affects her/his performance and consequently aspects of her/his final product. Robinson (2001a) maintains that the effects of task complexity can be construed in conceptualization of two functioning dimensions, resource-directing (+/- Here and Now, +/- Reasoning Demands, +/- Few Elements) and resource-dispersing dimensions (+/- Planning, +/- Prior Knowledge, +/- Single Task). These factors are believed to influence writing quality through navigating the attentional resources. In his Triadic Componential Framework (2001b, 2005, and 2007), Robinson states that the former makes conceptual demands and the latter makes procedural demands on the learner.

With the above contextual knowledge in the background, then it is conjectured that the manipulation of resource-directing features increases the accuracy and complexity of the oral production because the learner attends more to the functional aspects of the task; however, the fluency is less valued as the learner has deliberately directed the attentional resources towards the processing of language aspects (Robinson, 2003). On the other hand, an increase in resource-dispersing dimensions frees up the attentional resources because there is no element available to make the attentional resources zoom on any linguistic or functional

aspects of the task. It is hypothesized then, that manipulation of task complexity with regard to resource-directing and resource-dispersing dimensions affects both performance of the learners (Robinson, 2001b, 2003, 2005; Skehan, 1996) and their distribution of cognitive processes (Ong, 2014) during the task performance. This hypothesis turned into a controversial issue of investigation regarding the effects of manipulating task cognitive complexity on the quality of aspects of production (complexity, accuracy and fluency).

A more recent issue in task-manipulation investigations is to study the quality of metacognitive processes of language users during task performance and under the influence of task manipulations. This issue which revisits the role of cognition and process is very young (Ong, 2014) and requires a long way of exploration and seems to have a very rich ground for cultivation. Based on Ong's (2014) findings, manipulation of task complexity can affect the quality and frequency of metacognitive processes such as generation, elaboration and organization of new ideas. Though the quality of the final product was a good starting point, from the vantage point of this new research tradition it receives a secondary consideration; it is the online processes which requires careful examination. These points made the situation even more complex and at the same time shed light on the urgent need to study the whole matter of effects of task complexity more deeply and comprehensively.

Though this line of research is a novitiate in the field of writing, most of the researchers addressed Robinson's (2001a) proposal of task complexity and investigate the effects of resource-directing and resource-dispersing dimensions on the quality of language performance (Ellis & Yuan, 2004; Ishikawa, 2006; Kuiken and Vedder, 2006, 2007, 2008; Ong and Zhang, 2010, 2013) the results of which were not all in the same line and confirmatory. That is why the issue of task-complexity effects on the writing quality is still controversial and of paramount importance to the researchers and teachers. Additionally, the aspects of language production, i.e. grammatical accuracy, fluency and complexity, were either studied from the viewpoint of resource-directing dimensions or the resource-dispersing ones. Therefore, there appears the lack of a comprehensive study which examines the effects of task manipulation through both dimensions. This paucity of a fully-fledged study is even more severe among Iranian researches with the same concerns. The enhancing demands of the Iranian students to learn English for their educational and/or vocational purposes and also the growing number of those who are interested in studying abroad and metaphorically speaking seek the gates of paradise overseas stress the pressing need to develop ways of improving writing skill of Iranian L2 learners. A deep delving into the related literature of Iranian studies (Abdollahzade & Fard Kashani, 2011; Farahani & Meraji, 2011; Ghavamnia, Tavakoli & Esteki, 2011; Hosseini & Rahimipour, 2010; Rahimpour & Nariman-Jahan, 2011; Sadeghi & Mosalli, 2012, 2013) revealed the scarcity of comprehensive studies in this area of inquiry. No study other than Ong's (2014) was found on the effects of task complexity on the distribution of metacognitive sub-processes of the L2 learners.

This is while, cognitive processes of the learners during the writing task performance is of a great significance. Indeed, the self-regulation of underlying cognitive (sub) processes was considered as a key point to the successful writing-task completion (Kellogg, 1990; Kellogg & Raulerson, 2007; Ong, 2014). Moreover, a careful consideration of literature was also indicative of the biased emphasis on manipulation of some factors of resource-directing (+/- Here and Now) and resource-dispersing (+/- Planning time) dimensions at the expense of some other factors in both dimensions such as manipulation of [+/- single task] and [+/- reasoning demands]. Thus, this study held in an embrace the chance to investigate the effects of task manipulation along both resource-directing (+/- single task) and resource-dispersing (+/- reasoning demands) dimensions on writing quality and frequency of metacognitive sub-processes in the wake of recent research developments and with an eye to the existing gaps into the literature. The present research, then, sought to be responsive to the following questions:

1. What are the effects of manipulation of task complexity along a) +/- reasoning demands and b) +/- single task on grammatical accuracy, and lexical complexity of the Iranian L2 learners' written production?
2. What are the effects of manipulation of task complexity along a) +/- reasoning demands and b) +/- single task on the frequency of distribution of metacognitive processes of Iranian L2 learners during writing task?

3.Method

3.1. Research Design

The present study incorporated an experimental design in which the participants had to perform a writing task under four different conditions. The conditions were defined as:

+ single task + reasoning demand (single task, + picture available)
– single task – reasoning demand (dual task, – picture available)
– single task + reasoning demand (dual task + picture available)
+ single – reasoning demand (single task, – picture available, control group).

The single task, + picture available condition was to increase the cognitive complexity of the task along resource-directing dimensions through increasing the items involved in the task with a picture. On the other hand, the second condition (dual task, – picture available) was operationalized through increasing task cognitive complexity along resource-dispersing dimensions. In this condition, the participant had to perform two tasks (outlining and writing) simultaneously while there is no picture available to him/her. The third condition was constituted through increasing task complexity along both the resource-directing and the resource-dispersing dimensions of task complexity (both picture and outlining available) and the last one with a plus-single-task-minus-reasoning-demand condition form the control group condition in which no picture and no outlining were available. In this study, task manipulations (+/- single task and +/- reasoning demands) were the independent

variables and the final grammatical accuracy and lexical complexity were the dependent variables addressed by the first research question. In this study, lexical complexity was defined as the number and variety of the vocabularies used throughout the production and accuracy as the grammatical and native-like command of sentences and structures (Robinson, 2003).

The effect of task manipulation on the frequency of the metacognitive sub-processes was also addressed by the second research question of the present research. In this study, metacognition was defined as the control and awareness one has over his/her cognition (Baker & Brown, 1984; Gourgey, 2001). Metacognitive sub-processes of the learners as the dependent variables in this part were divided into three groups. Firstly, generation of ideas which meant bringing new ideas and information as the content of the task into one's production. Secondly, elaboration of ideas was defined as a way to support the content using examples, definitions and explanations and the last one was organization of ideas which meant the thinking about the sequence of ideas, the overall organization of the production and also the structure (both word-choice and grammar) in which the ideas were put (Ong, 2014).

3.2. Participants

The participants in the present study were recruited from EFL learners of Sheikhbahaee University in Esfahan at the pre-intermediate level of language proficiency. At first, there were 200 students available to take part in the study. All the students had about 24 hours of English instruction per week, including general English and also specialized courses of Teaching English as a Foreign Language (TEFL). Their English backgrounds were almost the same as they had six years of learning English at school. Additionally, none of them have been exposed to any natural native context and they all shared Persian as their L1. As students of TEFL, they were taught the basics of writing in English in a preliminary course of writing. However, when the Oxford Placement Test (OPT) was conducted to choose students with the right level of proficiency, 103 of the participants were dropped out due to either higher or lower level of language knowledge. From the remaining 97 participants 24 did not show up at the right time for different reasons. Finally, 73 participants remained who were randomly assigned to three experimental groups with 18 participants in each and one control group with 19 students. By the time of the data collection another 23 participants were excluded from the study because they could not complete the tasks according to the task and researchers' instructions. So, there remained 50 students who could successfully reach the end point of the data collection procedure

3.3. Instruments

3.3.1. Oxford Placement Test (2001) (OPT)

A test of OPT was used which was consisted of 60 test items and was designed to assess the English language knowledge of the participants. This test was a power test, and was made to be answered in 30 minutes. The level of proficiency was

determined based on the instructions provided by OPT manual. However, the boundary scores were omitted to make sure that the chosen participants have the required level of proficiency. As such, the target sample of this study was chosen from among those who scored 32-46.

3.3.2. Writing Task

All the individual participants of this study were supposed to complete a writing task. As reasoning demand was one of the variables of this study and also as argumentation needs reasoning, evidence and support (Styslinger & Overstreet, 2014), this study found argumentative writing type as the most relevant ground for investigation. So, the following prompt was chosen from among a list of argumentative topics, the appropriateness of which was verified based on the expert judgment of two assistant professors in TEFL and also piloted in a later stage:

Mobile phones have changed the way many people communicate and live. The style of living has been under the effect of smartphones and access to different applications they provide. Nowadays people cannot live without them if they want to be a part of society. To what extent do you think this is true?

As nowadays most of young people are familiar with the smartphones and use the different applications they provide they could better write about their own experiences with the smartphones. In this way, no specialized information was required and the effect of topic knowledge was controlled for.

Though the prompt was the same for all the groups, the types of manipulations of the writing task were different for each group. In fact, the determining factor for the task type in each group was the condition under which the group's participants had to perform the task. For example, under the effects of +/- single task factor, a type of writing task appeared which required a simultaneous paragraph-by-paragraph outlining task (after writing each paragraph its outline have to be written). This was in line with the definition of – single task or + dual task condition (Robinson, 2003). With such a task, the language user has to accomplish two tasks simultaneously (composition phase and outlining phase). This is while, +single task condition did not required the outlining phase.

With regard to reasoning demand factor, a picture was used which at the first sight looked contrary to the prompt given to the individual. For this, the learner was required to use his/her reasoning power and logic to be able to fulfill the task. This picture shows that 72% of smartphone users also use other media such as newspaper, laptop, TV, etc. With this picture, two more writing tasks emerged (+ picture available, - picture available). Thus, these four types of manipulations (single task + picture available, single task + picture unavailable, dual task + picture available, and dual task + picture unavailable) constituted the writing tasks of the three experimental groups and the one control group of the present study.

3.3.3. Think-aloud Protocols

In order to arrive at a better understanding of the frequency of the target metacognitive sub-processes (generation, elaboration and organization of ideas), think-aloud protocols, i.e. explicit verbalization of the thoughts and mental processes (Wong, 2005) were applied. The presupposition was that this way the researcher can delve into what is really happening in learner's mind during writing process (Smagorinsky, 1989, 1994). In fact, this procedure can be revealing because a system of mental processes is at work from the input point of departure to the output point of arrival (Gass & Sleinker, 2008; Kumaravadivelu, 2006; Vanpatten, 2004) which is not tangible in itself and thus there should be a medium available in order to touch it. Though we are aware of the shortcomings ascribed to the think-aloud protocol (see Leow et al, 2014; Wong, 2005 for the most recent discussions), its use is justified in this study as follows:

Think-aloud (TA) provides ways of penetrating into the participants' minds and underlying processes (Mackey & Gass, 2005),

TA has a better elicitation power comparing to the other means used in the previous studies on the cognitive processes (e.g. questionnaires) (Ong, 2014),

TA provides a better match with the requirements and purposes of this study when is triangulated with the retrospective interview,

triangulation decreases the risk of subjective judgment (Leow et al, 2014),

there is no absolutely objective data-collection procedure when human beings are the subjects of study (Leow et al, 2014; Wong, 2005).

3.3.4. Retrospective Interview

This procedure was used as an instrument with high elicitation power for the measuring of unobservable underlying metacognitive sub-processes. The presupposition was that the interactive nature of this procedure directs the researcher towards what she was looking for (Mackey & Gass, 2005). Thus, the researcher finds the chance to delve into the learners' thought and guarantee the findings of think-aloud protocol. As the interview allows the questions and answers in both L`1 and L2, the participants could feel more at ease. The interview was conducted in a semi-structured format. In this way, the researcher had the freedom to formulate new questions for eliciting additional information during the interview time.

3.4. Data Collection Procedure

3.4.1. Piloting

Data collection process started with a pilot study which was conducted with twelve individuals (three for each of the groups). They were chosen through their availability and their performance on OPT. The tasks were piloted on the: 1. appropriateness and quality of the topic, 2. applicability of the outlining as the simultaneous task in dual-task conditions, 3. adequacy of allocated timespan to avoid any probable effects of time pressure, and 4. comprehensibility of the instructions. The pilot study was also carried out to predict the comparability of the manipulations. This was to make sure that there is no overlap among types of task

manipulations provided for each of the experimental groups and for the control group. From the participants' performances, it was found that a warm-up phase has to be added to the whole process of data collection to exemplify different phases of the task performance. Indeed, the participants showed a great sense of uncertainty about what the researchers expected from them (especially with regard to the thinking aloud), and so could not meet the task requirements. In addition, instances of typing errors were observed in the prompt hence the final version underwent some modifications.

3.4.2. Treatment

After the piloting phase, the researchers started the actual phase of data-collection process. That is, the participants of each of the experimental groups received the manipulations to be examined accordingly.

A timespan of 30 minutes was allocated to restrict the performances of all the experimental groups and the control group. The time limitation was a requirement of task performance within TBLT (Ellis, 2003). Additionally, the groups were not allowed to use dictionaries, ask questions and plan their task beforehand. This way any probable effects of other sources on the quality of writing and the frequency of metacognitive sub-processes could be controlled for.

The data collection took place in an individual-by-individual format in 50 separate sessions. The process included four phases for each participant. The first step was the how-to-do phase in which the kind of task was introduced to the participant with an explanation of the abovementioned restrictions. The participant was informed that the task requires an argumentative piece of writing and then the prompt was read to her/him and any probable clarification was added. The second phase was a warm-up in which the participant was provided with a clear example of think-aloud process and was asked to rehearse it for about two or three minutes. In addition, for those with dual tasks, outlining was practiced either with a brief explanation or an example.

Task performance made the third phase and in fact was the heart of the whole data collection process in which the participant had to simultaneously complete the task and think aloud. In this phase, the participant was carefully observed and his/her process of thinking aloud and the task performance was recorded for later analyses. The final phase was the retrospective interview during which the researcher delved into the hows and whys of the process that took place in the previous task-performance phase. In this phase, the participant was required to map his/her mental path on to the task performance. Similarly, the participants in control group had to pass all these phases, unless that they did not receive the picture or the outlining task as to increase the task cognitive complexity along resource-directing or resource-dispersing dimensions. At the end of data-collection process, a corpus of 50 pieces of writing was obtained, 12 sheets for each of the experimental groups and 14 sheets for the control group's participants. Now, the data were ready

to be coded for the analyses purposes. Next section is devoted to the report of the whole process of data analysis.

3.5. Data Analysis

The writing quality as one of the dependent variables in the present study included two levels of grammatical accuracy and lexical complexity. By accuracy it meant number of error free clauses and by complexity it meant the proportion of lexical words to function words (Ellis & Yuan, 2004). To be able to measure accuracy, researchers used a procedure which calculated the ratio of error free clauses to total clauses (EFC/TC). Based on Ellis (2005, 2009) and Polio (1997), the scope of grammatical errors included, syntactical errors, wrong lexical choices and morphological errors. But spelling errors and wrong application of mechanics of writing were not within this scope. As such, selection of inappropriate lexical items and morphemes and also erroneous use of singular/plural nouns, pronouns, tenses, articles, prepositions, verb formation, subject-verb agreement and use of fragments were defined as instances of grammatical inaccuracy.

The second point at issue is the lexical complexity which was intended to be measured by lexical-density procedure (LD). In this procedure the number of separate lexical words had to be divided by the total number of words in the text. This required stating a clear distinction between function words and lexical words. The present study applied the definition which was also used by Carter (1987) and Larsen-freemen (2006) (Appendix A).

For the purpose of analyzing metacognitive sub-processes, the researchers had to count the frequency of these processes according to what was at their disposal through recordings and the interviews. For this purpose, where the participant reported on the occurrence of one of the metacognitive sub-processes the researchers counted that for the frequency (Ong, 2014). A sum of frequencies of the metacognitive sub-processes of each of the participants and a mean frequency of the participants of each group were required for the purposes of scoring and statistical analysis. The analyzed data, then, were fed into SPSS (Ver. 21) to enable discussing the results statistically. Quality of complexity and accuracy of the written texts underwent One-way ANOVA procedure and tests of Post-hoc Tukey. On the other hand, to assess the effects of the task manipulations on the frequency of metacognitive processes the collected data were calculated using MANOVA procedure. The statistical results are presented in detail in the following section.

4. Results and Discussion

4.1 Results

The first question of this research addressed the effects of task-complexity manipulation on the quality of L2 written product in terms of grammatical accuracy and lexical density (LD). Table 1 below illustrates the descriptive results of the

statistical analyses of the grammatical accuracy under the effects of task-manipulation in four different groups.

Table 1
Descriptive Statistics for Grammatical Accuracy of Written Production

Groups	*Mean*	*SD*
Single Pic-Av[a]	.4520	.13726
Dual Pic-Av	.3650	.09525
Dual Pic-Unav[b]	.6320	.08942
Control	.3810	.07370

[a] Picture-Available, [b] Picture-Unavailable

As Table 1 shows the mean score of the dual task + picture unavailable group was higher than all (M: .63). The results of a one-way ANOVA (Table 2, below) showed that there was a significant difference between the performances of the groups, ($p < .00$).

Table 2
One-Way ANOVA for Grammatical Accuracy of Written Output

	Sum of Squares	*Df*	*Mean Square*	*F*	*Sig.*
Between Groups	.449	3	.150	14.478	.000
Within Groups	.372	36	.010		
Total	.821	39			

As confirmed by a follow-up Post Hoc Tukey test (Table 3), there was a significant difference between the experimental group defined by dual task + picture unavailable condition and all the other experimental groups and the control group ($p < .00$).

Table 3
Post Hoc Tukey test results for Grammatical Accuracy of Written Production

Grammatical Accuracy	*(I) Groups*	*(J) Groups*	*Mean Difference (I-J)*	*Std. Error*	*Sig*
	Dual task + Picture Unavailable	Single task + picture available	.18000	.04546	.002
		Dual task + picture available	.26700	.04546	.000
		Control	.25100	.04546	.000

The results showed that the L2 learners in the dual task + picture unavailable group outperformed the ones in the other two experimental groups and the control group. However, there was no other point of significant difference among the groups regarding the grammatical accuracy of the writing tasks.

LD of the written product was another determining factor of writing quality. The obtained scores from statistical analyses of the data were given to SPSS and the descriptive and inferential statistics were calculated. The following table depicts the results.

Table 4
Descriptive Statistics for Lexical Density of Written Production

Groups	*Mean*	*SD*
Single Pic-Av[a]	.4800	.02981
Dual Pic-Av	.5050	.02224
Dual Pic-Unav[b]	.4620	.02440
Control	.4430	.05165

[a] Picture-Available [b] Picture-Unavailable

According to Table 4 the mean score of the dual task + picture available group (.50) seems slightly higher than the other groups. A one-way ANOVA procedure was used for the purpose of inferential analysis of the data (Table 5) which marked a significant difference between groups ($p < .00$).

Table 5
One-Way ANOVA for Lexical Density of the Written Output

	Sum of Squares	*Df*	*Mean Square*	*F*	*Sig.*
Between Groups	.021	3	.007	6.006	.002
Within Groups	.042	36	.001		
Total	.063	39			

However, further Post Hoc Tukey test (Table 6) indicated that there was only a significant difference between the dual task + picture available group and the control group ($p< .00$) and dual task + picture available group and dual task + picture unavailable group ($p< .03$).

Table 6
Post Hoc Tukey Test Results for Lexical Complexity of Written Production

	(I) Groups	*(J) Groups*	*Mean difference (I-J)*	*Std. Error*	*Sig*
Lexical Complexity	Dual task + Picture available	Single task + picture available	.02500	.01524	.370
		Dual task + picture unavailable	.04300	.01524	.037
		Control	.06200	.01524	.001

The findings suggest that the participants in this experimental group outperformed those of the control group and the dual task + picture unavailable group in terms of lexical density. Nevertheless, there was no significant difference among other groups with regard to lexical complexity.

The second research question of this study was directed to the consideration of the effects of task-manipulations on frequency of the three metacognitive sub-processes of generation of ideas, elaboration of ideas, and organization of ideas. Table 7 below summarizes the results of MANOVA procedure conducted to determine the effects of task manipulations on each of these sub-processes.

Table 7
Multivariate Test for the Effect of Task Manipulation on Metacognitive Sub-Processes

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent Parameter	Observed Power
Wilks' Lambda	.157	9.61	12.00	114.05	.000	.460	97.19	1.000

The analysis showed a main effect of task manipulations on the three metacognitive sub-processes: [Wilks's Lambda= F (12, 114) = 9.62, p = .000; Wilk's Λ .157, ηp^2 = .46]. Through a univariate ANOVA it was revealed that task manipulations had meaningful effects on the frequency of the metacognitive sub-processes, i.e., for generation (p = .000), for elaboration (p = .000) and for organization (p = 014). The follow-up Post Hoc Tukey test clarified that for generation of ideas, the participants in single task + picture available group had a marginally significantly higher mean (M: 3.4). This is while for elaboration of ideas dual task + picture unavailable group (M: 5.2), and for the organization of ideas control group (M: 4.5) represented higher mean frequencies.

In summary, the researchers found that task manipulations positively affect the writing quality. Grammatical accuracy was influenced by dual task, - picture available condition and that the participants' performance manipulated under this condition outperformed all the other groups significantly. LD was also positively affected by dual task + picture available group. Furthermore, frequency of metacognitive sub-processes was indicative of the positive effects of task manipulation on the elaboration of ideas and generation of ideas but not on the organization of ideas.

4.2 Discussion

In this research, the potentials of task-complexity manipulation within task-based language pedagogy were examined. It was conjectured that, based on Robinson's (2005) Cognition Hypothesis and his Triadic Componential Framework, increasing task complexity along resource-directing and resource-dispersing dimensions would affect the quality of written product and the frequency of learners' metacognitive sub-processes. The results of statistical analyses of the written performances of Iranian L2 learners at intermediate level of proficiency demonstrated that complex tasks requiring performance of more than one task at a time (manipulated along resource-dispersing dimension) had significant effects on the grammatical accuracy

of the written texts. The findings reject Robinson's (2005) hypothesis which states that resource-directing dimensions of increasing cognitive complexity of a task would positively affect the accuracy of the product. It means that, though with an increase in cognitive complexity of the task through requiring reasoning demands under two conditions of +single task, + picture available and – single task, + picture available the expectation was a higher quality of grammatical accuracy, the results showed exactly vice versa. Indeed, it was the effect of manipulating task cognitive complexity along resource-dispersing dimension which positively affected the grammatical accuracy. This observation clearly marks a point of divergence from the results of Ishikawa's (2006), Kuiken & Vedder's (2008), Rahimpour & Hazar's (2007), and Rahimpour's (2007) studies whose findings verified Robinson's (2005) hypothesis. We attribute this discrepancy and non-confirmation of Robinson's prediction to the influential and interfering role of a trade-off effect to which Skehan (1996) lays a great credit. Based on his model, where task complexity imposes cognitive demands on the language user, the quality of aspects of production would experience a trade-off effect. In other words, due to cognitive capacity limitations, a prioritization process occurs by which one aspect from CAF undergoes deficiencies at the expense of others. Hence, it seems that this trade-off effect is the reason why we can observe a higher grammatical accuracy in the performances of participants in dual task + picture unavailable group.

However, the story becomes twofold when the results of the lexical complexity analyses come to the scene. Statistical analyses of the learners' written productions showed that dual task + picture available group outperformed the control group and the dual task + picture unavailable group in terms of the quality of lexical complexity. Both Robinson's (2005) and Skehan's (1996) hypotheses seem to provide a plausible explanation of the results obtained from lexical complexity analyses. The LD findings of this study are indeed in line with the Robinson's (2005) prediction that increasing task complexity through both complex resource-directing dimensions and resource-dispersing ones (as took place in dual task + picture available group) would partially increase the general quality of CAF. It means that the quality of all the three aspects (complexity, accuracy and fluency) would increase to some extent. What is at odds, is in fact the findings of other experimental groups with complex manipulations such as dual task + picture unavailable and single task + picture available groups which did not show any significant differences indicative of the positive influence of task manipulations. Clearly stating, the results go contrary to the Robinson's (2005) predictions in that with an increase in task complexity lexical density increased but grammatical accuracy decreased. As such, Robinson's hypothesis seems to lag behind in explaining the findings of this study.

However, the results conform to the basics of Skehan's (1996) limited attentional capacity model. As mentioned earlier, due to inherent restrictions of mental and attentional resources highly complex tasks of language production influence the quality of language users' performance through a trade-off effect. The

cognitive load of the complex task occupies the learners' attentional resource and does not allow the learner to fully attend to all the aspects of the production (VanPatten, 1994). Therefore, in a situation like the one provided for the learners in the present research in dual task + picture available group we can observe that under the effects of task manipulation lexical complexity increases but grammatical accuracy decreases. This is what we did observe with regard to the grammatical accuracy. It means that, with an increase in grammatical accuracy of the performances of the dual task + picture unavailable group, the lexical complexity decreased. Altogether, it seems that Skehan's (1996) hypothesis can better explain the findings of the current research in general and the performances of the participants in dual task + picture available group in particular. Additionally, there appears a line of consistency of the results of the present study with the findings of Ruiz-Funes (2015), Skehan and Foster (2001), and Ong and Zhang (2010, 2013). These studies shed light on the trade-off effect as the underlying cognitive process responsible for this inferior text quality.

The concern for the cognitive state of the language learners and also the importance of bringing a balance between task cognitive load and the learner's cognitive capacity led the present study to examine the effects of task complexity manipulation on the frequency of metacognitive sub-processes of the learners. It was hypothesized that with a record of learners' frequency of online processes during task performance a better task design and task sequencing are possible.

The main results of the statistical analyses of the learners' frequency of metacognitive sub-processes showed that in this study task manipulation had significantly positive effects on the frequency of generation of ideas in single task + picture available group. In statistical terms, the participants in this group significantly outperformed those of the control group and the other two experimental groups. As was mentioned earlier, the mental capacities of the participants in the experimental groups were either directed towards specific linguistic and functional dimensions of the task performance or were dispersed by these aspects. In other words, the learners' attentional resources were occupied with the complex tasks of writing. This is while, idea generation itself requires access to background knowledge and activation of formal and conceptual schemata (Ong, 2014). These processes in themselves are attention distracting and impose cognitive loads on the participants' mental capacities (Ellis, 2000, 2003; Roca de Larios et al, 2008; van den Bergh & Rijlaarsdam, 2007). According to the results, then, it seems that the picture available at the participants' disposal helped navigate the students' attentional resources and activate some background information. In such a case one may ask, why the performance of the participants in the dual task + picture available group did not prove significant. In fact in this group the load on the participants' cognitive resources is doubled due to the simultaneous outlining task. As such, the lower frequency of idea generation among the participants in this experimental group seems to be quite reasonable. Furthermore, as Robinson (2001a) delineates, reaching the objectives of a single task is cognitively easier for the language users.

Clearly described single tasks with pre-specified goals and cues are considered simple tasks (Ellis, 2000) and in dealing with these tasks learners' working memory is more likely to have free space. Thus one can expect a better transition of cognitive processes (Kellogg, 1996; VanPatten, 1994).

Regarding the elaboration of ideas, however, task manipulation showed a significant difference of learners' frequency of processes in dual task + picture unavailable group. Though it is not possible to illustrate how picture availability can affect idea generation but not idea elaboration (or idea organization as will be stated), it is possible to elaborate on the influential role that outlining plays in elaboration of ideas as Kellogg (1988) also emphasized. Using an outline, one can orderly structure and elaborate his/her ideas (Smet et al, 2012). With such an explanation, it is logical to expect the dual task groups to significantly affect the frequency of organization of ideas, as well. However, based on the results, the control group outperformed the other experimental groups with regard to the organization of ideas. It seems that thinking about the organization of ideas requires the learners to free up their cognitive resources in order to enable them restructure their ideas during the writing. The results were partially in line with the results of Ong's (2014) study in that increasing cognitive complexity of the tasks had significant effects on the elaboration and generation of ideas, but not on the organization of ideas. However, due to the scarcity of the studies conducted over the issue of frequency of metacognitive sub-processes no definite explanation can be submitted.

Regarding what the authors found in this study, it seems that we cannot take for granted the primary position of writing instruction as an end in itself mainly because writing is a complex and multidimensional skill. Both the skill and its instruction are under the influence of so many factors, to some of which we tried to shed light. The findings of the study showed that not only haphazard and unsystematic ways of teaching writing would not work sufficiently, but also those planned instructional procedures and manipulations which have roots in deep layers of research and thought may fail in practice. As was observed in this study, not all types of task manipulations are satisfactory and fruitful. That is why this painstaking but vital process of research into writing instruction must continue to the point that writing instruction finds its appropriate position and also the most practical procedures. That time this line of research may deserve a rest. The importance and effectiveness of task-based writing instruction for Iranian EFL teachers is also highlighted in this study in that applying TBLT insights brought practical and up-to-date instructional procedures in use.

5. Conclusion and Implications

The main concern of this research was to find those suitable task conditions which can positively affect both writing instruction and cognitive states of L2 learners within the realms of TBLT. This study sought to address the problem of writing instruction in EFL and ESL contexts of language learning where the appropriate

position of writing as an end in itself is downgraded. To this end, the effects of task manipulation along resource-directing (+/- reasoning demands) and resource-dispersing (+/- single task) dimensions on the grammatical accuracy and lexical complexity of the argumentative written product of intermediate Iranian L2 learners were examined. Additionally, distribution of frequency of learners' metacognitive sub-processes defined in terms of generation of ideas, elaboration of ideas and organization of ideas was explored under the effects of task manipulation. The findings of the current research partially verified the potentials of task manipulations in developing the quality of writing task; however, the results of frequency of metacognitive sub-processes were indicative of the positive effects of task manipulation regarding elaboration of ideas and generation of ideas at the expense of organization of ideas.

Finally, it is hoped that the results of this study provide new insights into the way we look at language instruction and instructors. It is expected that the findings of this study promote the learning conditions for EFL language users through providing beneficial practices of task manipulation. In fact, through creating an appropriate balance between the cognitive state of language learners and the cognitive load of the writing task, instructional programs and teachers can pave the way for the learners to fully benefit from the time, energy and the money they spend on L2 learning process for their real-life purposes. Furthermore, with the challenging and dynamic nature of TBLT activities, such as using different and appropriate task manipulations, gradually language teachers would find the essence of their position not only as instructors but also as critical researchers and task designers (Kumaravadivelu, 2006). Indeed, the TBLT teacher needs to acknowledge the vital position of his/her profession, the learning identity of his/her students, and their needs and demands to be able to provide the suitable responses accordingly (Kumaravadivelu, 2006).

Commonly, this study was conducted with its own limitations, as they are inevitable. Firstly, this study involved a small sample size and, therefore, any claim of generalizability has to be treated with caution. The individual-by-individual process of data collection made it hard to find cooperative participants who devotedly spend time on the whole process. Secondly, though the data collection process was triangulated with retrospective interview, the use of think aloud protocol might have threatened the reliability and the validity of the results. This is because, think aloud protocol is mainly based on subjective reports and personal evaluations. Additionally, the participants in this study were selected from a particular group of EFL learners at pre-intermediate level of proficiency. So, the findings may not be applicable to other groups of ESL/EFL learners

A combination of the implications and the limitations of this study well highlights the potentials of further research into deep and hidden layers of L2 writing instruction within TBLT and task-manipulation area of inquiry. Therefore, this study can be replicated to find how other resource-directing and resource-dispersing dimensions affect the frequency of metacognitive sub-processes.

Additionally, age can be introduced as a determining factor regarding the role it plays in differentiating cognitive state of the participants. Then, the study can be conducted to find the type of relationship between task manipulations and cognitive state of the participants, and the possible effect on the final quality of the written product. Finally, future studies can explore the effects of manipulating task complexity on the frequency of metacognitive sub-processes separately and more comprehensively. It is also better to investigate the quality of complexity, accuracy and fluency of the written product as a full pack.

References

Abdollahzadeh, S., & Fard Kashani, A. (2011). The effect of task complexity on EFL learners' narrative writing task performance. *Journal of English Language Teaching and Learning, 8*(2), 1-28.

Abdollahzadeh, S., & Fard Kashani, A. (2011). The effect of task complexity on EFL learners'narrative writing taskperformance. *Journal of English Language Teaching and Learning, 8,* 1-28.

Al-Jarrah, R. S., & Al-Ahmad, S. (2013). Writing instruction in Jordan: Past, present, and future trends. *System*, *41*(1), 84-94.

Bereiter, C., & Scardamalia, M. (1987). *The psychology of written composition*. Mahwah, NJ Lawrence Erlbaum Associates.

Byrnes, H., & Manchon, R. M. (Eds.). (2014). *Task-based language learning: Insights from and for L2 writing.* Philadelphia/Amsterdam: Joh Benjamins.

Carter, R. (1987). *Vocabulary: Applied linguistic perspectives.* London: Routledge.

de Smet, M. J. R., & Brand-Gruwel, S., & Broekkamp, H., & Kirschner, P. A. (2012). Write between the lines: Electronic outlining and the organization of text ideas. *Computers in human behavior*, *28*(6), 2107-2116.

Ellis, N. (2003). Constructions, chunking, and connectionism: The emergence of second language structure. In C. Doughty, & M. Long (Eds.), *The handbook of second language acquisition* (pp. 63-103). Oxford: Blackwell.

Ellis, R. (2000). Task-based research and language pedagogy. *Language Teaching Research, 4*(3), 193-220.

Ellis, R. (2005). Planning and task-based performance: Theory and research. In N. Spada, & J. Hulstijn (Eds.), *Language learning and language teaching* (pp.3-34). Amsterdam/Philadelphia: John Benjamins.

Ellis, R. (2009). Task-based research and language pedagogy. In K. Van den Branden, M. Bygate, & J. M. Norris (Eds.), *Task-based language teaching: A reader* (pp.109-130). Philadelphia/Amsterdam: John Benjamins.

Ellis, R., &Yuan, F. (2004). The effects of planning on fluency, complexity, and

accuracy in second language narrative writing. *Studies in Second Language Acquisition, 26,* 59-84.

Flower, L. S. & Hayes, J. R. (1980). Identifying the organization of writing processes. In L. W. Gregg, & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp.31-50). Hillsdale, NJ: Lawrence Erlbaum.

Flower, L. S. & Hayes, J. R. (1981). Plans that guide the composing process. In C. H. Frederiksen, & J. F. Dominic (Eds.), *Writing: The nature, development and teaching of written communication* (pp. 39 - 58). Hillsdale, NJ: Lawrence Erlbaum Associates.

Galbraith, D. (1999). Writing as a knowledge-constituting process. In M. Torrance, & D. Galbraith (Eds.) *Knowing what to write* (pp. 139-160). Amsterdam, NL: Amsterdam University Press.

Ghavamnia, M., & Tavakoli, M., & Esteki, M. (2013). The effect of pre-task and online planning conditions on complexity, accuracy and fluency on EFL learners' written production. *Porta Linguarum, 20,* 31-43.

Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In C. M. Levy & S. Ransdell (Eds.), *The science of writing: Theories, methods, and individual differences, and applications* (pp. 1-27). Mahwah, NJ: Erlbaum.

Hosseini, P., & Rahimpour, M. (2010). The impact of task complexity on L2 learners' written narratives. *CCSE, 3*(3), 198-205.

Ishikawa, T. (2006). The effect of manipulating task complexity along the (Here-and-Now) dimension on L2 written narrative discourse. In C. M. Garcı´a Mayo (Ed.), *Investigating tasks in formal language learning* (pp.136-156). Clevedon, UK: Multilingual Matters.

Kellogg, R. T. (1996). A model of working memory in writing. In C. M. Levy, & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences and application* (pp.57-72). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Kellogg, R., & Raulerson, B. (2007). Improving the writing skills of colleg students. *Psychonomic Bulletin and Review, 14,* 237-242.

Khomeijani Farahani, A., & Meraji, R. (2011). Cognitive task complexity and L2 narrative writing performance. *Journal of Language Teaching and Research, 2*(2), 445-456.

Kuiken, F. & Vedder, I. (2008) Cognitive task complexity and written output in Italian and French as a foreign language. *Journal of Second Language Writing, 17*(1), 48-60.

Kuiken, F., & Vedder, I. (2006). Cognitive task complexity and linguistic performance in French L2 writing. In M. Garcı´a-Mayo (Ed.), *Investigating tasks in formal language learning* (pp.117-135). Clevedon, UK: Multilingual Matters.

Kuiken, F., & Vedder, I. (2007). Task complexity and measures of linguistic performance in L2 writing. *International Review of Applied Linguistics in Language Teaching, 45,* 261-284.

Kumaravadivelu, B. (2006). *Understanding language teaching from method to postmethod.* London: Lawrence Erlbaum Associates.

Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics, 27,* 590-619.

Leow, R. P., & Grey, S., & Marijuan, S., & Moorman, C. (2014). Concurrent data elicitation procedures, processes, and the early stages of L2 learning: A critical overview. *Second Language Research, 30*(2), 111-127.

Mackey, A., & Gass, S. M. (2005). *Second language research: Methodology and design.* London: Lawrence Erlbaum Associates, Publishers.

Mazdayasna, G., & Tahririan, M. H. (2008). Developing a profile of the ESP needs of Iranian students: The case of students of nursing and midwifery. *Journal of English for Academic Purposes, 7*(4), 277-289.

Norris, J. M., & Manchón, R. M. (2012). Investigating L2 writing development from multiple perspectives: Issues in theory and research. In R. Manchón (Ed.), *L2 writing development: Multiple perspectives* (221-244). Boston/Berlin: Walter de Gruyter.

Ong, J. (2014). How do planning time and task conditions affect metacognitive processes of L2 writers? *Journal of Second Language Writing, 23,* 17-30.

Ong, J., & Zhang, L. J. (2010). Effects of task complexity on the fluency and lexical complexity in EFL students' argumentative writing. *Journal of Second Language Writing, 19,* 218-233.

Ong, J., & Zhang, L. J. (2013). Effects of the manipulation of cognitive processes on EFL writers' text quality. *TESOL, 47,* 375-398.

Polio, C. G., (1997). Measures of linguistic accuracy in second language writing research. *Language Learning, 47*(1), 101-143.

Rahimpour, M. (2007). Task complexity and variation in L2 learners' oral discourse. *Working Papers in Language and Linguistics, 12,* 1-9.

Rahimpour, M., & Hazar, F. (2007). Topic familiarity effect on accuracy, complexity, and fluency of L2 oral output. *The Journal of Asia TEFL, 4*(4), 191-211.

Rahimpour, M., & Nariman-Jahan, R. (2011). The effects of planning on writing narrative task performance with low and high EFL proficiency. *English Language Teaching, 4*(1), 120-127.

Reichelt, M. (2005). English-language writing instruction in Poland. *Journal of Second Language Writing, 14*(4), 215-232.

Robinson, P. (2001a). Task complexity, cognitive resources, and syllabus design: A triadic framework for examining task influences on SLA. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 287-318). Cambridge: Cambridge University Press.

Robinson, P. (2001b). Task complexity, task difficulty, and task production: Exploring interactions in a componential framework. *Applied Linguistics, 22,* 27-57.

Robinson, P. (2003). The cognition hypothesis, task design, and adult task-based language learning. *Second Language Studies, 21,* 45-105.

Robinson, P. (2005). Cognitive complexity and task sequencing: Studies in a componential framework for second language task design. *International Review of Applied Linguistics, 43,* 1-33.

Robinson, P. (2007). *Re-thinking-for-speaking and L2 task demands: The cognition hypothesis, task classification, and sequencing.* Plenary address at the Second International Conference on Task-Based Language Teaching, University of Hawai'i.

Roca de Larios, J., Mancho´n, R., Murphy, L., & Marı´n, J. (2008). The foreign language writer's strategic behaviour in the allocation of time to writing processes. *Journal of Second Language Writing, 17,* 30-47.

Sadeghi, K., & Mosalli, Z. (2013). The effect of task complexity on the quality of EFL learners' argumentative writing. *Iranian Journal of Language Teaching Research, 1*(2), 115-134.

Silva, T., & Matsuda, P. K. (Eds.). (2010). *Practicing theory in second language writing*. West Lafayette, IN: Parlor Press.

Skehan, P. (1996). A framework for the implementation of taske-based instruction. *Applied Linguistics, 17*(1), 38-62.

Skehan, P. (1998). *A cognitive approach to language learning.* Oxford: Oxford University Press.

Skehan, P. (2003). Task-based instruction. *Language teaching, 36,* 1-14.

Skehan, P., & Foster, P. (2001). Cognition and tasks. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 183-205). Cambridge: Cambridge University Press.

Smagorinsky, P. (1989). The reliability and validity of protocol analysis. *Written Communication 6*(4), 463-479.

Smagorisnksy, P. (1994). Think-aloud protocol analysis: beyond the black box. In P. Gass, S. M., & Selinker, L. (2008). *Second language acquisition: An introductory course.* New York: Routledge.

Styslinger, M. E., & Overstreet, J. F. (2014). Strengthening argumentative writing with speaking and listening (Socratic) Circles. *Voices from the Middle, 22*(1), 58-62.

Torrance, M., & Galbraith, D. (2006). The processing demands of writing. In. C. MacArthur, & S. Graham, & J. Fitzgerald, (Eds.), *Handbook of writing research* (pp. 67-80). New York: The Guilford Press.

van den Bergh, H., & Rijlaarsdam, G. (2007). The dynamics of idea generation during writing: An online study. In G. Rijlaarsdam (Series Ed.), M. Torrance, L. van Waes, & D. Galbraith (Vol. Eds.), *Studies in writing: Vol. 20. Writing and cognition: Research and applications* (pp. 125-150). Amsterdam: Elsevier.

VanPatten, B. (1994). Evaluating the role of consciousness in SLA terms, linguistic features, and research methodology. *AILA Review, 11,* 27-36.

VanPatten, B. (2004). *Input processing in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum Associates.

Wong, A. T. Y. (2005). Writers' mental representations of the intended audience and of rhetorical purpose for writing and the strategies that they employed when they composed. *System, 33,* 29-47.

Xin, Z. (2007). Reflective thinking on communicative teaching in writing. *US-China education review, 4*(5) 19-25.

You, X. (2004). The choice made from no choice: English writing instruction in a Chinese University. *Journal of Second Language Writing, 13,* 97-110.

Zen, D. (2005). The process approach to ESL/EFL writing. *The Journal of Asia TEFL, 2*(1) 1-205.

APPENDICES

APPENDIX A. Categories of function words and lexical words defined by Carter (1987) and Larsen-freeman (2006)

A.1. Category inclusion of function words

Function Words
Modals, auxiliaries, determiners (articles, demonstratives, possessive adjectives, quantifiers, numerals), pronouns, interrogative adverbs (what, when, how), negative adverbs (not, never), contracted forms of pronouns, prepositions, conjunctions, discourse markers, sequences (next, finally), particles (oh, well), lexicalized clauses (you know, I mean), quantifier phrases (anyway), lexical pause fillers (so, well), interjections (gosh, really, oh), and reactive tokens (ok, No!)

A.2. Category inclusion of lexical words

Lexical words
nouns, adjectives, verbs, adverbs of time, place and manner, multiword verbs, idioms, contraction of pronouns and main verbs (counted as one single item), adverbs ending in ly, hyphened words (counted as one single item), and numbers (each number counted as one single item)