

The effects of planning and task on Chinese high school students' English language performance

Yanshu Sun¹ , Tong Wang² 

¹Liaocheng University, Liaocheng, Shandong Province, China

²Shengcheng Middle School, Weifang, Shandong Province, China

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Abstract

Planning is the core of writing process and the key to successful English writing. This study examines the effects of planning type on language complexity, accuracy and fluency in two different English writing tasks (practical writing and integral writing) of Chinese high school students. The results show that online planning promotes students' language complexity and accuracy, while pre-task planning improves fluency. Planning and task types have an interaction effect in writing accuracy. This study promotes an understanding of planning mechanisms in high school students' English writing and has implications for high school English instruction.

Keywords planning; language performance; task type; Chinese high school students

1. Introduction

Since the 1980s, the research on writing process and writing model has garnered much attention, and planning has been believed to be of central importance in writing process and in language production (Ebrahimi et al., 2019). It was found that writers' language performance varies with different forms of planning and might be affected by other factors such as language proficiency, task type, and time (Ellis & Yuan, 2004; Tabari, 2016, 2021).

Writing is an essential skill in English learning, and a difficult one to acquire, especially for EFL learners. Chinese high school students generally have over 7 years of English learning experience and still have many problems in the subprocesses of English writing (Li, 2017), yet few studies are concerned with Chinese English learners' writing and planning. *Chinese English Curriculum Criteria for Regular High School* (2017) put writing instruction in three parts: pre-writing, while-writing and post-writing, and indicates the importance of cultivating the skills of planning and outlining in writing. This study focuses on Chinese high school students' different English writing tasks, and tries to explore the effects of planning on language accuracy, fluency and complexity in Chinese EFL high school students' English writing.

2. Literature Review

Writing process was once considered a linear model consisting of planning, writing and revision (Rohman, 1965). Since 1980s, researchers have taken writing as a recursive model involving constant information

processing and problem-solving activities. Zimmerman's (2000) study on L2 writing model further indicates that L2 writers spend more time on revisions. In such a cognitive light, planning is believed to be "essentially a problem-solving activity; it involves deciding what linguistic devices need to be selected in order to affect the audience in the desired way" (Ellis, 2005, p. 3). The function of planning is also foregrounded in the various writing models (e.g., Bereiter & Scardamalia, 1987; Flower & Hayes, 1980; Hayes, 1996; Kellogg, 1996). It is argued that planning is necessary even in most natural and simple language production, helping the writer reduce the cognitive burden and seek proper expression and organization.

Yet at the same time, according to the cognitive models, attention resources and working memory capacity are limited. It is found that in the process of making a decision or accomplishing a task, one can choose to improve accuracy at the expense of time or achieve the goal at the expense of accuracy; thus speed-accuracy trade-off occurs. In L2 writing, a learner is faced up with the same choice. When the learner is overburdened with a complex task, accomplishment is prioritized while quality and accuracy are often neglected. On the contrary, when the attention and working memory are not stressed by task complexity or novelty, the learner may favor accuracy or complexity (Skehan, 1998). In writing process, planning, often serving as an advance organizer, can also place major demands on the central information executive, and the writer has to determine how and when to employ it in real writing context (Kellogg, 1996).

Researchers have long been interested in the effect of planning on language performance, and the relevant studies were mainly conducted along three dimensions, i.e.,

complexity, accuracy and frequency (CAF) (Skehan, 1998). Complexity is considered to be the degree of linguistic elaboration and selection. Accuracy is the ability to use language without errors in written or oral communication; and fluency means producing language in limited time without unnecessary pauses or hesitations (Wolfe-Quintero et al., 1998). Writing is essentially a complex and multi-faceted activity in second language learning. The three dimensions establish a complete and comprehensive framework for gauging writing quality, and its efficacy and validity have been acknowledged by most researchers (Housen & Kuiken, 2009; Skehan, 1998). The measurement of CAF in writing mainly employed the ratio of clauses per T-unit to measure syntactic complexity, and Bulté and Housen (2014) proposed using lexical complexity, average T-unit length, number of subordinate clauses per T-unit and phrase structure to further measure complexity of lexicon, sentences, subordinate clauses and phrases respectively. Linguistic accuracy in second language writing can be measured in a variety of ways, including counting error-free units, counting the number of errors, and considering error severity (Polio & Shea, 2014; Wolfe-Quintero et al., 1998), and the most common metric for language accuracy in second language writing is the number of linguistic errors in the text or the proportion of error-free T units (Johnson, 2020). Finally, it has been generally accepted by most previous studies on L2 writing that fluency could be measured by the number of words per text (Polio, 2001; Wolfe-Quintero et al., 1998).

Furthermore, according to information processing model, in the complex process of language production, attention to one of the three dimensions may come at the expense of another (Skehan, 1998). The case may be more evident for second language writers, as the limited human processing capacity makes it even more difficult for second language writers to take into account all dimensions at the same time, and the three domains in charge of complexity, accuracy and fluency have to compete with each other for attentions resources, resulting in trade-off effects.

The effects of planning on CAF were mainly examined under pre-task and online conditions. The two types of condition are distinguished in terms of when the planning takes place, i.e., before the task is performed or during its performance (Ellis, 2005). Pre-task planning provides writers with an opportunity to adequately consider and rehearse the task before the main performance. Online planning in most studies is taken as a type of unpressured writing process during which writers can plan and write at once to achieve goals. Research shows that both planning conditions may affect language performance in L2 writing, but in different ways. Crooks' (1989) study was among the earliest, which reported on an experiment in which two groups of 20 Japanese learners of English performed two monologic production tasks with and without time for planning. It was found that providing learners with time to plan their utterances results in more complex interlanguage productions. Ellis and Yuan (2004) investigated the effects of three types of planning, i.e., no planning, pre-task planning and on-line planning, on the performance of 42 Chinese learners' narrative writing. They found that pre-task planning resulted in greater fluency and syntactic variety. Kawauchi (2005)

investigated planning in oral narrative task with Japanese English learners, and the participants were grouped according to different English proficiency levels and assigned to different planning tasks. The results showed that planning had beneficial effects on the fluency, complexity, and accuracy of the participants' oral production, and the high-proficiency group benefited most from planning in fluency and complexity, while the low-proficiency group did so in accuracy. Later studies on L2 learners also obtained different results. Some studies showed that pre-task planning can improve L2 writer's fluency, complexity, and/or accuracy in writing at once (Jung, 2013; Thai & Boers, 2016), while some others indicated pre-task planning mainly promotes L2 writer's fluency, but not complexity or accuracy (Tabari, 2016; Qjima, 2006; Seyyedi et al., 2013). On the other hand, online planning was found to promote mainly accuracy and lexical diversity (Ellis & Yuan, 2004; Ghavamnia et al., 2013; Rostamian et al., 2018).

Research also examines the effect of planning in different tasks and contexts. Wigglesworth (1997) examined the combined effects of planning time and language proficiency on L2 production in different oral tests and found language proficiency made no difference between two groups in easier tasks, but in more complex tasks the proficient participants improved complexity and accuracy on some measures and benefited more from planning than the less proficient. As to task type, Skehan and Foster (1997) examined the effects of various task types on language performance and found some task types tended to promote fluency while others promoted accuracy. Lu's (2011) study based on WECCL (Written English Corpus of Chinese Learners) showed that genre is an important factor affecting L2 syntactic complexity in writing, but Mehrang and Rahimpour's (2010) study indicated no effect of task structure on language accuracy and complexity. Ye and Yan's (2010) study with Chinese undergraduates found genres had no significant effect on EFL learners' language performance.

On the whole, relevant studies have showed that planning has a positive effect on L2 language performance, and the effect might be varied with different types of tasks and learners. However, there lacks consistent results on the effects of pre-task and online planning on writing performance, and very limited research was conducted on the combined effects of planning and genre. Besides, previous studies were mostly conducted at the tertiary level, yet few studies were concerned with high school students' English writing in limited time, and it remains unknown how the combination of planning type and task may affect the performance of high school students in the Chinese EFL context.

In view of this, this study focuses on Chinese high school students' English writing and intends to explore the effect of different types of planning on Chinese high school students' language performance with different tasks. The research questions to be addressed are:

1. How do planning types affect accuracy, complexity, and fluency of Chinese high school students' English writing?
2. Do different genres affect Chinese high school students' planning and language performance in English

writing?

3. Research Methods

3.1. Participants

Eighty tenth-grade students from two classes of an ordinary high school in Shandong province, China attended the study, and one of the researchers was the teacher of the two classes. The students have studied English in school for over seven years, and have writing experiences of narrative, description and practical writings. One class was randomly assigned as pre-task planning group and the other class online planning group. Both classes have similar academic background and similar average English scores in the latest English test.

3.2. The Writing Task

The writing task includes an integral writing (an English writing genre introduced to Chinese college entrance examination since 2016), and a practical writing. The practical writing requires students to write an invitation letter, and the integral writing requires students continuing an unfinished story. Both genres are commonplace and frequently practiced in Chinese high schools when students prepare for Chinese college entrance examination, and the participants have been taught about the two genres in class.

3.3. Data Collection

This study mainly followed Ellis and Yuan (2004) and Rahimpour and Safarie's (2011) research design but put a time limit on the writing task. The writing samples were collected from a writing quiz during the winter semester in 2021. The quiz lasted 30 minutes, the length of time specified by Chinese college entrance examination for English writing. Before the research, the pre-task planning class were trained on how to plan on paper in terms of content, organization and language before writing. When the quiz began, each participant in pre-task planning group was provided with a planning paper and asked to plan on the paper for 10 minutes. The paper was collected as the referential guide in interview when time was up, so that all the language elicited by the writing task was produced within the following 20 minutes. They were reminded of the time limit. In comparison, the online planning group received no training on pre-task planning. They had only the test paper and were instructed to immediately start writing to reduce possible pre-task planning time. They were not reminded of the time limit.

To further explore the effect of planning type on writing, 8 students (4 students in each class) were randomly selected for retrospective text-based interview. The interview questions were mainly centered around the participants' experiences in writing, including the questions such as (1) What do you feel about the difference between the two types of writing (letter application text, reading and writing)? (2) What did you do in the 10-minute pre-task planning? (3) What did you do in online

planning?

3.4. Data Analysis

A total of 160 writing samples were collected (80 integral writing copies and 80 letter writing samples). The collected texts were analyzed in language complexity, accuracy and fluency through computational and manual methods. Syntactic complexity is measured along 3 dimensions: (1) General complexity, i.e., mean T unit length (MLT); (2) dependent complexity, i.e., number of dependent clauses per T unit (DC/T); (3) implicit complexity, i.e., number of complex noun phrases in each T unit (CN/T). All indicators of syntactic complexity were analyzed by the Syntactic Complexity Analysis Tool (L2SCA) developed by Lu (2011). Lexical complexity is measured in terms of lexical diversity and sophistication (Bulte & Housen, 2014): Lexical diversity is examined by the measure of textual lexical diversity (MTLD), i.e., the average number of tokens at a given type/token value, and lexical sophistication is measured by the average word frequency of all words (WRDFRQa). Both indicators of lexical complexity are computed by Coh-Metrix. Linguistic accuracy is calculated by proportion of error-free T-units (EFT/T), an indicator frequently used to measure the accuracy of second-language writing, in which all grammar, lexical, vocabulary choices, and spelling errors are taken into account. Fluency is measured by the numbers of syllables per minute (SPM) and dysfunction (DYSF). SPM is the total number of syllables per composition divided by the time taken to complete the composition and DYSF is the total number of word rewrites (such as words deleted, added, or modified) divided by the total number of words per essay. SPM and DYSF are selected instead of the number of words per minute (WPM) to reduce the effect of word length.

The accuracy and fluency of the writing were manually calculated by the researcher. To ensure the reliability of the measurement, five copies from each group were randomly selected and reviewed by two researchers, and the raters' reliability (Pearson correlation coefficient) was 0.881. After sorting the data, JASP statistical software was used to test the complexity, accuracy and fluency of the writings, and a 2×2 ANOVA test was conducted to examine whether there was an interaction between planning type and writing genre. Finally, the interviews were transcribed and qualitatively analyzed to further explore the planning and writing experiences of the participants.

4. Results and Discussion

4.1. The effects of planning type on linguistic complexity, accuracy and fluency

4.1.1. The effects of pre-task and online planning on linguistic complexity

Lexical and syntactic complexity were measured for both groups. The descriptive and *t*-test results were shown in Table 1.

Table 1. Statistics of linguistic complexity measures

Genre	Index	Pre-task planning		On-line planning		<i>t</i>	df	<i>p</i>
		mean	SD	mean	SD			
Letter writing	MLT	9.526	1.627	12.697	5.946	3.253	78	0.001
	DC/T	0.271	0.161	0.487	0.330	3.730	78	0.001
	CN/T	0.649	0.355	1.025	0.456	4.119	78	0.001
	MTLD	65.689	18.460	69.117	17.069	-0.861	78	0.391
	WRDFRQa	3.007	0.098	2.996	0.092	0.557	78	0.579
Integral writing	MLT	9.598	1.125	12.161	3.303	4.644	78	0.001
	DC/T	0.315	0.119	0.651	0.311	6.370	78	0.001
	CN/T	0.816	0.214	1.264	0.565	4.686	78	0.001
	MTLD	71.518	23.606	73.853	18.138	0.496	78	0.621
	WRDFRQa	3.200	0.055	3.172	0.089	-1.663	78	0.100

As is shown, the online planning group produced more syntactically and lexically complex writings. There were significant differences between the two groups in MLT, DC/T, CN/T in both genres ($p < 0.05$). There was no significant difference in lexical complexity, which might be due to the fact that the word command of the participants is still small, and the limited vocabulary reduced the lexical difference. It seems that the pre-task 10 minutes have not made any difference in complexity to the pre-task planning group. The result supports the study by Qjima (2006) and the study by Seyyedi et al. (2013) but differs from Kawauchi (2005) and Wigglesworth (1997). The inconsistent results might be explained by the differences in learners' proficiency level. Generally speaking, Chinese high school students are not proficient and skillful in planning as well as in English, and it might be difficult for them to benefit from pre-task planning in complexity.

4.1.2. The effect of pre-task planning and online planning on linguistic accuracy

The results showed that linguistic accuracy of the online planning group was higher than that of the pre-task planning group, and there was a significant difference between the two groups ($p < 0.001$). In integral writing the average proportion of correct clauses in the online planning group was significantly higher than that in the pre-task planning group (Table 2). The results indicated that in both tasks, online planning could improve more accuracy compared with pre-task planning.

It seems that although pre-task planning is conducive to participants' monitoring of the overall text and reducing cognitive load in writing process, the focus of pre-task planning is still on structure and organization of the passage instead of language accuracy. By contrast, the online planning is more concerned with grammar and precision of expressions. The results were consistent with the findings of Ellis and Yuan (2004) and Ghavamnia et al.

(2012) suggesting the positive effects of online planning on accuracy but ran counter to Rostamin et al. (2018). The difference might be due to the different research design for planning time. This study had strict time limit for planning and writing while Rostamin et al. (2018) had no time limit for the online planning group. Therefore, given time, the online planning seems to allocate more attention resources to language accuracy.

Table 2. Statistics of linguistic accuracy measures

	Pre-task planning		Online planning		<i>t</i>	df	<i>p</i>
	M	SD	M	SD			
Letter writing	0.701	0.172	0.827	0.096	4.045	78	0.001
integral writing	0.629	0.180	0.878	0.087	7.863	78	0.001

4.1.3. The effect of planning type on linguistic fluency

Table 3 showed that pre-task planning helped to improve the participants' language fluency more than online planning did, although there was no significant difference. In practical writing, SPM of the pre-task planning group and online planning group were 5.065 and 4.922 respectively, and in integral writing, SPM for pre-task planning and online planning was 7.169 and 6.944 respectively, suggesting that writing after pre-task planning is comparatively faster and more fluent. Besides, the statistics of non-fluency measures also suggested the pre-task planning group seemed to delete, repeat, or rewrite less in writing process. The reason might be that the time and efforts spent in pre-task planning could help reduce the writer's cognitive load or the writing tension, thus improving language fluency and reducing the number of mistakes and revisions in writing.

Table 3. Statistics of linguistic fluency measures

		Pre-task planning		Online planning		<i>t</i>	df	<i>p</i>
		M	SD	M	SD			
Letter writing	SPM	5.065	1.113	4.922	0.891	-0.632	78	0.529
	DYSF	0.057	0.040	0.071	0.051	1.338	78	0.185
Integral writing	SPM	7.169	1.857	6.944	1.626	-0.576	78	0.566
	DYSF	0.059	0.044	0.078	0.053	1.738	78	0.086

The results lent support to previous studies concerning beneficial effects of pre-task planning on fluency but not on complexity (Ellis and Yuan, 2004; Kawauchi, 2005; Tabri, 2016), and provided more evidence for Zimmerman's (2000) study on revisions, verifying the trade-off effect of information processing model.

The retrospective interviews also revealed that during the 10-minute pre-task planning, the pre-task planning group tended to generate main idea first, and overall structure next, followed by overall meaning of each paragraph, topic sentence and specific expression. Some participants would first produce an outline on the scratch paper for reference all through the writing process. This may partly explain the pre-task planning group's language fluency. The on-line planning group, on the other hand, mainly focuses on generating proper expressions or correct use of grammar in the process and neglects coherence. Some participants talked about their experience of "trying to produce some 'high-level' words and complex grammar or sentence structures" to make the writing more "advanced". This can also in part explain why language complexity of online planning group is higher than that of pre-task planning group in syntactic level.

4.2. The effect of planning and task on linguistic performance

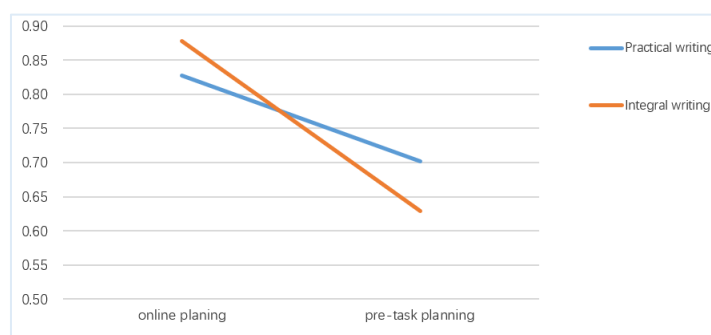
A 2×2 ANOVA test was conducted through JASP online statistical software to explore the interaction effect of planning type and task on language performance, and the results were shown in Table 4. It could be seen that planning type and task did not have any interaction effect in terms of language complexity and fluency but did have significant interaction effect in accuracy ($F = 7.660$, $p = 0.006 < 0.05$).

Table 4. The interaction effect of planning type and genre

		Planning type * Genre		
		F	df	p
Syntactic complexity	MLT	0.295	1	0.588
	DC/T	2.308	1	0.131
	CN/T	0.293	1	0.589
Lexical complexity	MTLD	0.875	1	0.351
	WRDFRQa	2.137	1	0.146
Language accuracy	EFTT	7.660	1	0.006
Language fluency	SPM	0.034	1	0.855
	DYSF	0.121	1	0.729

As the results indicated, in both writing tasks, the two groups showed difference in language accuracy, but the

difference was more evident in integral writing, proving that genre is indeed one of the factors affecting L2 writers' language accuracy. From Figure 1 it could be seen that for on-line planning group, language accuracy in integral writing was higher than that in practical writing, yet for pre-task planning group it was the otherwise. A post-hoc test was conducted to examine the interaction effects of planning type and task on language accuracy, which showed planning type had the main effect ($p < 0.001$), and the two groups in language accuracy of integral writing revealed significant difference.

**Figure 1.** Interaction effect of planning type and task type

The interview suggests that the participants believed practical writing to be comparatively simpler than integral writing, because "you just need to follow a formalized structure and sort out what you say", therefore, to the pre-task planning group, the 10 minutes' planning time provided could be employed for searching the most suitable expressions instead of outlining the whole text, thus improving the pre-task participants' language accuracy in practical writing.

In comparison, the task of integral writing was more complex to the participants. As some participants suggested, the structure of integral writing had no "fixed model" to follow, and they had to make out the outline and search for proper language at once in planning, which might increase their cognitive load; In such a case, the remaining 20 minutes' writing time for pre-task group is more pressing, resulting in lower language accuracy.

The results were in line with information processing theory and were consistent with most of the relevant studies (Beers, 2009; Lu, 2011; Way et al., 2000). As Ellis (2005) pointed out, "Within-task planning can be differentiated according to the extent to which the task performance is pressured or unpressured...When this is unpressured the participants have the opportunity to conceptualize, formulate and articulate their messages with some care". Naturally, L2 learners have to make discourse analysis in writing process, and employing

different planning types for different tasks is a reasonable strategy to improve overall writing quality.

5. Discussion

The study aims to examine the combined effects of planning type and genre on Chinese high school students' writing, and explore the complex relationship among planning type, genre and writing quality of EFL writing. To sum up, in terms of language complexity, the study found that online planning helped produce more complex writings, especially in phrases and clauses. Then, it is found that online planning could promote significantly more language accuracy than pre-task planning. In integral writing the average proportion of correct clauses in the online planning group was significantly higher than that in the pre-task planning group. In terms of fluency, the study showed pre-task planning helped to improve language fluency more than online planning did, but there was no significant difference as the previous studies found (Ellis & Yuan, 2004; Tabari, 2016), and pre-task planning was found to help reduce revisions in writing process. As to the relationship among planning, task and language performance, it is found that planning type and task did not have any interaction effect in complexity or fluency yet did interact in accuracy. Specifically, on-line planning promotes significantly more accuracy in integral writing, while pre-task planning promotes significantly more accuracy in practical writing.

The study indicated pre-task and online planning participants performed differently in language performance. As a whole, participants produced more complex and accurate language under online planning than pre-task planning condition and produced more fluent language under pre-task planning, which is in accordance with many previous studies (Ellis & Yuan, 2004; Ghavamnia et al., 2013; Qjima, 2006; Skehan, 1998). Information processing theory (Skehan & Foster, 2001) believes that the central executive allocates attention capacity to speed and accuracy during task, which could interpret the results of the study. It seems learners in online planning tends to allocate more attention to language form such as phrasing and sentence patterns during task, and learners in pre-task planning allocate attention to fulfillment of task.

Furthermore, the results expanded the application of information processing theory to Chinese high school students' English writing, and shed more light on the arguments between "trade-off effect hypothesis" and "cognition hypothesis". Skehan (1998) argued that the heavy burden imposed on the central executive by the complex task forces the writer to allocate attention among language dimensions, i.e., complexity, accuracy and fluency, and the writer have to trade off one of them for another. Cognition hypothesis (Robinson, 2001, 2005) proposes that the various dimensions of language output are not competitive but connected with each other. When faced up with a challenging task, the writer will recruit most attention resources he could get access to in order to meet the great demands of the task; in this process, meaning and form of language production are given equal

attention. This study found that for different tasks and under different planning conditions, the learner prioritizes different language dimensions, giving more evidence to Skehan's (1998) hypothesis. The conclusion was in line with the previous studies (Ellis & Yuan, 2004; Salimi & Dadashpour, 2012). Considering the fact that the participants in this study were Chinese high school students, the application scale of trade-off effect was extended.

This study also suggested the effect of genre on language performance. It is indicated that in tackling with unfamiliar genres, the pre-task planning time hardly helps in language accuracy as the learners tend to focus more attention upon the overall structure and fulfillment instead of language form. In comparison, in writing task of familiar genre, learners in online planning could have sufficient time to formulate, revise and improve language accuracy. The results support some studies (Skehan & Foster, 1997; Tavakoli & Skehan, 2005), which indicated that task with macrostructure under planning condition promotes accuracy. The results differ from the Mehrang and Rahimpour (2010), which found that task has no effect on language accuracy or complexity. The difference might be due to the different task types. The tasks in Mehrang and Rahimpour (2010) include two picture-based oral narratives; as oral task produces more real-time pressure than writing task and is not amenable to revision, it is difficult for learners in oral task to review and revise. In other words, the favorable effect of online planning on language accuracy might be reduced in oral task.

6. Conclusion

This study examined the effect of planning on CLF of high school students in China and enhanced the understanding of planning as a form of task preparation in allocating attentional resources. It was found that pre-task planning tends to prioritize macrostructure and meaning construction, which could lessen the pressure of working memory and reduce revisions, but in more complex writing tasks such effects of pre-task planning seem limited. In comparison, online planning helps promote language complexity and accuracy, especially in written product of unfamiliar genre. The results indicate that pre-task planning, by promoting L2 fluency, could to some extent make up for L2 language deficiencies, and online planning strategies are particularly effective in tackling with complex tasks. The results verified the cognition model of information processing theory (Skehan & Foster, 2001), and expanded the application of cognitive writing model to EFL high school students.

The study also has pedagogical implications for EFL teachers. Explicit instruction on planning, writing models and subprocesses could be integrated into writing instruction to promote students' language performance. Students can be taught to employ pre-task planning in brainstorming and outlining process and employ online planning to search for more specific expressions and in revision to distribute cognitive load to different steps and improve learners' writing ability and confidence. Teachers could help students of different proficiency levels grade

and sequence tasks, weigh up the subprocesses, and promote optimal writing quality of written product. Meanwhile, task type should be taken into account in writing instruction.

Yanshu Sun (PhD) is an associate professor at Liaocheng University, China. Her research interests include second language writing and foreign language instruction. Email: syanshu@126.com

Tong Wang (MA) is an English teacher at Shengcheng Middle School, Weifang, China.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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