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# Effects of Content Support on Integrated Reading-writing Task Performance and Incidental Vocabulary Learning

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## Abstract

**Over the past few decades, task-based language teaching (TBLT) has spawned a series of studies on how various task features affect the way second language (L2) learners use the target language (TL)(e.g., Rostamian, Fazilatfar, & Jabbari, 2018) and acquire TL constructions by carrying out the task (e.g., Solon, Long, & Gurzynski-Weiss, 2017). The theoretical rationale for this strand of research is that task, a meaningful activity that entails TL use to achieve a specified objective (Bygate, Skehan, & Swain, 2001), can engage L2 learners in TL use and hence serve as a viable unit of L2 instruction. As the area has matured with accumulated empirical findings, researchers have commonly identified the near-exclusive attention paid to output-based tasks that entail productive skills such as speaking or writing (Gilabert, Manchón, & Vasylets, 2016). Receptive skills, however, play an important role in task-based instruction, creating opportunities for exposure to new TL features contained in the task input. Shintani (2012) aptly pinpoints the need for more research into input-based tasks that push learners to use the TL to respond to task input, and further asserts that outcome-oriented component can heighten learners' sensitivity towards new TL features contained in the input and, in doing so, cater for incidental L2 learning. This is an important gap, considering the pervasive use of input-based tasks in many L2 instructional and naturalistic settings (e.g., responding to literature, replying to emails, or filling out a form following an instruction). Another gap in the literature is only marginal attention paid to the effects of task complexity on vocabulary learning. Thus far, target linguistic constructions in the TBLT studies have predominantly been L2 grammatical structures (e.g., Kim, 2012; Révész, Sachs, & Hama, 2014), while the applicability of the task-based approach to L2 vocabulary learning has largely been unattended. Against this background, the present study aimed at filling the gaps in the literature, i.e., the effects of task complexity on L2 learners' performance in an integrated reading-writing task and learning of vocabulary contained in the task input.**

## Keywords

**Incidental Vocabulary Learning; Integrated Reading-writing; Content Support; TBLT.**

## 1. Introduction

Within the framework of TBLT, it is considered essential to understand how various task features may impose differential amounts of cognitive demands on learners' limited mental resources, which in turn affects their task performance. In order to predict and explain task effects unique to writing, Kellogg's (1996) model of writing process is often called upon. Based on the Overload Hypothesis (Kahneman, 1973) [7], Kellogg contends that composing is a challenging task in which writers need to cope with multiple, cognitively hierarchical processes simultaneously, such as planning content and linguistic forms, considering voice and style, and monitoring and revising drafts. Thus, writers should allocate their limited attention strategically to the three stages of writing, i.e., planning, execution, and revision. In the case of writing in L2, linguistic demands add even greater complexity, often having detrimental

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influence on writing process and product (Thorson, 2000). Recently, Révész, Kourtali, and Mazgutova (2017) [8] set forth explicit predictions on how task complexity would affect L2 learners' writing processes and products. To be more specific, when learners are cognitively overloaded, writing processes will be slowed down as reflected in longer and more frequent pauses during writing, especially between larger linguistic units such as clauses or sentences (Author, xxxx; Schilperoord, 1996) [9]. In addition, due to lack of surplus attention, learners may be less able to revise their drafts, producing linguistically less complex texts.

## 2. Research Design

The present study was inspired by Zhang (2017)[19] and Author (xxxx). To be more specific, the integrated reading-writing task and the task input were adapted from Zhang's (2017) study on the impact of integrated reading-writing task and corrective feedback on EFL writing development, and the task manipulation and data analysis methods were taken from Author's (xxxx) research into the effects of task complexity on EFL writing processes. The novelty of this study lies in investigating the applicability of the task-based approach to an integrated reading-writing task in connection with its pedagogical potential to promote L2 vocabulary learning, which has received only marginal attention in the previous TBLT studies. To be more specific, this study examined the influence of task manipulation of an integrated reading-writing task on EFL learners' task performance and incidental learning of target vocabulary items (see Figure 1). Within a between-subject design, thirty- four participants read an English opinion essay and refuted the argument presented in the essay, with (–complex condition) or without (+complex condition) content support. Upon the completion of the task, they completed a post-task survey, a summary, and a vocabulary form and meaning recognition test.

## 3. Analysis

### 3.1. Writing Performance Indices

The indices used in this study were adapted from Révész et al. (2017) and Author (xxxx). Inclusion of the common indices was expected to facilitate comparison of the findings among the studies and thereby contribute to estimation of the feasibility of the predictions made by Révész et al. (2017). As mentioned in the earlier review, Révész et al. (2017) involved a comprehensive range of indices for nuanced understanding about the influence of content support on writing performance. In order to investigate temporal characteristics of on-line writing processes, keystroke logs recorded with Inputlog were analyzed in terms of writing fluency, pausing, and revision behaviors. For fluency, the average stroke per minute, total words and characters per minute, and total time divided by words and characters were calculated. Indices for pausing behaviors were examined in terms of frequency and length of pauses at word, at sentence, and at paragraph levels. Threshold for pausing was set at two seconds following Spelman Miller et al. (2008). Lastly, revisions were analyzed with the number of total revisions, deletes, inserts, and R-bursts (bursts that stopped for revision).

Next, the written products were analyzed in relation to lexical diversity, syntactic complexity, and general quality. Any spelling or punctuation errors were corrected before submitting the written products to different text-analyzing programs. First, lexical rarity was examined with proportion of 1K, 2K, academic words, and off-list words, calculated with the classic version of Vocabprofiler (Cobb, 2016). In addition, lexical variability was explored with indices such as type-token ratio, D formula (Malvern & Richards, 1997) and MTLD (McCarthy & Jarvis, 2010), which were computed with McNamara, Louwerse, Cai, and Graesser's (2005) Coh-Metrix 3.0. Lastly, latent semantic analysis (LSA) index was extracted with Coh-Metrix to measure lexical diversity. As for syntactic complexity of the written texts, ratios of words and clauses to t-unit were obtained (i.e., overall and subordination complexity) using SynLex (Lu, 2010). Also, the

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number of modifiers per noun phrase (i.e., phrasal complexity) and syntactic structural similarity (i.e., syntactic sophistication) were computed to using Coh-Metrix. Lastly, the general quality of the written products was evaluated with an analytic scoring rubric that subsumed categories such as organization, content, grammar, vocabulary, and mechanics (see Appendix C). The maximum score was 100 (Cronbach's alpha = .81).

### 3.2. Statistical Analysis

SPSS 22.0 for Mac was used to compute descriptive statistics for the data and reliability of various tests. In order to compare indices for writing processes and products between the task conditions, independent-sample t-tests were used. Prior to conduct t-tests, normality of the data was checked to examine if the assumption for t-tests was met.

Following Plonsky and Oswald (2014), Cohen's d of .40 was evaluated as small, .70 as medium, and 1.00 as large effect sizes. The significance level was set at an alpha level of $p < .05$. Next, in order to explore the influence of content support on the participants' perceived task difficulty, and vocabulary recognition test scores, mixed-effects models were constructed using the statistical program R version 3.3.0 (R Development Core Team, 2016). Mixed-effects modeling was conducted as it can account for random factors nested in participants and items. Before running the models, linearity and homoscedasticity of the data was checked with residual plots. Next, the package lme4 was used for developing mixed- effects models, with Subject and Item as random effects and Complexity as fixed effects.

Interval data (i.e., survey responses) were analysed with the lmer function, and absolute t-values above 2.0 was the criterion for testing significance of the models (Gelman & Hill, 2007). Conditional effect sizes for the models were calculated using the r.squaredGLMM function from the package MuMln. Models with categorical data (i.e., vocabulary form and meaning recognition scores) were constructed using the glmer function, and effect sizes were computed with C index of the concordance using the somer2 function from the package Hmisc. C-indices of .70 (moderate), .80 (good), and .90 and above (excellent) were set as the benchmarks for evaluating the model fit (Baayen, 2008).

## 4. Results

### 4.1. Perceived Task Difficulty

The mean of the post-task survey responses was 18.71 for –complex group (n = 17, 95% CI [17.70, 19.72], SD = 3.46), and 21.47 for +complex groups (n = 17, 95% CI [20.46, 22.48], SD = 2.50). The results of likelihood ratio tests showed that inclusion of Complexity ($\chi 2(1) = 8.22$, $p = .02$, $R2 = .26$) improved the null model (only with random effects) to a significant level. A post-hoc mixed-effects model (perceived difficulty ~ complexity + (1|participant) + (1|item)) further showed that Complexity had a significantly positive influence on perceived task difficulty ($t = 2.75$). In other words, the participants felt they were under greater task demands when content support was not available.

### 4.2. Effects of Content Support on Writing Processes

The two conditions did not demonstrate significant differences in their writing fluency. Likewise, overall pausing behavior appeared to be comparable between the groups both in terms of frequency and length of pauses. It was found, however, that the participants made significantly more frequent, ($t(34) = 2.66$, $p = .01$, Cohen's $d = 0.74$) and longer pauses ($t(34) = 2.23$, $p = .03$, Cohen's $d = 0.65$) between sentences when they did not receive content support. Similarly, although the average number of revisions was unaffected by content support, participants made significantly more inserts when they were assigned in the +complex condition ($t(34) = 2.10$, $p = .04$, Cohen's $d = 6.49$). In other words, the results showed that the

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participants in the +complex condition paused more and longer at a sentence level and tended to insert more.

### 4.3. Effects of Content Support on Written Products

Participants' written products were also evaluated in terms of linguistic complexity and general quality. First, as shown in Table 3, the proportion of 2K words ($t(34) = 3.05$, $p = .01$, Cohen's $d = 1.05$) was significantly different between + and – complex conditions. That is, the result indicated that participants who received content support tended to include more 2K- level words than those who had to write on their own. The number of modifiers per a noun phrase ($t(34) = -2.61$, $p = .01$, Cohen's $d = 0.90$) was also significantly greater for the – complex condition. Caution is needed, however, as the difference seemed to be only marginal and the confidence intervals overlapped.

## 5. Discussion

This study investigated whether content support in an integrated reading-writing task would affect EFL learners' on-line writing processes as reflected in keystrokes, their written products in terms of linguistic complexity and general quality, and incidental learning of new words contained in the reading passage. Drawing upon Révész et al. (2017), it was hypothesized that content support would reduce the cognitive pressure loaded on planning processes, allowing L2 learners to write more fluently with fewer and shorter pauses, and monitor their writing processes more effectively. Indeed, participants' perceived level of task difficulty was found to be significantly greater when content support was not provided, confirming that the task manipulation in this study was successful.

Interestingly, it was found that three participants from the +complex group used target pseudowords (tralion and phosens) in their writings, providing additional support to deeper engagement with task input under greater task demands (Robinson, 2011). Considering that development of vocabulary knowledge progresses in an incremental manner (Nation, 2015), more sensitive indices, such as a partial definition task, could have captured learning of the target pseudoword meanings more accurately (Rott, 2004). What was also notable is that the pseudowords found in the written products were used along with the same modifying words as in the original phrases (everyday tralion and failed phosens). In other words, the three participants seem to have noticed the pseudowords together with the neighbouring and semantically connected words, which lends further credence to the possibility of incidental learning of collocations from reading (e.g., Pellicer-Sanchez, 2017; Sonbul & Schmitt, 2013; Webb, Newton, & Chang, 2013). That is, it seems reasonable to assume that the learners might have noticed the phrases as holistic chunks, an initial stage of collocation learning, which could be later developed into prefabricated patterns and acquired as novel collocations (Hoey, 2005).

## 6. Conclusion

The present study attempted to extend the scope of TBLT literature into input-based tasks (Shintani, 2012) by examining the impact of content support in an integrated reading- writing task on L2 learners' on-line writing processes, written products, and incidental learning of new vocabulary items contained in the reading passage. Inspired by Révész's predictions on the impact of task complexity on L2 writing processes and products (Révész et al., 2017) it was hypothesized that absence of content support would lead L2 learners to demonstrate longer and more frequent pauses between clauses or sentences and produce linguistically less complex texts. Findings of this study supported this prediction, demonstrating an increased amount of pauses and inserts during writing as well as a smaller proportion of 2K words and fewer modifiers in noun phrases in the written products under the +complex condition. Also,

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drawing upon Robinson's (2011) claim on the role of increased task demands as a catalyst for deeper engagement with task input, it was assumed that the lack of content support would lead participants to process the reading passage more deeply, resulting in more incidental vocabulary learning. The + complex group, indeed, demonstrated superior ability in terms of recognizing target word forms, and some participants in this group further used the target words in their writings.

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