THE EFFECTS OF AN INCREASE IN TASK COMPLEXITY ON LEARNERS' WRITTEN PRODUCTIONS VIA WIKI

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Abstract

Studies have widely investigated the effects of an increase in task complexity on L2 learners' language productions. However, little has examined the effects of an increase in task complexity on L2 learners writing via wiki (Zailin, 2010; Zailin, Nik & Ainol, 2012). With respect to the prediction of Cognition Hypothesis (Robinson, 2001, 2005 & 2007), the current study aims to investigate the possible effects of an increase in task complexity variable (+/-reasoning demand) on L2 learners' written productions. Thirty-seven *(N=37)* undergraduate engineering L2 learners doing English Course at University Malaysia Pahang were assigned into two different complex (+Reasoning demand) and simple (–Reasoning demand) tasks. Wiki a 2.0 web (Zailin et al. 2012) platform was introduced to learners where they could write their essays for one hour. The data was analyzed with regard to complexity, accuracy, and fluency. As predicted by the Cognition Hypothesis learners in complex task (+RD) produced more accurate though less fluent language. However, complexity was not affected. As a result, the current study partially supports the Cognition Hypothesis.

Key words: Task complexity, Wiki, Language Productions

1. TASK COMPLEXITY

Task design and second language (L2) productions is currently a broad area of research, and typically complexity, accuracy and fluency variables measure to observe if task complexity can assist learners to improve their language productions. Since 1980s, language pedagogy introduced tasks as a vital part in L2 acquisition (Kuiken & Vedder, 2008). In a task-based syllabus, pedagogic tasks should be developed and sequenced to increasingly approximate the demands of real-world target tasks, with the goal of enabling L2 users to succeed in attaining needed lifetime performance objectives (Robinson, 2005). Task complexity is considered a central issue in task-based language learning process, i.e., "This is an important area of

investigation given that one of the pedagogical goals of TBLT is to create tasks and sequence them to best help learners produce and acquire an L2/FL" (Baralt, 2010, p. 50).

Several studies argued on the effects of task complexity on L2 development, i.e., complexity, accuracy and fluency (Robinson, 2001, 2005, 2007; Robinson & Gilabert, 2007; Skehan, 1998, 2003; Skehan & Foster, 2001). For instance, the Limited Capacity Model predicted a better performance on a less complex task as cognitively demanding task draw attentional resources away from language. The basic assumption of Limited Attentional Capacity Model by (Skehan, 1998) was that humans have a limited processing capacity, and more demanding task might cause trade-off effects in learners' language productions (Skehan, 1998; Skehan & Foster, 2001). Cognition Hypothesis by Robinson (2001, 2005 & 2007), on the other hand, claimed that learners could gain more in a complex task as they would able to share their attention between form and contents. The Cognition Hypothesis claimed that an increase in task complexity in monologic task with respect to the resource-directing variables (e.g., +/- here-and-now, +/- reasoning-demands, +/- few-elements) could lead to more complex and accurate language but the fluency would suffer from task complexity (Robinson, 2001, 2005, 2007; Robinson & Gilabert, 2007). Other than the resource-directing variable of task complexity, Skehan (1998) and Robinson (2001, 2005 & 2007) predicted similar hypothesis of resource-dispersing variable of an increase in task complexity. They agreed that an increase in task complexity along resource-dispersing variable would have negative effects on complexity, accuracy and fluency of learners' language productions. However, they still oppose each other in terms of resource-directing factor.

1.1. THE EFFECTS OF TASK COMPLEXITY ON SECOND LANGUAGE PRODUCTIONS

A number of studies examined the effects of task complexity on L2 learner language productions, i.e., Kuiken and Vedder (2007), Nuevo (2006), Rahimpour (2010), Robinson 2001, Salimi and Dadashpour (2012). For instance, Nuevo (2006) measured the effects of task complexity by looking at (+/- casual-reasoning) on learners language productions where no significant difference among high and low complexity groups was found. One-hundred and thirteen (*N*= 113) ESL learners were enrolled in high-complexity, low-complexity and a control group. The study used pre, post and delayed-posttests design to measure the second language development while English past tense and locative prepositions were used as linguistic items of the study. She found no difference of English past tense and locative prepositions among the high and low complexity groups. However, only complex group significantly performed better than the control group. Kuiken and Vedder (2007), on the other hand, found that task complexity significantly helped learners to produce an accurate piece of writing. The study enrolled 84 Dutch University and 75 French learners and were asked to write a letter to a friend based on complex and non-complex task. Learners in a complex task required to consider six points while

less complex task needed to include three. Results showed that not only learners in complex task were more accurate than less complex task but also task complexity significantly affected lexical frequency of learner language productions, and learners in complex task produced frequent words than those involved in less complex task. In terms of accuracy, the findings of the study by Michel, Kuiken and Vedder (2007) are similar to Kuiken and Vedder (2007), i.e., learners in complex task generated more accurate but less fluent speech. However, the linguistic complexity was marginally affected. Other than that, contrary to the Cognition Hypothesis, Rahimpour (2010) depicted that an increase in task complexity along resource-directing variable (+/-here-and-now) significantly affected fluency rather than complexity and accuracy of learner language productions. Fifty-two (N=52) Iranian English language learners were enrolled in the study where they were asked to write two narratives, i.e., simple task (here-and-now) were given a story picture and a prompt written in present tense while complex task (there-and-then) were asked to do it in the past. Written narratives from the two sessions were collected and evaluated in terms of complexity, accuracy, and fluency. Number of error free t-units/t-units ratio was analyzed to measure the accuracy; total number of words/t-unit ratio was used to measure the fluency of learners' performance. In order to measure the complexity of learners' performance, S-nodes/t-unit was analyzed where the number of sentence nodes indicated by tensed and un-tensed in a narrative/total number of t-units in the narratives. Results of the study by means of t-test indicated; however, the mean of accuracy in there and then session m=0.5048 was greater than here and now $M = 0.4896$; however, task complexity had no significant effect on accuracy. Likewise, there was no significant effect of task complexity on complexity as the mean score of the learners in complex task (there-and-then) and less complex task (here-and-now) were $M = 1.6252$ and m=1.5908 respectively. Results of the study revealed a significant effect of an increase in task complexity only on fluency as the significance level was $p<0.05$. Regarding the accuracy and fluency, the findings of the study by Rahimpour (2010) echoed by (Salimi & Dadashpour, 2012; Salimi, Dadashapour & Asadullahfam, 2011). Unlike Rahimpour (2010), these studies showed a significant effect of task complexity on complexity of learners' language productions. The studies reviewed above provided insights into the effects of an increase in task complexity along resource-directing variable on L2 learners' language production in a traditional paper and pen form. It would be interesting asking learners to write via a web 2.0 which is wiki. The following section further discusses this.

1.2.   WIKI A 2.0 WEB AND ITS IMPACT ON STUDENTS' WRITING

Wiki is a freely expandable collection of interlinked web pages, a hypertext system for storing and modifying information, and a database where each page can easily be edited by any users (O'Neill, 2005). Wiki is a set of linked web pages that is shaped through an incremental development by a group of users (Wagner, 2004), an easy-to-use platform for collaborative work on texts and hypertexts (Ebersbach et al. 2006), and is open accessed (Ruth & Houghton, 2009). In addition, Ben-zvi (2007) believed that the ease of procedure and communication made wiki a

useful tool for group collaborative authoring, and it can be used to gain information from their teacher and other learners.

Researchers acknowledge that the use of wiki can have positive effects on learning process, and can be used as an effective collaborative tool for writing in language classes (Kovacic et al. 2007; Parker & Chao, 2007; Ren & Gong, 2011; Wang et al. 2005; Zailin et al. 2012). For instance, Zailin et al. (2012) found that the learners collaborated and participated equally through wiki. The study also showed that most of the learners, who used wiki in their classes, were able to write, rewrite and edit their group works anytime from anywhere. Moreover, the discussion that took place about writing, editing, feedback, and other interactions helped them in improving their written assignments. The Findings of the study by Zailin et al. (2012) were supported by Biasutti and EL-Deghaidy (2012). They indicated that wiki offered collaborative, flexible, rich and empowered learning environments, and the learners were highly satisfied when they used wiki.

In addition to collaboration, some researchers also highlighted wiki as one of the best tools in teaching and assessing the overall learners' performance in language classes (Barry, 2012; Umar & Rathakrishnan, 2012; Zailin, 2010; Zailin et al. 2012). For example, Umar and Rathakrishnan (2012) investigated that wiki did not only assist learners to improve their essay writing performance, it also improved their critical thinking skills. Findings of the study by Barry (2012) correlated with the findings of the study by Umar and Rathakrishnan (2012); the study assessed learners watching their presentations via wiki and revealed that watching the videos of learners' group presentation was an effective method of feedback and could improve group and individual performance.

Furthermore, Zailin (2010) asserted that wikis could also be used as an effective tool for teaching writing because revisions and feedback can easily be analyzed and addressed using this editable web-based tool. The researcher reported that during 10 weeks of study a total of 1553 of feedback were given via wiki. The revision made by the learners to their report writing has improved the text quality of their writing, and this was well acknowledged by the learners. The findings of the study by Zailin (2010) recently echoed by Ng (2014). He investigated that wiki could assist learners to improve their writing by receiving comments from their peers and teachers. The study examined integrating assessment for learning as a practical pedagogy to improve the quality of their wiki-based project. 76 participants were enrolled at a teacher training institute in Hong Kong. Results indicated a total of 451 comments were provided on wiki which showed the eagerness of learners condense their comments to peers. Participants of the study pointed out that teachers and peers comments helped them improve the quality of their wiki project. The above descriptions on the effectiveness of wiki may well relate to the teaching and learning approaches the instructors or researchers have employed. Nevertheless, most of the studies sought to measure the impact of CF on linguistic accuracy of learners' written or oral

productions. Also, as reviewed earlier, providing CF is one of the beneficial assistances instructors may offer the learners with. As such, the current study aims to fill the gap by investigating the possible effects of wiki-based implicit CF on L2 learners' written productions with reference to complexity, accuracy and fluency.

As reviewed above that most of the previous studies investigated the impact of an increase in task complexity along resource-directing variable (+/- here and now, +/- reasoning-demands, +/- few-elements) on learners' language productions in a traditional way i.e., paper and pen form, i.e., Kuiken and Vedder (2007, 2008), Michel et al. (2007), Rahimpour (2010), Robinson (2001, 2005). However, little has examined the impact of an increase in task complexity on L2 learners' written production particularly in a wiki platform. Therefore, the current study aimed to fill the gap by investigating the positive effects of an increase in task complexity in monologic task along resource-directing variable (+/-reasoning-demand) on learners' written productions in a wiki platform with reference to complexity, accuracy and fluency.
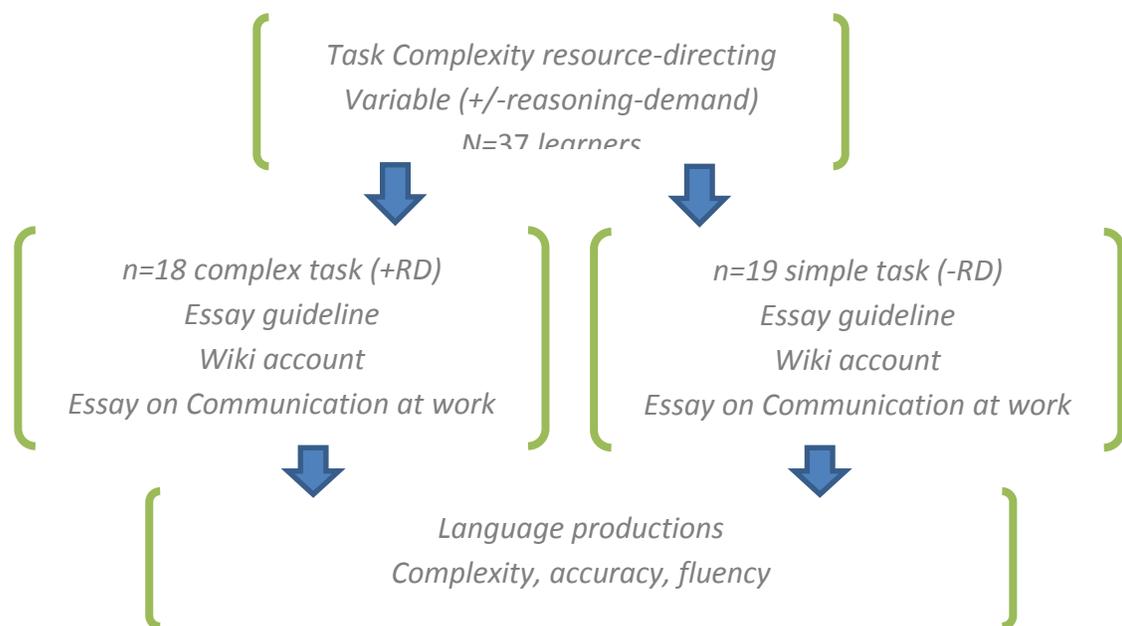
2. RESEARCH MATERIALS AND METHOD

The study, which was conducted at University Malaysia Pahang, was designed to investigate the extent to which an increase in task complexity along resource-directing variable (+/-reasoning-demand) could help L2 learners to improve their written production (complexity, accuracy, fluency) as evidence in their writing via wiki. Thirty seven (*N*=37) undergraduate learners doing English for Professional Communication course from two intact classrooms participated in the study. Their age ranged between 18-22 years old and their L1 were either Malay, Chinese or Tamil. Their English proficiency was at low level as evident from their Malaysian University English Test (MUET) results. Majority of the learners achieved band 2 or 3 in the exam. One of the task complexity variables, i.e. resource-directing (+/-reasoning-demand) was manipulated in the task design. The learners were randomly assigned into two groups, i.e. complex task (+RD) and less complex task (-RD). Throughout the semester as the study took place, the teaching and learning sessions were conducted in language labs. As such, learners were able to use computers with internet connection for classroom activities including assessing and writing on wiki. There were three research questions formed with the aim to investigate the following:

1. How does an increase in task complexity along resource-directing variable (+/-reasoning demand) via wiki affect complexity of learner written productions?
2. How does an increase in task complexity along resource-directing variable (+/-reasoning demand) via wiki affect accuracy of learner written productions?
3. How does an increase in task complexity along resource-directing variable (+/-reasoning demand) via wiki affect fluency of learner written productions?

2.1. RESEARCH DESIGN

The data collection process, which used in the study, is expected to investigate the effects of an increase in task complexity along resource-directing variable (+/- reasoning demand) on L2 learner written productions. The data is collected in one stage using wiki a 2.0 technology. The learners were randomly assigned into complex task (+RD) and less complex task (-RD) based on an increase in task complexity of resource-directing variable and asked to write an essay the topic of communication at workplace. The learners in +RD group were asked to write their essays based on casual reasoning while the learners in –RD group were not provided with reasons and were required to write their essays independently. Learners were given one hour to write the essays on their wiki pages. The data was collected by one of the researchers using the following procedure shown in figure 1.

Figure 1: Procedure of the study

Task Complexity resource-directing Variable (+/-reasoning-demand) N=37 learners

n=18 complex task (+RD)
Essay guideline
Wiki account
Essay on Communication at work

n=19 simple task (-RD)
Essay guideline
Wiki account
Essay on Communication at work

Language productions
Complexity, accuracy, fluency

2.2. DATA ANALYSIS

Learners' written essays on communication at workplace from pre and posttests were analyzed to investigate: 1) if an increase in task complexity along resource-directing variable (+/-reasoning demand) via affect the complexity of learners' written productions, 2) if an increase in task complexity along resource directing variable (+/-reasoning demand) via wiki affect the accuracy of learner written productions, and 3) if an increase in task complexity along resource directing variable (+/-reasoning demand) via wiki affect the complexity of learners' written productions.

C/T and DC/C ratios were analyzed to measure the syntactic complexity. In addition, lexical complexity was measured by Guiraud index, and percentage of sophisticated words. Accuracy was measured by total number of E/T and total numbers of E/C. In addition, total number of W/T and total number of W/C ratios were used to measure the fluency of learners' written productions. The data was analyzed using Microsoft Excel and SPSS. Independent t-test was run to answer the research questions. The independent t-test provides the *p* value that shows significant difference between the two groups of the study. First, if the p value is $p>0.05$, it means there is no significant difference between the groups. However, if the p value is $p<0.05$, it means there is a significant difference between the two groups based on an increase in task complexity. Table 1 summarizes the measures used in the study.

Table 1: Measure of written productions: complexity, accuracy, fluency

Main measures	Sub measure	Symbols
Syntactic complexity	1. Number of clause per T-unit	C/T
	2. Number of dependent clause per clause	DC/C
Lexical complexity	1. Guiraud Index of lexical richness	GI
	2. % of sophisticated words	SW
Accuracy	1. Number of errors per T-unit	E/T
	2. Number of errors per clause	E/C
Fluency	1. Number of words per T-unit	W/T
	2. Number of words per clause	W/C

T=T-unit, C= total number of clauses, DC= total number of dependent clause, GI= Giraud's index of lexical diversity by means of types/ tokens, SW= % of sophisticated words, E= total number of errors, W= total number of words

3. RESULTS

The independent t-test was administered to analyze the data and observe the effects of an increase in task complexity on learners' written productions. Results revealed that learners in +RD group significantly produced more accurate language over those learners participated in –RD group. On the other hand, learners participated in –RD group significantly produced more fluent language over +RD group. However, an increase in task complexity along resource directing variable (+/-reasoning-demand) via wiki did not affect the syntactic and lexical complexity of learner written productions.

3.1. COMPLEXITY

Considering separate measures, independent t-test revealed that an increase in task complexity along resource-directing variable (+/-reasoning-demand) via wiki did not help learners to

improve the syntactic complexity of their written productions. C/T and DC/C ratios were analyzed to measure the syntactic complexity of their written productions. Results found that an increase in task complexity did not affect the syntactic complexity of learners written productions C/T $t(35) = 1.059, p>0.05$, and DC/C $t(35) = -0.247, p>0.05$. In addition, GI and SW ratios were analyzed to measure the lexical complexity of learners' written productions. Likewise, results showed that an increase in task complexity along resource-directing variable (+/-reasoning-demand) dimension did not affect the lexical complexity of learners' written productions GI $t(35)= -0.347, p>0.05$ and % of SW $t(35)= -0.347, p>0.05$.

Table 2: Effects of task complexity on complexity of learner written productions

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C/T	Equal variances assumed	.462	.501	.059	35	.297	.06799	.06420	-.06234	.19833
	Equal variances not assumed			.060	4.994	.296	.06799	.06412	-.06219	.19817
DC/C	Equal variances assumed	.053	.820	.247	35	.806	-.00651	.02634	-.05998	.04696
	Equal variances not assumed			.247	4.451	.807	-.00651	.02639	-.06011	.04709
IG	Equal variances assumed	2.364	.133	.347	35	.731	-.12202	.35154	-.83568	.59164
	Equal variances not assumed			.351	1.481	.728	-.12202	.34779	-.83089	.58685
SW	Equal variances assumed	.997	.325	.978	35	.335	.76201	.77897	-.81937	2.34340
	Equal variances not assumed			.972	2.240	.338	.76201	.78415	-.83478	2.35881

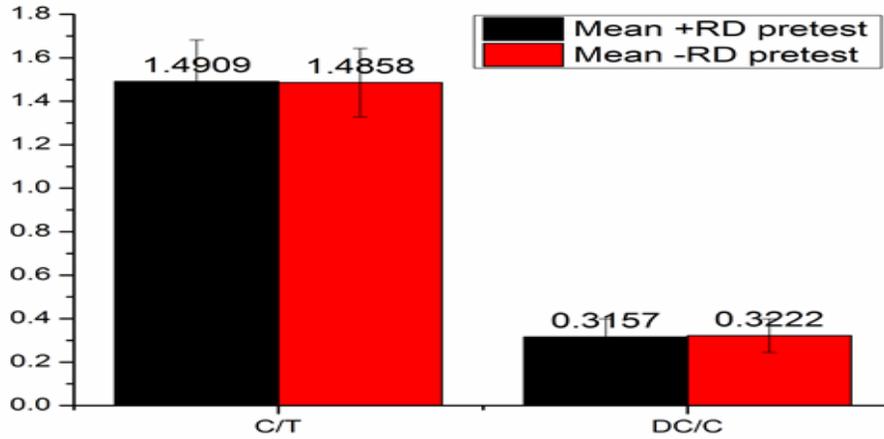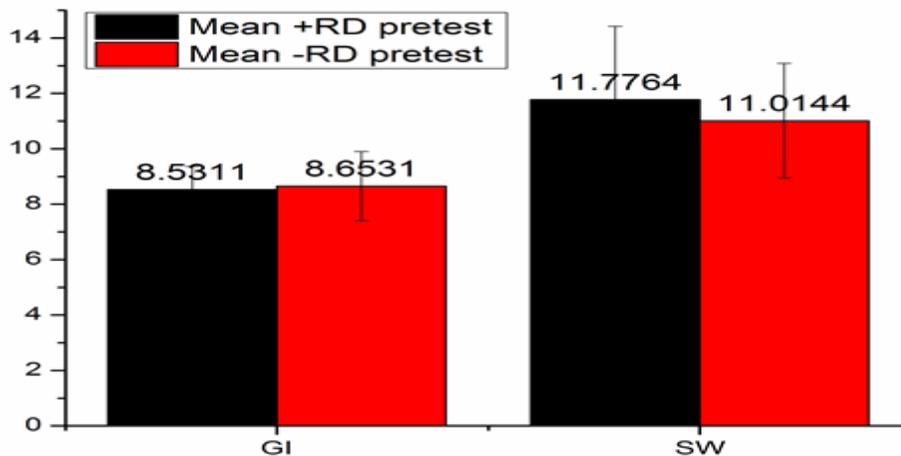Figure 2: The effects of task complexity on syntactic complexity of learner language production

Figure 3: The effects of task complexity on lexical complexity of learner written productions


3.2. ACCURACY

In addition to the impact of an increase in task complexity on complexity, E/T and E/C ratio were analyzed to measure the accuracy of learners' written productions. Results found that an increase in task complexity along resource-directing variable (+/-reasoning-demand) via wiki significantly affected the accuracy of L2 learners written productions, i.e., learners in +RD group produced more accurate language over –RD group when E/T ratio $t(35)= -3.597, p<0.05$ was analyzed.

Table 3: The effects of task complexity on accuracy of learner written productions

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
E/T	Equal variances assumed	.144	.707	3.597	35	.001	-.42503	.11815	-.66489	-.18516
	Equal variances not assumed			3.614	4.542	.001	-.42503	.11760	-.66387	-.18618
E/C	Equal variances assumed	11.135	.002	1.674	35	.103	-.19185	.11464	-.42458	.04088
	Equal variances not assumed			1.694	0.451	.100	-.19185	.11325	-.42300	.03930

The mean score of learners participated in a complex task were significantly less $M = 1.44$ $(SD =0.32)$ than −RD group $M = 1.86$ $(SD = 0.38)$. Results found that learners in +RD group significantly produced more accurate language over −RD group. However, an increase in task complexity did not affect the accuracy of learners' written productions when E/C ratio was analyzed. Results indicated that there was no significant difference between +RD and −RD groups as indicated in $t(35) = -1.674$, $p>0.05$.

Figure 4: The effects of task complexity on accuracy of learner written productions
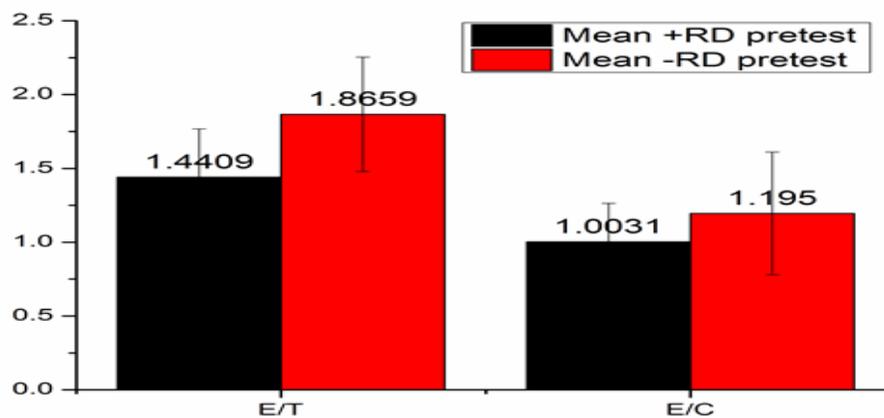
3.3. FLUENCY

With respect to fluency, results found that an increase in task complexity along resource-directing variable (+/-reasoning-demand) via wiki significantly affected fluency of learners' written productions. Learners in -RD group produced more fluent language over +RD group when W/T ratio $t(35)= -2.063, p<0.05$ was analyzed.

Table 4: The effects of task complexity on fluency of learner written productions

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
W/T	Equal variances assumed	.016	.899	2.063	35	.047	-1.63472	.79223	-3.24303	-.02641
	Equal variances not assumed			2.064	4.942	.046	-1.63472	.79190	-3.24245	-.02699
W/C	Equal variances assumed	.761	.389	1.905	35	.065	-1.00057	.52530	-2.06699	.06586
	Equal variances not assumed			-1.890	1.481	.068	-1.00057	.52942	-2.07966	.07853

Figure 5 shows that the mean score of learners participated in +RD was $M = 14.36 (SD = 2.38)$ while –RD $M =15.99 (SD = 2.42)$. However, an increase in task complexity did not affect accuracy of learners' written productions when E/C ratio was analyzed. Results indicated no significant difference between +RD and –RD groups as indicated by $t(35)= -1.674, p>0.05$.

Figure 5: The effects of task complexity on fluency of learner written productions
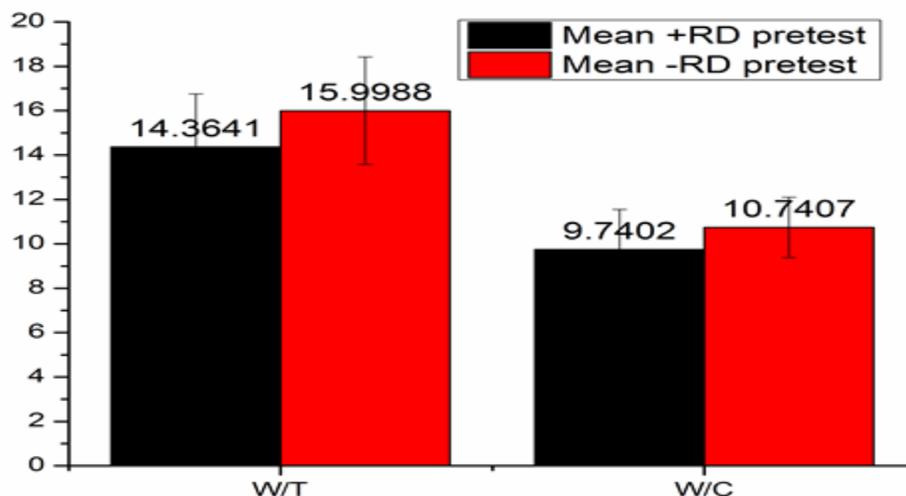
4. DISCUSSION

According to Robinson's Cognition Hypothesis, reasoning demand is one of the dimensions of resource directing variables. As stated in the second chapter of the current study, reasoning demand (+RD) task contains more guidelines and learners need to include these details in the content of their essays. According to Robinson's hypothesis, such tasks need learners to cognitively or functionally devote more attention to complete the task. Unreasoning demand (-RD) task, on the other hand, is cognitively less demanding or less difficult. Similarly to the studies on CF so far, previous studies examined the effects of task complexity along resource-directing variable on learner language productions in a f2f settings (Kuiken & Vedder, 2007; Michel et al., 2007; Nuevo, 2006). To conclude, previous studies up to now did not come with a conclusive answer to the claims of the Cognition Hypothesis. Particularly the predicted effects of an increase in task complexity in monologic task have not yet been tested systematically. Therefore, research questions of the current study were formulated to examine this claim in an asynchronous computer mediated communication (ACMC) setting.

Independent t-test was administered as the statistical means of analysis on four measures for complexity, two for accuracy and two for fluency. Results showed no significant effect of an increase in task complexity on the syntactic complexity of learner written productions. In addition to syntactic complexity, GI and % of SW were analyzed to find the effects of an increase in task complexity in monologic task along with resource directing variable (+/- reasoning demand) on lexical complexity of learner written productions. Similarly, findings of the study showed that task complexity did not affect the lexical complexity of learner written productions. In terms of complexity, findings of the current study support the claim by Skehan

(1998), i.e., a difficult task will no elicit more complex language. The finding also provide full support to the results of the current study by Kuiken and Vedder (2007, 2008), Michel, Kuiken, and Vedder (2007), Rahimpour, (2010); Robinson (1995), i.e. an increase in task complexity along resource directing variable did not reveal any significant effect on complexity of L2 learners language production. However, findings of the current study contradict the Cognition Hypothesis, i.e., an increase in task complexity in monologic task along with resource-directing variable (+/-reasoning-demand) push learners to greater complexity. Likewise, it also oppose the findings of the study by Salimi and Dadashpour (2012) who found significant effects of an increase in task complexity on complexity of learner written productions. In terms of complexity, the findings fully support Skehan's (1998) argument, i.e., individual's attentional capacity is definitely limited and it is difficult to pay attention to complexity when load is heavier. This support for LACM does not reduce the significance of Cognition Hypothesis in task-based research. It means some other factors might influence L2 learners not to increase the complexity of their written productions. For example, as stated in section 3.2 of chapter three, majority of the learners participated in the study had low level of English proficiency. Lower proficiency or intermediate learners are more likely to focus on grammatical forms (Storch & Wigglesworth, 2007).

In addition, E/T and E/C ratios were calculated (Wolfe-Quintero et al., 1998) to investigate the possible effects of an increase in task complexity on accuracy of the learner language production. Results revealed that learners participated in complex task (+RD) significantly produced more accurate piece of writing over less complex task (–RD). The effects were significantly reflected on only one measure, i.e., E/T. In contrast, Errors/Clause ratio was not significantly affected. Nevertheless, it can be concluded that task complexity could have positive effects on accuracy (at least error counting). Findings of the current study provide full support to Cognition Hypothesis, i.e., a complex task will elicit more accurate language production over simple task. Results of the current study are also similar and support findings of the previous studies, i.e., Gilabert (2007), Kuiken, Mos and Vedder (2005) and Michel, Kuiken and Vedder (2007), and Robinson (1995) that an increase in task complexity along with resource directing variable (+/-reasoning demand) significantly affected accuracy of learner written production. However, results of the current study in terms of accuracy are in contrast to the Skehan's (1998) argument (e.g., individual attentional capacity is limited and it is more difficult to pay attention to accuracy when the processiong load is heavier). Likewise, findings of the current study also oppose the findings of the study by Rahimpour (2010), i.e., no significant effect were found on accuracy of learner language productions.Nevertheless, it can be concluded that task complexity could have positive effects on accuracy (at least error counting). In contrast to the previous studies, i.e., f2f situation, the current study used an ACMC situation. Learners in the study use wikispaces as a writing platform. To summarize the results on accuracy, complex writing task (+RD) significantly elicited more accurate written production over less complex writing task (-RD).

Other than the complexity and accuracy, W/T and W/C ratios were analyzed to measure fluency of L2 learner written production. Results from independent t-test showed that learners in +RD group were significantly less fluent than learners in –RD group. The effects were significantly reflected on only one measure, i.e., W/T. Overall, it can be concluded that fluency suffers from an increase in task complexity. The findings of the current study on fluency provide full support to the predictions by Cognition Hypothesis (e.g., complex task will cause to reduce the fluency of learner language production). The findings of the current study are also similar to the findings of the studies by Michel, Kuiken, and Vedder (2007), i.e., fluency suffered from an increase in task complexity. However, findings of the current study contradict findings of the studies by Rahimpour (2010), Salimi and Dadashpour (2012). For instance, they found that an increase in task complexity along with resource-directing variable led to greater fluency. Learners in complex writing task (+RD) significantly produced less fluent language than less complex writing task (-RD). Nevertheless, it can be concluded that an increase in task complexity in monologic task along resource-directing variable (+/-reasoning-demand) could have negative effects on fluency (at least words counting). It can be concluded that an increase in task complexity in monologic task along resource-directing variable (+/-reasoning demand) via wiki partially confirmed the prediction by Cognition Hypothesis, i.e., task complexity push learners to greater complexity and accuracy while fluency suffers from task complexity.

5. CONCLUSION

Results of the current study replicates similar finding to earlier works in so far that positive effects of increased task complexity were found on accuracy whereas fluency decreased. Findings show that learners in complex task (+RD) significantly produced more accurate language over less complex task (-RD). On the other hand, learners in less complex task (-RD) significantly improved their fluency which means fluency suffered from increased task complexity. Regarding the complexity, there was no significant effect of increased task complexity on syntactic and lexical complexity of learners' written productions. Therefore, findings of the current study partially confirmed the Cognition Hypothesis.

6. LIMITATION AND RECOMMENDATIONS

The study conducted at University Malaysia Pahang and used the learners who use wiki technology in their English language classes. It is not going to over-generalize the level of effectiveness of wiki in other universities. It is going to focus only on an increase in task complexity along resource directing variable (+/-reasoning demand) and its effects on learner written productions; to test how it helps them towards improving their writing. Therefore, the validity of the findings in this study is limited to the above mentioned topic. It is worth mentioning that the current study used one shot design. Further research may use advance level or native speakers of English language as language proficiency can affect language development (Farokhi & Mahmoudi, 2012; Kuiken & Vedder, 2007). The study found that learners with the

low level of language proficiency were concerned in focusing on accuracy and fluency rather than trying to produce sophisticated structures and/ or lexical items.

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REFRENCES

Baralt, M. (2010). Task Complexity, the Cognition Hypothesis, and interaction in CMC and FTF environments. Doctoral Dissertation, *Graduate School of Arts and Sciences of Georgetown University,* Washington DC, USA.

Barry, S. (2012). A video recording and viewing protocol for student group presentations: Assisting self-assessment through a Wiki environment. *Computers and education*, 59 (3), 855-860.

Ben-zvi, D. (2007). Using Wiki to Promote Collaborative Learning in Statistics Education. Technology innovations in statistics education (TISE), *Center for the teaching of statistics, UCLA*. UC Los Angeles.

Biasutti, M. & EL-Deghaidy, H. (2012). Using wiki in teacher education: Impact on knowledge management process and students' satisfaction. *Computers and education*, 59, 861-872.

Ebersbach, A., Glaser, M. & Heigl, R. (2006). Wiki: Web collaboration. *Berlin Heidelberg*, Verlag.

Farrokhi, F & Mahmoudi, A. (2012). Rethinking convenience sampling: Defining quality criteria. *Theory and practice in language studies*, 2,784-792.

Kovacic, A., Bubas, G. & Zlatovic, M. (2007). Evaluation of activities with a wiki. *System, Teaching English as a second language*, 2–5.

Kuiken, F. & Vedder, I. (2007). Task complexity and measures of linguistic performance in second language writing. *Walter de Gruyter*,10.1515/2007.012

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

Michel, M., Kuiken, F. & Vedder, I. (2007). The influence of task complexity in monologic versus dialogic task in Dutch L2. *IRAL, Walter de Grutyer*, 45, 241-259.

Ng, E. (2014). Using a mix research method to evaluate the effectiveness of formative assessment in supporting student teachers' wiki authoring. *Computers and education*. 73, 141-148.

Nuevo, A. (2006). Task complexity and interaction. Unpublished Ph.D. dissertation, *Georgetown, Georgetown University*, U.S.A.

O'Neill, M. (2005). Automated use of a wiki for collaborative lecture notes. *ACM SIGSCE Bulletin*, 37, 267-271.

Parker, R. & Chao, J. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects*. Retrieved September 2, 2010.

Rahimpour, M. (2010). Current trends on syllabus design in FL instruction. *Social and behavioral sciences*, 2(16), 60-64.

Ren, Y. & Gong, C. (2011). An Empirical Study on Application of Wiki-based Collaborative Lesson-Preparing. *International Conference of Information Technology Computer Engineering and Management Sciences*, *IEEE*.

Ruth, A. & Houghton, L. (2009). The wiki way of learning. *Australian journal of education technology*, 25, 135-152.

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

Robinson, P. (2005). Cognitive complexity and task sequencing: Studies in a componential framework for second language task design. *International review of applied linguistics in language teaching*, 43, 1-32.

Robinson, P. & Gilabert, R. (2007). Task complexity, the Cognition Hypothesis and second language learning and performance. *International review of applied linguistics in language teaching*, 45, 161-76.

Robinson, P., Ting, S. & Urwin, J. (1995). Investigating second language task complexity. *RELC journal*, 25, 62-79.

Salimi, A. & Dadashpour, S. (2012). Task complexity and language production dilemma (Robinson's Cognition Hypothesis vs Skehan's Trade-off Model). *Social and behavioral science*, 46, 643-652.

Salimi, A., Dadashpour, S. & Asadollahfam, H. (2011). The effect of task complexity on EFL learners' performance. *Social and behavioral science*, 29, 1390-1399.

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

Skehan, P. (2003). Task-based instruction. Cambridge University Press. *Language and teaching, 36*, 1–14.

Skehan, P. & Foster, P. 2001. Cognition and tasks. In Robinson's (Ed.), *Cognition and Second Language Instruction*, 183–205. Cambridge: Cambridge University Press.

Storch, N. & Wigglesworth, G. (2007). Writing task: Comparing individual and collaborative writing. In M.P. Gracia Mayo (Ed.), *Investigating task in formal language learning*. (157-177). London, UK: Multilingual matters.

Umar, I. & Rathakrishnan, M. (2012). The effects of online teachers' social role and learning style on students' essay writing performance and critical thinking in a wiki environment. *Social and behavioral sciences*, 46, 5730-5735.

Wagner, C. (2004). Wiki: A technology for conversational knowledge management and group collaboration. *Communications of the association for information systems*, 13, 265-289.

Wang, H., Lu, C., Yang, J., Hu, H., Chiou, G. & Hsu, W. (2005). An empirical exploration of using wiki in English as a second language course. *Fifth IEEE international conference on advanced learning technologies* (ICALT'05).

Wolfe-Quintero, K., Inagaki, S. & Kim, H. Y. (1998). Second language development in writing: Measures of fluency, accuracy and complexity. *University of Hawaii Press*.

Zailin, Y. S. (2010). Evaluating the impact of feedback given via wikis on ESL students' reports. Unpublished doctoral dissertation. *International Islamic University Malaysia*, Gambang.

Zailin, Y. S., Nik, A. & Ainol, H. (2012). Investigating students' perception of using wikis in Academic writing. *The south East Asian journal of English language studies*, 18(3), 91-102.