

EFFECTS OF INTRINSIC COGNITIVE LOAD ON YOUNG EFL LEARNERS' SHORT-TERM ENGLISH WORDS MEMORY RECALL

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Abstract

This paper reports effects of intrinsic cognitive load on young EFL learners short-term English word memory recall. Thirty-four participants' were exposed to English word repetition which differ in terms of their processing load, lexical vs. lexicogramatical. The interaction that arose during the treatments were analysed quantitatively to examine the ability of young EFL learners to recall and use target L2 words. The study found that variation in intrinsic cognitive load (lexical and lexicogramatical items) did not differ in their effects on young EFL learners' short-term recall of target L2 words. On the other hand, the learners improved in their abilities in using targets L2 words (both lexical or lexicogramatical) over time.

Keywords: Cognitive Load, Intrinsic Cognitive Load, Young EFL Learners, Short-term Memory Recall.

Working memory is limited in its capacity to process information (Robinson, 2011; Skehan, 2018). Such limitation typically makes certain information that learners receive from their learning environments fail to be processed in their working memory. Likewise, although particular information is successfully processed in the learners' working memory, the information may not be successfully stored in their long-term memory in ways that facilitate future recall (N. Ellis, 2019). Sweller and his colleagues in the late 1980s and early 1990s (Chandler and Sweller 1991; Sweller 1988, 1989; Sweller et al. 1990) introduced Cognitive load theory as a theory of instructional design based on aspects of human cognitive architecture. The basic idea of Cognitive Load theory tries to explain how

the information processing load caused by a learning task can affect a student's ability to process new information and to build knowledge in long-term memory. In simple terms, the cognitive load theory states that learning is hampered when the working memory capacity is exceeded in a learning task. Cognitive load can also be increased by processes that are closely related to learning, such as instructional methods that emphasize information on subjects that are intrinsically complex. Intrinsic cognitive load refers to the complexity of the subject matter (Cooper 1998; Sweller and Chandler 1994). More specifically, the material contains many elements of interactivity. Low interactivity material consists of a single, simple element that can be studied separately, whereas in high interactivity material, individual elements can only be well understood in relation to other elements (Sweller 1994; Sweller et al 1998). However, intrinsic load is not only a function of the quality of the subject matter but also of the prior knowledge carried by the learner to the task (Bannert 2002; Sweller et al. 1998). Based on this analysis, intrinsic cognitive load can only be changed by changing what needs to be learned or changing learners' skills.

Although the Cognitive Load Theory that Sweller developed proves useful in the process of designing and implementing

instructional materials of various subjects, relatively few have been done to investigate how L2 instruction may benefit from this theoretical insight as well. The present study, therefore, aims to fill this gap by investigating whether differences in intrinsic cognitive load affects L2 learning differently as reflected in young Indonesian EFL learners' ability to recall English words in subsequent contexts of usage.

Method

This study uses experimental research methods to test whether differences in intrinsic cognitive load affected short-term memory recall of English words by young EFL Indonesian students. In line with the research method The present study employs a repeated-measures design.

The first factor is the influence of intrinsic cognitive load is divided in two categories: (1) low Intrinsic Cognitive load (low in element interactivity material) that is applied to the processing of lexical information (rice, corn, bread, cloud). (2) high intrinsic cognitive load (high in element interactivity material) which is applied to lexicogramatical information processing (a shoe, a chair, a cow, a goat). Meanwhile, the second factor includes the outcome English words that young EFL learners' produced during the course of instruction, which would

be divided into two categories: (1) use, and (2) accuracy.

Participants of this study were (+/-) 34 Indonesian Elementary school students enrolled in an at SDN Slawu 02 based in Jember Regency, East Java Province, Indonesia. These participants range in age from 7 and 11 years.

In collecting data, all participants were exposed to English words that differed in terms of their processing load, namely, lexical vs. lexicogramatical processing. During the instruction (treatments), the participants received the same treatment, where the participants were asked to name referents depicted in given pictures in English. The teacher provided feedback in the case where the participants could not do so. Following this, the participants were asked to repeat the words provided in the feedback. In obtaining data, video recording was carried out during the lesson to get the intended data. In order to ensure that the records are clear, participants in the study were divided into several small groups with the aim of obtaining maximum results in analyzing the data. Therefore, these data can be transcribed easily and reliably.

To analyze the data, two criteria were employed for the purpose of scoring, namely, use and accuracy. The scores were then analyzed statistically to know whether there

the two independent variables (i.e., low / high Intrinsic Cognitive load) differed significantly in their effects on the two dependent variables (i.e., use and accuracy in pronouncing L2). The study employed a non-parametric statistics to analyze the data. This is because the distribution of the data (students' scores) was not normally distributed. In doing so, the Friedman test was used to know whether there the independent variables significantly differed in their effects on the dependent variables. In the case where this test indicated that there were, indeed, significant differences, pair-wise comparison with Wilcoxon Sign-Rank tests were used to further examine where the significant differences existed.

Results and Discussion

Table 1. Tests of Within-Subjects measures
Within-subjects measures

DVs	Phase	The Friedman Test
Lexical	2,3,4	$X^2(2) = 10.1176, p = 0.00635$
Lexicogramatical	2,3,4	$X^2(2) = 9.8382, p = 0.00731$

The table above shows that the lexical context proves significant results in terms of recall and use in the sequence of phases 2-3-4 with $p = 0.00635$. Significant results were also shown on the lexicogramatical in recall and use in the sequence of phases 2-3-4 with $p = 0.00731$.

Table 2. Pairwise Wilcoxon signed rank tests (in press) for similar arguments as well as empirical support).

DVs	Phases	Wilcoxon with bonferroni	<i>r</i>
Lexical	2,3	($Z=1.516, p=0.130$) > 0.017	-0.184
	2,4	($Z=3.109, p=0.002$) < 0.017	-0.377
	3,4	($Z=2.673, p=0.008$) < 0.017	-0.324
Lexicogrammatical	2,3	($Z=1.324, p=0.185$) > 0.017	-0.161
	2,4	($Z=3.249, p=0.001$) < 0.017	-0.394
	3,4	($Z=3.027, p=0.002$) < 0.017	-0.367

Table 2 confirms the changes in each movement between phases. Indicated by both lexical and lexicogrammatical (2-3/2-4/3-4) provides evidence that ongoing development does not occur continuously but occurs over time.

In conclusion, the results above suggest that variation in intrinsic cognitive load (operationalized by means of lexical and lexicogrammatical items) did not differ in their effects on young EFL learners' short-term recall of target L2 target words. Put another way, the learners improved in their abilities in using target L2 words (both lexical or lexicogrammatical) over time

A plausible explanation for such finding is that target words were presented with the same degree of frequency. As explained in Ch. 1, the *availability variable* (i.e., the frequency of which target L2 words are present [available] during the course of learning or processing) potentially facilitated short-term retention of those words in working memory as well as subsequent recall/retrieval (see also N. Ellis (2002) and Uchihara et al.

Another plausible explanation for the finding is that the study was concerned with immediate, rather than delayed, recall of newly-learned target L2 words. In light information processing view of L2 learning (Lambert et al., 2021), a factor such as 'recency' (i.e., getting L2 learners to use/recall specific L2 words in a relatively short period of time) promotes ease of recall of target information or, in the context of present study, L2 words.

However, the ongoing development of L2 target words does not always occur continuously, but allows for stabilization and destabilization of patterns that indicate a process of change, both growth and decline may thus be indicative of development (see Lambert, 2019).

Conclusion

Findings of the present study indicated that variation in the levels of intrinsic load manifested in the amount of information associated with the use of particular L2 words did not differ in facilitating L2 word (vocabulary) learning as reflected in young EFL learners' ability to recall target L2 words in subsequent contexts of use. Such a lack of difference might be due to the fact that the target words were presented in the currents

study with the same frequency to target learners. Further, learners' abilities in recalling those words were tested immediately during the course of learning.

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