



A Study on a Working Model for a Vocabulary List Based on Working Memory: Using Episodes From American TV Series

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Abstract

The purpose of this paper is to suggest a working model to use vocabulary lists (VL). When college students' VLs were analyzed, it was found that they had made their lists simply for memorization. They were then given instruction about the relationship between working memory (WM) and a VL. In particular, the role of WM in language learning was explained, the relationship between WM and long-term memory (LTM) was emphasized and an explanation was given about how a VL can reduce the burden of WM. Nine participants were put into 3 groups (advanced, intermediate, and low-intermediate) with the task to make a VL and hand it in every week. Their VLs were analyzed and evaluated in terms of recall. First, all the groups learned the so called 'connection' between WM and LTM. Second, the participants realized that language knowledge or world knowledge could be retrieved from LTM. Third, they realized that non-linguistic or linguistic information is necessary for better memorization and recall. Consequently, their VLs were full of contents-related information, compared with their previous VLs. Even though each group showed different abilities in collecting relevant information, every group changed their approach to making a VL by improving it to support language development.

Keywords: working memory, vocabulary list, vocabulary learning, long-term memory, movie-based English learning

Applicable levels: secondary, tertiary

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I. INTRODUCTION

There is no way to avoid memorization in learning a second language (Bilbrough, 2011) and, to facilitate memorization, learners often make vocabulary lists (VL). According to a survey of 44 college student in a university of Korea, about 82 % (36 students) made VLs while studying a second language. Among them, about 89% used notebooks or memos for their VLs. However, only 6 students had kept checking most of the words on their VL. This appears to be a common situation for college students—many have experienced making VLs but few of them use their VLs in their language learning¹.

These statistical figures tell us the possibility that their VLs could not be particularly helpful in their study. Even though they make their own VLs, the organization of the VL is typically simple, as it requires only writing down the word and its Korean meaning. VLs only have the function of documenting words that a learner has encountered, and after they write them down, the students are prone to put the VLs away, without reviewing them again. From the students' perspective, computer dictionaries are much more helpful and easier to use. When they encounter an unknown word while reading a text, they can search for the meaning of the unknown word quickly and easily in a computer dictionary.

Computer dictionaries have a serious limitation in second language learning, however. They include only the linguistic meaning of a word. A word is basically polysemous. When a speaker says *lion*, each listener could have a different image of the meaning of *lion*. Suppose the listener saw a real lion in Africa, or a picture of a cute lion. In this way, their experience determines their understanding of the meaning of *lion*. Linguistic meaning only reflects a fact about an object in the real world. Elman (2009) mentions that language users need detailed knowledge about the specific words involved when they translate one grammatical structure of a sentence. Therefore, the real meaning of a word should be based on the integration of both language and event (Willits, Amato, & MacDonald, 2015). That is, language should include world knowledge to get the correct meaning. Computer dictionaries do not provide this and consequently may be not suitable for language development. This issue goes beyond the main concern of this paper, however, and the relations between computer dictionaries and language development will not be discussed further.

The purpose of this paper is to suggest a way to make VLs that are more effective for language learning. For this, the concept working memory (WM) needs to be understood. According to Guo (2016), WM has an important influence in relation to vocabulary acquisition. In fact, WM is sometimes called the 'new IQ' and the importance of its role in language learning is now understood (Alloway & Alloway, 2008, 2013; Blair, 2010; Gemm Learning, n. d.).

This paper suggests a working model to reduce the overload of WM by using a VL. This working model is different from the typical VL which L2 students make. The former comes from integration of linguistic and world knowledge. It helps retain vocabulary into long-term memory. On the other hand, the latter is only for storing words. When language users communicate in real situations, they have to take out the relevant information (language knowledge and world knowledge) from long-term memory. Considering this, L2 students can understand that this working model would allow them to create a more efficient VL, which can help them in real communication, compared to the standard approach to making a VL.

If the working model is made successfully, L2 learners will have new insights into what a VL should be, that it is not something that is used only for storage. The working model VL also tells L2 learners why they have to repeatedly review the VL. The working model VL can be called an 'external hard drive' because it helps to reduce the overload of WM. In general WM has "the memory's capacity limit and temporary storage" (Chai, Hamid, & Abdullah, 2018). In the working model the WM can be accessed optimally, and cognitive overload avoided (Taking Learning Seriously, n.d.).

¹ This survey was done in September 2022 at a University in Korea.

II. LITERATURE REVIEW

1. Three Components of Working Memory

The term WM was coined by Miller, Galanter, and Pribram (1960) and became the title for a multicomponent model in Baddley and Hitch's (1974) work. WM is derived from short-term memory (STM) but STM refers to the storage of information and WM includes the manipulation of the stored information (Baddeley, 2010; Wen, 2015). There are three components in WM. First is the phonological loop, called verbal working memory; second is the visuospatial sketchpad (visual-spatial working memory); and third is the central executive, which includes the attentional control system (Baddeley, 2000a; Baddeley & Hitch, 1974; Chai, Hamid, & Abdullah, 2018). Baddeley's working memory model includes a fourth component which he called the "episodic buffer" (Baddeley, 2000b, p. 417). In this paper, the three-component model will be followed. McLeod (2022) summarizes the three components as follows:

- 1) Central executive: Drives the whole system and allocates data to the subsystems, the phonological loop and the visuospatial sketchpad. It also deals with cognitive tasks such as mental arithmetic and problem-solving.
- 2) Visuospatial sketchpad (inner eye): The visuospatial sketchpad is a component of the working memory model which stores and processes information in a visual or spatial form. The visuospatial sketchpad is used for navigation.
- 3) Phonological loop: The phonological loop is a component of the working memory model that deals with spoken and written material. It is subdivided into the phonological store (which holds information in a speech-based form) and the articulatory process (which allows us to repeat verbal information in a loop).
 - (1) Phonological store (inner ear) processes speech perception and stores spoken words we hear for 1-2 seconds.
 - (2) Articulatory control process (inner voice) processes speech production and rehearses and stores verbal information from the phonological store.

One of the most well-known working memory models is the multicomponent working memory model. Its components are central executive, visuospatial sketchpad, and phonological loop. The central executive functioning as the attentional component system. The central executive is "the control center which oversees manipulation, recall, and processing of information," both verbal or non-verbal (Chai, Hamid, & Abdullah, 2018, p. 2). The phonological loop or the verbal working memory is the component of most concern to L2 learners.

2. Working Memory and New IQ

The common belief is that the higher your IQ, the better your academic advantage. However, having a high IQ doesn't necessarily mean you will be successful in life. It can be asserted that "IQ isn't the best measure of intelligence or the best predictor of lifetime success", especially in the twenty-first century (Alloway & Alloway, 2013, p. 15). It is often heard in schools that teachers have difficulty teaching a certain number of students because of the students' poor IQ. In the United Kingdom, these students may be "classified as having special educational needs" (Alloway, 2009, p. 92). Swanson and Siegel (2001) argue that there is abundant evidence from experiments that the problem may not be related to IQ (Brown, 2015; Bull, Johnston, & Roy, 1999; Chiappe, Hasher, & Siegel, 2000; Passolunghi, Cornoldi, & De Liberto, 1999). They say that a learning problem may come from a basic deficit in working memory.

WM is not a surrogate for IQ (Alloway & Alloway, 2008, 2010). It is "a dissociable cognitive skill with unique links to academic attainment" (Alloway & Alloway, 2010, p. 20). Performance on WM tasks hinges on high degrees of individual variation (Alloway, 2006). When these are all taken together, there are pedagogical implications for EFL teachers. When teachers evaluate their students, IQ matters should not be a consideration. Each student has enough capacity to handle cognitive activities or tasks in daily life, including academic activities. This is the function

of the WM system. WM offers “an advantage in a huge range of activities” (Alloway & Alloway, 2013, p. 3). WM has some limitations, however: a small amount of storage, a time limit and the imposition of overload. Students with poor grades, could be helped by being shown how to overcome these limitations of the WM. A possible way to do this is through instruction in an effective way to make a VL.

3. Working Memory and Long-Term Memory

Memory is not a single system. It is divided into various sub-types, each with its own characteristics. The first is long term memory (LTM). Different from WM, its capacity is unlimited. LTM has other subtype memories: explicit memory and implicit memory. Vocabulary learning relates to explicit memory and riding a bike relates to implicit memory. Explicit memory is split into semantic and episodic. Semantic memory includes word learning. On the other hand, episodic memory deals with events and activities. WM works by manipulating information from sensory memory. WM is a mental working space. It seems to be the most important area because thinking takes place here. However, it has limited capacity and holds information for a very short time (Belham, 2018).

Understanding WM and LTM can provide an insight into how L2 learners study vocabulary or constructions. As mentioned earlier the two memories constantly interact. WM manipulates incoming information and sends it to LTM (Business Bliss Consultants FZE, 2021; Cheer, 2022). Also, WM searches LTM for better manipulation in WM. In this regard, when you think of something, it means you want to retrieve the desired information in LTM. So, when you study, the information you have studied must eventually go into LTM.

WM plays a role in sifting through LTM and pulling out relevant information held there (Alloway & Alloway, 2013, Burmester, 2017; Churchill, 1999; DiGiulio, 2018; Smith, 2021); that is, WM connects incoming information to existing information and helps to store connected information into LTM. If language users have no existing information in LTM, incoming information cannot enter into LTM. Considering this phenomenon, L2 learners can understand that a VL is an important means to save incoming information temporarily. Until relevant knowledge exists in LTM, incoming information waits in the VL. In this sense WM works by accessing LTM and taking out necessary information then returning the information back to LTM (Gynglish, 2020).

Unsworth, Brewer, and Spillers (2013) examined the role of working memory capacity (WMC) in the controlled search of LTM. One of their findings was that high-WMC participants were better than low-WMC participants at retrieving the desired information in LTM. If it is possible to improve WMC, then it can be theorized that this can assist learners in retrieving information and facilitate their language learning.

III. DESIGN

1. Goal

Three characteristics of WM were introduced to the participants: manipulation, linking, and retrieval. These characteristics are based on the researcher’s reconstruction from literature review. Manipulation indicates the fact that WM creates new information from sensory memory and prepares the information to enter into LTM. Linking indicates that WM works in connecting new information to old information in LTM. Retrieval means taking out information from LTM. If WM is utilized appropriately to input information into LTM, then retrieval is much easier.

It was investigated whether participant VLs would be improved when they were given instruction in these three characteristics of WM. To do this, the researcher analyzed each participant’s VL after instruction and investigated what type of extra information had been added to the VL.

2. Participants

Participants in this activity consisted of 3 groups of college students based on TOEIC test results they reported individually: Group A (advanced group—4 students), Group I (intermediate group—3 students), and Group L (low-

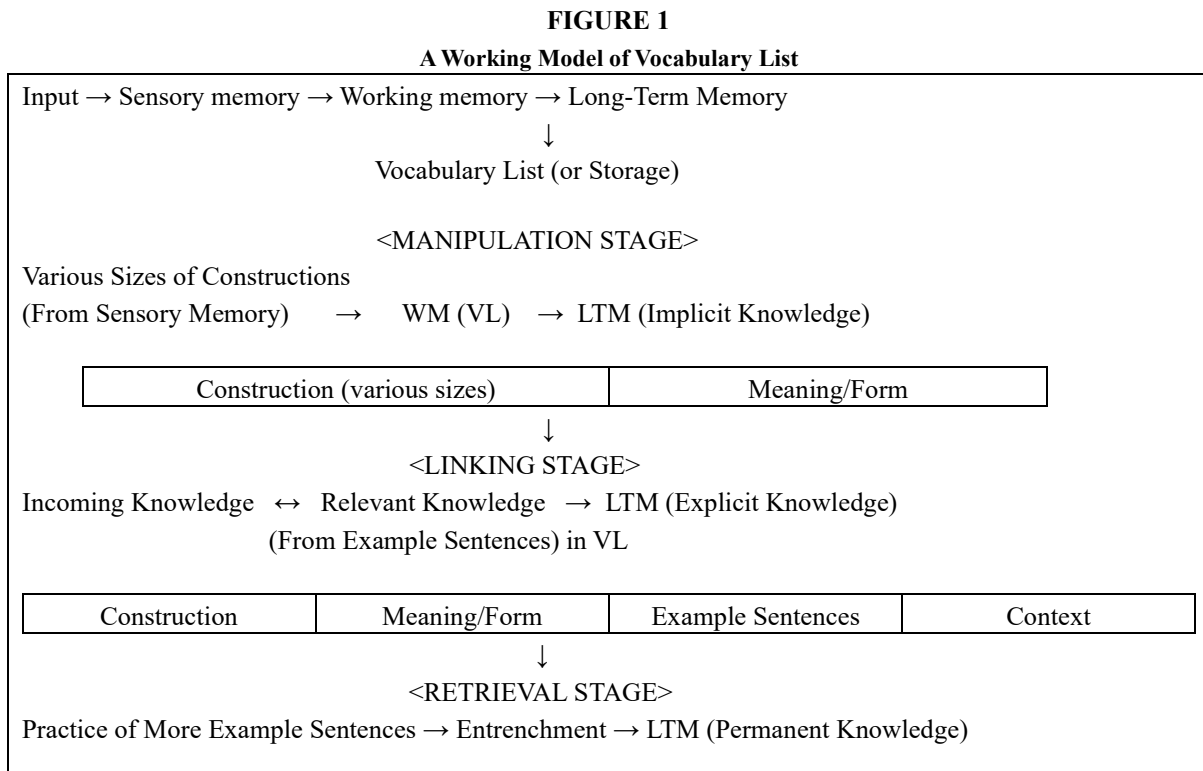
intermediate group–2 students), making a total of nine participants. To check whether each group shows distinctive results, their data was analyzed according to group level, not individual level.

3. Material

Each group used season 1, episode 1 of different American TV series; *Gossip Girl* (Piznarshki, 2007) for advanced, *Good Witch* (Pryce, 2015) for intermediate, *Brooklyn Nine-Nine* (Lord & Miller, 2013) for low-intermediate. It is believed that TV series are a good source of productive vocabulary that could be applied to the task of creating an effective VL. TV series have stories longer than movies and statistically the same vocabulary occurs more than movies (Ryu, 2011). Also, they are mainly based on daily life expressions. So, participants can feel close about daily vocabulary. In this regard, TV series are much more effective in making a VL.

4. A Working Model

Based on literature review, the working model of VL is reconstructed as follows in Figure 1.



As mentioned in literature review, WM manipulates information coming from sensory memory (SM). Then WM handles incoming information appropriately in order that such information enters into LTM without difficulty. WM needs to work quickly because it has to process a lot of information, regardless of the relevant work involved. Its capacity is limited, however, and it processes only a small amount of information. Here language users need VLs to save time and store new vocabulary temporarily. The VL functions as a space to manipulate new information (constructions) in place of the WM. In this sense, a VL can be like an external hard drive of WM.

What L2 learners have to do in a VL space is to manipulate incoming information from sensory memory. As mentioned in Table 2-4, L2 learners primarily deal with the meaning of incoming information. They are not ready to manipulate form-based knowledge yet because they are accustomed to receiving new information receptively. However, this doesn't mean that receptive knowledge cannot enter into LTM. Such knowledge is temporarily stored in LTM as implicit knowledge.

The next stage to connect incoming knowledge of SM and existing knowledge of LTM. In order to connect them,

L2 learners should change the implicit knowledge of LTM into explicit knowledge. For this, they need to record similar example sentences in their VLs to be familiar with patterns of implicit knowledge. This can be done through the VL, which can control the interaction between them. Such an effort strengthens the connection, after which it can be ready to be moved into LTM.

Next is the retrieval stage. If implicit knowledge can be turned into explicit knowledge successfully, retrieval is possible. It sounds simple but in reality, retrieval is the hardest thing for L2 learners. For this, L2 learners need to train themselves. They need practice with both meaning and form. Since language is full of form-meaning pairs, both aspects should be practiced. Meaning practice is not difficult if appropriate L1 translation is provided. On the other hand, form practice needs careful consideration. It needs typical example sentences. Through these examples, L2 students can learn from highly specific utterances to highly schematic utterances. In general, example sentences provide contextual diversity to L2 students. Contextual diversity supports remembering, recall, or retrieval (Hills, Maouene, Riordan, & Smith, 2010; Johns, Dye, & Jones, 2016). Hoffman, Ralph, and Rogers (2013) emphasize semantic diversity. When L2 students use example utterances, they need to pay attention to nuances of target vocabulary according to the relevant contexts. Semantic diversity like this helps remembering, too. Simple redundant experiences about the same vocabulary item does not guarantee successful memory recall (Balota et al., 2007).

There are three things to mention. The first is about L1 translation. Low-intermediate, intermediate, and even some advanced students often have little L2 knowledge in their LTM. Their LTM is full of L1 knowledge. That is why L1 translation is very important. L1 translation is effective in terms of pragmatic translation and can help connect new L2 knowledge to their LTM. The second is about example sentences. When L2 students choose example sentences, the meanings of the sentences should be related to the daily life of the students, which will help them to remember the relevant structures. Therefore, example sentences need to offer meaningful contexts and contextual diversities.

The third point is in regard to entrenchment in memory. Repeated exposure and experience lead to entrenchment in memory (Johns, Dye, & Jones, 2016). L2 learners need to keep practicing until target vocabulary gets entrenched in memory, which can lead to permanent acquisition. Taken together, if L2 learners want to accomplish language proficiency, they should not neglect their VLs. They have to put as much information as possible into them to reach a high level of memorization.

5. Procedure

The procedure consisted of two steps, the researcher teaching through TV drama scenes and then participants making their own VLs (one Excel file for each drama). After watching the film and being taught about the scene, participants are asked to choose their words from each scene and make their own VLs, using Excel program on their own. Therefore, the words participants chose varied from each other. At first, they made their VLs without any input from the researcher.

From the second lesson, the three components of WM, the manipulation stage, linking stage, and the retrieval stage were explained explicitly by the researcher in Korean. The explanation for each stage included practice by all the participants. In the manipulation stage, participants had to seek for what they already knew, such as background knowledge, grammar rules, related words, from words that they found in the script. Instead of writing down and memorizing the unknown words and meaning directly, the participants kept looking for the information they already knew, that is from their LTM, until they became familiar with the new word. For instance, the expression, “My hands are tied” could be ‘manipulated’ with the metaphoric idea that both a person’s hands are tied with thick ropes, or with the sentence structure pattern S+V+C. Learners manipulate the newly learned words with their own prior knowledge. This is a very subjective process, deriving from each learner’s own experience and knowledge. Therefore, a teacher can’t control their manipulation. In this part the researcher checked the process by investigating what kind of information was added in their VLs.

The linking stage is related to taking out the relevant information from the LTM. Manipulation and linking occur simultaneously. Once manipulation is completed, the linking is successfully followed and achieved when the new information is connected to the relevant information. The Figure 2 below was made by a participant of intermediate.

FIGURE 2
Vocabulary List Sample

번호	영어 단어	뜻	그림	상황/메모
41	I don't want my permanent record being screwed up	난 내 생활기록부를 망치고 싶지 않아		Nick을 찾아가 Grace는 Nick에게 아직은 말하지 않았지만 말할걸 그랬다면서 Nick에게 꾸지람을 놓는다. 하지만 Nick은 자신이 잠깐 아니러면서 발뻠하려고 한다.
42	It's a really good thing you didn't pass up that opportunity when it came along.	참 잘됐네요. 기회가 왔을 때 놓치지 않았군요.		샘이 우연한 기회에 George의 증상의 원인을 알게 되고, 그것에 대해 Cassie에게 말해주기 위해 찾아가는다. zebra라는 medical slang을 사용하여 설명하는데, Cassie는 이 이야기를 다 듣고 기회를 놓치지 않았으며 Sam을 칭찬? 한다.

In this stage as well, a teacher cannot exert any influence. Though he/she can demonstrate by using an example, links can only be made from the learner's own experience and the teacher can only check and evaluate the learner's data. The retrieval stage is the result of processing the combination of the two stages. The researcher collected the participants' feelings about the work they had done in order to improve their VLs and determined the effect of their work according to their responses.

IV. RESULTS AND ANALYSIS

L2 students' original VLs will be shown to compare the original VLs with the changed VLs. The data about the original VLs are divided into two columns: form and meaning. The following Table 1 shows how this was structured:

TABLE 1
Original Vocabulary List

L2 Form	L1 Meaning
English vocabulary	Meaning in Korean

1. The Results of Manipulation Stage

The participants (advanced, intermediate, and low-intermediate) were instructed to control new vocabulary to improve their ability to remember it. The results are shown below from advanced to low intermediate.

TABLE 2
Group A Vocabulary Lists

Participants	Construction	Reason to choose plus meaning
A 1	This is not happening right now.	Explanation plus meaning
A 2	On the passage of time	Explanation plus meaning
A 3	I want it to be special.	Explanation plus meaning
A 4	Get off of me!	Explanation plus meaning

All the Group A participants in Table 2 explained why they chose their particular constructions. A 1 manipulated his construction into two: *This is not happening* and *right now*. After this, he explained each chunk. He analyzed the first chunk mentioning that it looked like a declarative piece but was functionally imperative. A 2 just described the

pragmatic meaning of her construction. To her, manipulation seemed better to understand the meaning of the construction. A 3 also pragmatically dealt with her construction, focusing on the construction as one unit. A 4 was similar to A 1. She mentioned that *off of* is used in the USA and *of* does not affect the whole meaning of the construct.

In sum, A 1 and A 4 analyzed their constructions in terms of form and meaning. On the other hand, A 2 and A 3 focused on the meaning aspect of their constructions although the process they used was not really manipulation. However, from the result of linking stage, it is suggested that they could understand manipulation better when they experience the linking stage.

TABLE 3
Group I Vocabulary Lists

Participant	Construction	Synonym	Example	Context
I 1	<i>I can't tell you</i> how thrilled we are that you're here.	I can't put into words.	I can't tell you how lucky I am.	Martha and Sam meet...
I 2	Bistro	X	I would like to go to the bistro where...	Restaurant and bistro...
I 3	<i>I take it</i> , you met Sam.	In my understanding	I take it, you're dating my X.	Stephanie & Cassie

Surprisingly in Table 3 Group I had more criteria than Group A. Group I had 4 aspects of each construction. I will focus on the sub-construction, *I can't tell you*. I 1 manipulated the construction in two: *I can't tell you* and *how thrilled we are that you're here*. But he only handled the former. In order to explain this, he used a synonym and focused on the meaning, not the form. His example column and contest all focused on the meaning. He did not seem to understand the real function of manipulation. As in Group A, it is hoped he might understand manipulation when he experiences the linking stage. I 2 chose the one-word construction *Bistro*. He compared bistro and restaurant in the context column. Also, he gave one example of the use of bistro. Since he dealt with one word, he could not show how to handle manipulation. I 3 followed the same pattern as I 1. I 1 and I 3 seemed to do the work together.

In sum, Group I put more information into analyzing their constructions. However, they also failed to effectively use manipulation in their analysis.

TABLE 4
Group L Vocabulary Lists

Participant	Construction	Reason to choose plus meaning
L 1	Citizen Kane is terrible. <i>Pick</i> a good movie.	Pick and choose
L 2	What do Santiago and Peralta have <i>riding on</i> this bet of theirs?	Riding on and a horse

Group L in Table 4 used two columns: construction and reason to choose plus meaning. Given they were low intermediate, two columns might be enough. L 1 chose a word *pick* in the *Pick a good movie* construction. He mentioned that he saw this word when he did the Pick Me game, so he was delighted to see the same word. What he did was close to manipulation because he treated the word in terms of form and meaning. L 2 focused on the phrase *riding on* in the above construction. He compared *riding on* with being on a horse. He regarded *riding on* as having the literal meaning *sit on* and extended the meaning to a horse. He also treated manipulation in terms of only meaning.

Taken together, the 3 groups all (except A 1 and A 4) treated manipulation in terms of meaning. If language users make their VLs in this way they can improve vocabulary or constructions receptively, not productively. In terms of information, Group I had more aspects than the other two groups. In this sense, the capability of making a VL seems to depend on training, not language ability. Hopefully the next stage would enlighten the groups as to how to do manipulation.

2. The Result of the Linking Stage

In the linking stage, participants were required to connect incoming information with existing information in LTM. In other words, they had to search for information in LTM, so they were instructed to write down information which they already had in relation to incoming information. The researcher clearly mentioned that information could include both meaning and form. The next Table 5 show the results of the linking stage.

TABLE 5
The Linking Stage VL of Group A

Participant	Construction	L1 explanation	Examples
A 1	It's setting a course for the rest of your life.	It = admission to Ivy league	What we decide in these moments sets a course for the rest of our lives.
A 2	They <i>are</i> almost <i>through</i> with Ivy Week.	Explanation of 'be through with'	I am through with you.
A 3	It's setting a course for rest of your life.	Insertion of a picture for visualizing.	I am setting a course to be an English teacher in the near future.
A 4	They <i>are</i> almost <i>through</i> with Ivy Week.	Addition of culture	We will be through with the trial at 9am.

Now, Group A participants were taking out relevant information about the chosen constructions from their LTM. Group A put one more column in their VLs. They all began to use example sentences. A 1 chose the construction, *It's setting a course for the rest of your life*. His example was not from his LTM but from outside his LTM; that is, from a dictionary. A 2 and A 4 did the same thing. Only A 3 took out the example from her LTM.² In this respect, they did not know about existing information in their LTM.

However, the patterns of their examples were very similar to those of their constructions, even though they did not come from their LTM. It can be judged that such similarity of patterns would help L2 students become familiar with the form and consequently such experience would lead to storage in LTM.

What happens in this process is ascribed to VL. Though nothing may be stored in LTM, VL will overcome shortcomings in both WM and LTM.

TABLE 6
The Linking Stage VL of Group I

Participant	Construction	Meaning	Examples	Context
I 1	A moment of your time, please.	L1 translation	No example	Grace, Nick, and Vice president
I 2	I'm also your 3:15.	L1 translation	I'm Dr. Go's 2:20.	Explanation of the choice
I 3	I can't wait to find out.	L1 translation	I can't wait to see you.	Stephanie and Sam's clinic

In Table 6, Group I had 4 aspects of participants' constructions. Compare them with those of Group A. I 1 chose the construction *A moment of your time, please*. He built up meaning and context for the construction, but he did not use an example. Consequently, his VL lacks form-based knowledge. On the other hand, I 2 put down an example in his VL. His VL would help him to practice patterns of his construction. I 3 did the same. Her VL showed an example using her construction. The claim here is that she would have a chance to repeatedly practice the pattern thanks to the VL.

In sum, the three groups had very little knowledge about form or pattern in their LTM. Thanks to VL, their WM and LTM could do different work.

In Table 7, group L also had four columns for their constructions. L 1 made a comment about grammar. Given his language ability was low, his comment was revealing. His example couldn't come from his LTM. His VL took over the example allowing him to manipulate and connect it to his LTM. He didn't write about the background of his construction. In this time, he reduced meaning-based knowledge. L 2 chose the construction 'That's enough'. In his

² She confessed to the researcher that she made the example herself.

example, he showed a pattern similar to his construction. He didn't mention grammar, but this could be attributed to his low ability.

In sum, their VLs basically worked for their examples and gave them the chance to learn a sort of pattern drill. Taken together, none of the groups put form-based knowledge into their LTM directly. However, their VLs, regardless of their levels, took over the work of the WM and LTM.

TABLE 7
The Linking Stage VL of Group L

Participant	Construction	Meaning/Form	Examples	Context
L 1	I like to know what my detectives are <u>up to</u> .	Grammar explanation	What are you up to at the moment?	No comment
L 2	That's enough.	L1 translation	I think that's enough about me.	Class atmosphere

3. The Result of the Retrieval Stage

Through the two stages, the researcher found that the participants were able to deal with the meaning of the constructions. However, they didn't seem to pay attention to their form. Since Group I and Group L lacked grammatical understanding, they tended to ignore the aspect of grammar. Therefore, in the retrieval stage, the researcher wanted to make all the participants experience form-based knowledge. Table 8 shows how they handled the grammatical aspects of constructions.

TABLE 8
The Retrieval Stage VL of Group A

Participant	Construction	Meaning/Form explanation	Examples
A 1	You're gonna stay right here, okay?	L1 translation Imperatives Interrogatives	You're not going to solve all your problems in one meeting.
A 2	She's <u>really more of</u> an indoors type of girl.	L1 translation No comment on form	I am really (more of) a dog person.
A 3	In common with	Something in common with Nothing in common with	She has absolutely nothing in common with her mom.
A 4	What's happened to Eric has <u>put a huge strain</u> on our family.	Insertion of a picture to explain <i>strain</i>	I've been under a strain.

Group A made 3 columns. A 1 mentioned the 'be going to' construction. In regard to form-based knowledge, he said that the imperative construction (e.g., stay right here) put pressure on listeners and an interrogative construction would sound too polite. The 'be going to' construction would be halfway between pressure and politeness. It seems clear that this understanding came from his LTM. His example was outside his LTM. He needed the help of his VL. A 2 selected the 'more of' construction. She didn't mention grammar, so she should have written a 'more of' example in her VL and practiced the pattern 'more of'. A 3 selected the construction 'in common with'. In the meaning/form explanation column, she had examples using a similar pattern as the construction. These examples came from her LTM. Also, she wrote an example sentence in her VL. It's clear this came from her LTM. Only A 3 was able to retrieve form-based knowledge from her LTM. Lastly, A 4 picked a construction using the word, 'strain'. She drew a picture of the meaning of 'strain'. This was meaning-based knowledge. Her example 'I've been under a strain' came from her LTM.

In sum, A 1, A 3 and A 4 deliberately took some form-based knowledge from their LTM. As time passed, they seemed to manage retrieving form-based knowledge from their LTM. However, if they wanted to pick examples which weren't in their LTMs, they would have to depend on their VLs until those examples are entrenched in their memory.

TABLE 9
The Retrieval Stage VL of Group I

Participant	Construction	Meaning/Form explanation	Examples	Context
I 1	It's written all over your face.	L1 translation Form+Picture	No shown	Sam, George, and Cassie
I 2	It's written all over your face.	L1 translation	It's written all over your face that you are lying.	Reason to choose the construction
I 3	It's written all over your face.	L1 translation No comment on form	Sometimes I feel like one small mistake ruin all over.	A sort of confession on her character

Strangely enough, in Table 9 Group I had more columns than Group A. This time the three participants chose the same construction *It's written all over your face*. I 1 did not analyze the construction but he used a drawing and matched the construction with an image. It seemed fine to take out a sort of form-based knowledge from his LTM in that he had images, not grammatical knowledge. I 2 spent time on meaning-based knowledge. If his example had been written in his VL, his form-based knowledge would be improved. I 3 focused on the small construction, *all over*. Since she described meaning-based knowledge about *all over*, her VL would take over the work of her WM and LTM. In sum, it turned out that dependency on VL was higher with Group I than Group A because they mainly described their selective construction in terms of meaning.

TABLE 10
The Retrieval Stage VL of Group L

Participant	Construction	Meaning/Form explanation	Context
L 1	You could not be farther from the action.	L1 translation Could not be+comparative	More comment on comparative
L 2	If you can't beat'em, join'em.	L1 pragmatic translation	More examples in L1

In Table 10 Group L made 3 columns. L 1 selected the construction 'could not be + comparative'. Interestingly enough, L 1 showed a sort of analyzing construction into chunks. In the meaning/form explanation column and context column, he kept commenting on the comparative. It is not clear whether such knowledge came out of his LTM but it's clear that some part of his knowledge came from his LTM. L 2 chose the specific construction, *If you can't beat 'em, join 'em*. Since this construction was not productive, he had no choice except to memorize the construction.

Taken together, Group A showed development to retrieve the form-based knowledge from their LTM. On the other hand, the intermediate and low-intermediate participants needed to rely on the VL until the construction became entrenched in memory.

V. CONCLUSION AND IMPLICATIONS FOR EFL TEACHERS

In the introduction it was noted that 82 % students of one class (52 students) had had some experience in making a VL, but around 82% of these students reported that they had never used their VLs in their language study. This issue was the main focus of this paper. The teacher collected relevant data about why such a phenomenon occurs. First, the VL was only a simple storage place to the students. There was no particular information in the VL, so the VL was not useful. In terms of retrieval, and a computer dictionary was much better. Second, the students had no idea about the role of a VL. They mentioned only one thing in making a VL: that it was only for memorization of vocabulary. Because of the retrieval problem of their VLs, however, the VLs were useless.

The students needed to change their attitude about the role of a VL. Their teacher used the concept of working memory to make them understand how a VL should work. Three elements were explained: manipulation, linking, and retrieval. Regardless of group level, all the participants made meaningful improvements in making their VLs. They added extra information about relevant vocabulary items in order to memorize and retrieve the items

successfully. Some of the participants used contextual knowledge, such as culture and transmedia matters, for added information.

There are a number of pedagogical implications for EFL teachers. Memorization and retrieval are very important not only for second language learning but also in our daily lives (Forsberg, Adams, & Cowan, 2021). It is true that human beings forget memorized things in the long run. However, when learners develop a strategy for successful memorization, their strategies will help retain the things they memorize. When they memorize a complicated fact, they need to manipulate complication into simplification. Think about your past life. You do not have to memorize everything you have experienced. You manipulate ‘everything’ and select some aspects from it. After manipulation the information is connected into LTM (linking). In this process, you need extra information from LTM. Such information works to assimilate the new information. If you are successful with manipulation and linkage, remembering or retrieving is guaranteed. Lastly, one thing should be kept in mind. A VL is not a storage place to accumulate vocabulary. It is a device for language development. Since L2 students’ working memory systems cannot work alone, a VL should be used to help their WM.

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