

# *EFL students' vocabulary learning in NS-NNS e-mail interactions: Do they learn new words by imitation?*

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## Abstract

The present study investigated Japanese students' EFL vocabulary development through e-mail interactions with a native English speaker (NS), with primary focus on students' imitation of new words. According to sociocultural theory, learners can internalize new linguistic knowledge by imitating an expert's expressions to create his/her own utterances. This study, therefore, specifically examined whether (1) students could imitate the new vocabulary items provided by the NS tutor, and (2) they could retain these items at the end of the project. An examination of the e-mail log showed that students did imitate and use some of the lexis provided by the NS. The results of the post-test also revealed that some of the imitated words were subsequently retained. However, there were some words that had been learned without imitation. The questionnaire survey and the students' interview comments indicated that students memorized a considerable number of new words provided by the NS by repeatedly reading them in e-mail text, as well as in other learning contexts, such as regular classes and independent study, through noticing, retrieving, and generating the meaning/form of each word (Nation, 2001). The study concluded that vocabulary learning via e-mail takes place not only by a single process such as imitation, but also by a combination of various processes functioning in an integrated manner.

Keywords: E-mail, vocabulary, EFL, imitation, sociocultural theory

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## 1 Introduction

In recent years, a growing number of educational institutions have introduced and implemented computer-assisted language learning (CALL) activities. In particular, the rapid development of telecommunications technology has resulted in an explosion of computer-mediated communication (CMC) in second/foreign language (L2) education. While CALL studies in the early days mainly provided practical guidelines

and suggestions concerning instructional use of CMC, there have been an increasing number of studies that attempted to include theoretical support from second language acquisition (SLA). One of the SLA-originated frameworks that have recently been influential in CMC studies is sociocultural theory (SCT).

SCT views all learning as essentially social, and SCT researchers have traditionally believed that language learning takes place only through social interaction (Lantolf, 2000; Lantolf & Appel, 1994; Mitchell & Myles, 1998; Myles, 2002). Like the interactionist approach (Chapelle, 2005; Smith, 2005), it emphasizes the importance of learner interaction, but within the relationship between learners and the socio-cultural context where learning is taking place. So far, a number of CMC studies have been conducted from sociocultural perspectives (Arnold & Ducate, 2006; Beltz, 2002; Tanaka, 2005; Thorne, 2003; Warschauer, 2005).

One of the key concepts of SCT that this study addresses is *imitation*. Vygotsky (1978, 1986), the original proponent of SCT, suggested that imitation is indispensable in a child's mental development. He distinguished conscious imitation from automatic copying, and suggested that children can imitate only what resides in the individual's zone of proximal development (ZPD).<sup>1</sup> Lantolf (2000, 2006), discussing the language learning process from SCT, mentioned that imitation is not a mechanical activity such as rote mimicking or mere repetition of what an expert (e.g., teacher, native speaker of the target language) says, but a complex and transformative activity, in which the novice (i.e., learner) creates something new "out of saying or doing 'the same thing'" (Newman & Holzman, 1993: 151). In sum, in SCT, imitation has been regarded as the process through which new linguistic knowledge in the learner's ZPD is internalized.

Fotos's (2004) study on NS-NNS e-mail exchange activities clearly illustrated imitation by L2 learners. In her study, Japanese university students, who expanded their linguistic expressions by modeling grammar structures and borrowing vocabulary items from their NS tutors' text to construct more elaborate sentences, showed significant English proficiency gains at the end of the project. These would be interpreted as instances of imitation in the ZPD from SCT perspectives. In other words, Fotos's students were considered to have succeeded in internalizing new linguistic features through imitation, and this could account for the development of their overall proficiency.

Notwithstanding the conclusion that Fotos (2004) drew, her study did not, however, address whether each of the linguistic features her students imitated were subsequently learned. Therefore, questions still remain: Did students learn new linguistic knowledge through imitation? Was every imitated item retained? Is imitation the decisive or only factor in linguistic development? Our study will thus focus on the new linguistic properties that each learner actually imitated from the NS tutor's text so that the study could fully clarify whether and to what degree imitation helps learners construct new items in their linguistic knowledge. Also, since the linguistic

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<sup>1</sup> The ZPD, another SCT key concept, denotes "the difference between what a person can achieve when acting alone and what the same person can accomplish when acting with support from someone else" (Lantolf, 2000: 17).

items that each student imitates vary, further study should adopt a case study approach to elucidate each individual learner's learning process.

## 2 The study

The present study, taking a case study approach, sought to explore whether and how students' imitation in e-mail interactions would facilitate language learning, with particular focus on their vocabulary development.

The study specifically attempted to address the following research questions:

1. In composing e-mail replies, do students imitate newly introduced lexical items that the NS provides?
2. Are the lexical items that students imitate in their replies subsequently learned (i.e., retained)?

The authors of this study hypothesized that students would imitate new lexical items provided by the NS to establish e-mail communication, but not every item would be learned. It was also anticipated that there might be some items learned without imitation. Therefore, another research question was added:

3. Are there any factors, other than imitation, which bring about vocabulary learning? If there are, what are they?

### 2.1 Participants

A total of ten male Japanese learners of English participated in this study. They were all in the third year (aged 14–15) at a private junior high school in Japan. Their English proficiency level was intermediate-low.<sup>2</sup> They were engaged in the e-mail project as part of the course work in an elective CALL class that met once a week for a 90-minute period. They were notified that the goal of the project was to use the target language for communication, and told to maintain at least one e-mail exchange per week with a NS over a six-week period.

One American male NS served as tutor for the project. He was in his late 20s, a TESOL professional, and had experience in working as an EFL/ESL teacher in both Japan and America. He had met none of the students before, during or after the project. Prior to the project, he was informed of the purpose of the study.

### 2.2 Materials and procedures

Following the suggestions by Tanaka (1998) that a key-pal project would, without a specific purpose (i.e., topics to discuss), end in just a small number of exchanges of self-introduction, several topics were previously determined for the e-mail discussion

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<sup>2</sup> Students' average score of "GTEC for students" was 537.5. This figure denotes that the English ability of these students is considerably high compared with that of Japanese students of the same age. "GTEC (Global Test of English Communication) for students" is an English proficiency test developed by Benesse Corporation, with the main focus on assessing the English communication skills of Japanese students at secondary level.

and suggested to the NS. The topics included social and school problems (e.g., illegal parking, smoking in public, and juvenile delinquency), which were considered to be common concerns in both Japan and America. Sixty topic-related English words were also predetermined as keywords for the study (see Appendix). The authors asked the NS to focus on a couple of particular topics to discuss with each student over the project period, and use the keywords in his e-mail text intentionally, as well as naturally, according to the ongoing topic.

Each student was told to use his own e-mail account, created in advance by the authors. Before the project started, students participated in practice sessions in sending and receiving e-mail to ensure that they possessed the technical and typing skills needed to carry out the project. Most of the class time was allotted to the project, and they were also encouraged to exchange e-mails with the NS out of class (e.g., working in the school's CALL lab during open-use period, or on a home PC).

The e-mail text that the NS wrote to each student was 150–250 words in length, and students replied with 100–200 words. All the students had six or more e-mail exchanges during the project (sending 7.1 replies on average).

### **2.3 Data collection and analysis**

The data of the study were collected and analyzed both quantitatively and qualitatively. At the beginning of the project, a pre-test was administered, in which students were required to produce the literal Japanese translation of the sixty topic-related keywords. As the study intended to focus only on the new lexical entries for students, each student's already-known words (i.e., the keywords the student scored on the pre-test) were eliminated from his keyword list, to determine individual target words (TWs) for the study. As a result, the TWs varied among students in terms of number and variety.

The entire e-mail log was saved with the students' consent to identify the TWs provided and imitated. To answer the first research question (In composing e-mail replies, do students imitate newly introduced lexical items that the NS provides?), each student's TWs were classified into two categories: TWs provided by the NS (NS<sup>+</sup>), and TWs not provided by the NS (NS<sup>-</sup>). Then, TWs that fell into NS<sup>+</sup> were further divided into two subcategories: TWs imitated by students (NS<sup>+</sup>S<sup>+</sup>), and TWs not imitated by students (NS<sup>+</sup>S<sup>-</sup>). Every student's total number of TWs in each subcategory was tallied and examined to see if students imitated new lexical items provided by the NS.

In the final class meeting, one week after the project closing, a post-test was administered. The test was the same type as the pre-test (including the sixty topic-related keywords), but presented in a different order from the pre-test. To examine the second research question (Are the lexical items that students imitate in their replies subsequently learned (i.e., retained)?), the number of TWs learned by each student (i.e., the TWs the student scored on the post-test) were sorted and tallied in each category to see if new lexical items which the students imitated were learned, and also if there were any items learned without imitation.

For the third research question (Are there any factors, other than imitation, which bring about vocabulary learning? If there are, what are they?), a post-project meeting was held after the post-test. In the meeting, each student was handed a questionnaire

Table 1 *Total number of TW tokens learned and un-learned across categories*

	TWs (n = 486)		
	NS <sup>+</sup> (n = 193)		NS <sup>-</sup> (n = 293)
	NS <sup>+</sup> S <sup>+</sup> (n = 60)	NS <sup>+</sup> S <sup>-</sup> (n = 133)	
TWs learned (n = 111)	36	39	36
TWs un-learned (n = 375)	24	94	257

which presented the TWs that he had scored in the post-test, and asked to recall and identify the occasion that seemed to best contribute to the gain of each TW. Students were told to choose one occasion from five options: (a) the e-mail project; (b) regular English classes of the school; (c) English institutes outside school (e.g., cram school, conversation school, etc.); (d) independent study (e.g., individual study for general English proficiency tests such as GTEC and STEP<sup>3</sup>); (e) other learning context (specification required).

Subsequent to the questionnaire survey, the first author of this article had interview sessions with each student. In the interviews, the author asked questions according to the students' responses on the pre-administered questionnaire, and attempted to collect more detailed information about how they learned new vocabulary presented in the NS's e-mail text.

### 3 Results

#### 3.1 Frequency count of TWs

The pre-test showed that students had previously known 114 out of 600 tokens<sup>4</sup> of the predetermined keywords. Hence, this study examined 486 tokens as the students' TWs. As a result of the e-mail log analysis and the post-test, each student's TWs were classified into categories as illustrated in Table 1.

#### 3.2 E-mail log analysis

An examination of the e-mail log showed that, among the 486 TW tokens, the NS provided 193 in his entire e-mail output, leaving 293 unused. It seemed that the NS's attempt to concentrate on a few focused topics during the project narrowed the range of keywords he had used.

<sup>3</sup> STEP (Society of Testing English Proficiency), also known as "Eiken," is a commercially-developed English proficiency test widely acknowledged in Japan. It has seven grade levels and, at each level, the examinee's proficiency is assessed with a written test and an oral interview.

<sup>4</sup> In this article, we refer to the total of each student's TWs as a 'token'. The term 'token' generally denotes the total number of words that occur in a set of written texts or utterances, counting repeated words as they arise.

Students imitated 60 out of 193 tokens (31%) provided in the NS's e-mail text. Based on these figures, the first hypothesis (i.e., students would imitate new lexical items used by the NS) was not fully supported, since there were still 133 tokens unused. This result is, however, rather convincing because students were instructed that the main purpose of the project was to have English discussions with the NS on particular topics, but not to learn new linguistic expressions by using them. It was, therefore, only natural that students used these 60 tokens in their e-mail replies because they regarded these words as appropriate and necessary to convey their opinions about the ongoing topics.

Among the 60 TW tokens imitated by students, 36 (60%) were learned but 24 were not. This confirmed the second hypothesis: not every imitated item was learned. In other words, imitation did not always lead to learning of new words. A closer examination of the e-mail log showed that students' lexical gains seemed to have been affected by the frequency of the NS's provision of the words rather than the students' imitation itself. Each of the learned TWs in the NS<sup>+</sup> category (36 + 39 = 75 tokens) were provided 2.8 times on average, while the un-learned TWs (24 + 94 = 118 tokens) were used only 1.7 times. It might be possible to say that the NS's repeated TW provision promoted the students' vocabulary learning.

### 3.3 Questionnaire survey

Table 1 showed that 36 TW tokens were learned from contexts outside the e-mail project (NS<sup>-</sup>). Also, there were 39 tokens which were provided by the NS, but learned without imitation (NS<sup>+</sup>S<sup>-</sup>). As was anticipated earlier, there seemed to be factors other than the e-mail project (or imitation), which brought lexical gains. The results of the questionnaire survey conducted in the post-project meeting revealed the students' latent learning process, as shown in Table 2.

Students mentioned that 20 TW tokens in NS<sup>+</sup>S<sup>+</sup> (i.e., learned by imitation) and 17 tokens in NS<sup>+</sup>S<sup>-</sup> (i.e., learned without imitation) were learned in the e-mail project. The sum of these figures (37 tokens) ranges nearly half of the NS<sup>+</sup> category (n = 75). The e-mail log analysis showed that these 37 tokens were provided in the NS's e-mail text more frequently than those learned from other occasions. Each of

Table 2 Occasions that best contributed to lexical gains

	TWs learned (n = 111)		
	NS <sup>+</sup> (n = 75)		NS <sup>-</sup> (n = 36)
	NS <sup>+</sup> S <sup>+</sup> (n = 36)	NS <sup>+</sup> S <sup>-</sup> (n = 39)	
(a) E-mail project	20	17	0
(b) Regular English classes of the school	14	7	10
(c) English institutes outside school	0	4	2
(d) Independent study	2	10	24
(e) Other learning context	0	1	0

the 37 tokens was provided 3.8 times on average, while the other 38 tokens (b: 14 + 7; c: 0 + 4; d: 2 + 10; e: 0 + 1) were 1.8. It may thus be possible to say that the e-mail project itself had some effect on students' vocabulary learning when the target items were provided repeatedly.

It also appears true that other learning contexts too had a significant effect in their lexical gains. Within the NS<sup>+</sup>S<sup>+</sup> category, although students had substantially imitated these TWs in their e-mail replies, they reported that 16 tokens were learned mainly from other learning occasions (14 tokens in regular English classes and 2 tokens in their independent study). Among the 39 TW tokens learned without imitation (NS<sup>+</sup>S<sup>-</sup>), students identified 22 tokens, which had been learned principally through other contexts, such as regular English classes at school (7 tokens), English institutes outside school (4 tokens), independent study (10 tokens), and other learning context (1 token). Adding 36 TWs tokens in the NS<sup>-</sup> category, which were learned by neither provision nor imitation, students learned as many as 74 tokens (67%) out of 111 from outside the e-mail project. Putting these data together we found that, in this study, students' lexical gains had been brought about by a combination of various factors, not solely by the e-mail exchange activity. It seems inappropriate to directly attribute students' learning to a single factor such as imitation.

### 3.4 Interview

In the interview sessions with each student, the first author of this article asked how the student learned each TW in the learning occasions he had identified in the questionnaire. As the purpose of the study was to investigate whether and how students learn vocabulary provided in the NS's e-mail text, TWs the NS did not use during the course of the project were eliminated from the analysis (i.e., 36 tokens in the NS<sup>-</sup> category).

*3.4.1 Vocabulary learning in the e-mail activity.* Table 2 (a) showed that students regarded 37 TW tokens as being learned through the e-mail project (20 with imitation and 17 without imitation). All the students mentioned that, during the project, they resorted to various references (e.g., dictionaries, classmates, teacher) to search the meaning of each new word when it appeared in the NS's text. Student A said:

*In e-mail, it is necessary to know the meaning of every word to understand the NS's message. I looked up all unknown words in the dictionary, not leaving any of them unsolved. (Originally written in Japanese; the authors' translation is used in this and subsequent student quotations)*

Student B said:

*Every time I found a new word in the NS's e-mail, I first tried to guess the meaning of the word in the context, and when I didn't find the appropriate translation of the word, I made other efforts to know its meaning, by asking the teacher and classmates, or referring to the dictionary. This (process) served memorization (of the word).*

The NS's devoted attitude to the project, which was embodied in his immediate and thorough response to each student's reply, served to sustain students' motivation to

continue their e-mail conversation. Student C, who had twelve e-mail exchanges during the six-week period, said:

*As the NS immediately wrote back to every e-mail of mine with a long message, I felt his generous support to my English study, and wanted to reciprocate his effort. So I worked hard to search the meaning of new words, and compose and send my replies as soon as possible.*

Other students appreciated the NS's respectful attitude in e-mails (e.g., acceptance of, and agreement with, every opinion of students). They said that they enjoyed reading the NS's comments, and after they sent their replies, they were always looking forward to receiving his next message.

According to these students' comments, it seems that one of the advantages of the e-mail exchange in vocabulary development was that the students' communicative needs and wants facilitated their attempt to know the meaning of every unknown word.

Some students commented that repeated appearance of the TWs in the NS's e-mail text also helped them learn the new lexis. Student B said:

*As the NS talked about the same topic for weeks, the same word appeared in his e-mail again and again. I could memorize even difficult words such as "juvenile delinquency" as I read it many times.*

Student D said:

*In rote learning, we can handle a lot of words at the same time, but most of them are easily lost. In the e-mail project, however, we see the same words repeatedly over several weeks. Once it is memorized, it's never been forgotten. I think vocabulary learning through e-mail exchange is good, although the number of words learned is limited.*

These comments may support our contention that e-mail exchange is effective in vocabulary development when the words to be learned are repeatedly provided in the NS's text.

Two students answered that using the new words in their replies served their memorization of those items. Student C said:

*I think I learned the new words effectively by looking them up in the dictionary and using them in writing.*

Student E said:

*I could reinforce the knowledge of the new words by actually using it in my replies.*

To sum up these reflections of the students, e-mail exchange with the NS has the potential to serve as an effective tool in vocabulary learning, in that it motivates students to study new lexis and facilitates their memorization of the words by providing them with repeated encounters and productive opportunities to use the vocabulary.

### 3.4.2 Vocabulary learning in other learning contexts.

#### (b) Regular English classes at school.

Students reported in the questionnaire that 21 TW tokens (14 in NS<sup>+</sup>S<sup>+</sup> and 7 in NS<sup>+</sup>S<sup>-</sup>) were learned chiefly in the regular English classes at school.<sup>5</sup> In the interview sessions, students mentioned that they had first met these TWs in the e-mail project, but they admitted that the re-encounter with the words in the regular English classes at school was the decisive factor in memorizing them. For example, Student E said:

*In my (regular) English class, when I heard “drop out” in the teacher’s words, I remembered that the same expression had been used in the NS’s e-mail and recalled its meaning. It helped me memorize the words.*

Students E and F, who both learned the word “social,” also said they found the word in the textbook used in the grammar class and noticed it had been used in the e-mail project. Student B said that when he saw the word “smell” in the passage used in the reading class, he could recall the meaning of the word immediately because he remembered it had been used in the NS’s e-mail. In total, 18 tokens (13 in NS<sup>+</sup>S<sup>+</sup> and 5 in NS<sup>+</sup>S<sup>-</sup>) out of 21 were recognized by students to have been used in the NS’s text. From these comments, it seems possible to say that re-encountering and noticing the TWs they met in the NS’s e-mail text served to reinforce their memory of the newly learned vocabulary.

Student G described his experience in a conversation class, where he talked to a female NS teacher about how to commute to school.

*I explained to her that I didn’t like to use buses to go to school, and said “Sometimes my bus is late because of traffic jam.” She nodded and repeated the word “Ah, traffic jam!”*

This student, who had eventually learned “traffic jam,” said the conversation topic (“How do you come to school?”) evoked the vague memory of the expression (i.e., traffic jam) he had obtained in the e-mail project. He then tested it out in his oral production, and the teacher’s subsequent positive feedback (“Ah, traffic jam!”) made him realize his word choice was appropriate. Student E said that he had used “complain” in his writing assignment, and the teacher’s comment (“Good English!”) had reinforced his memory of the word. It seems true that the new vocabulary was also memorized by using it in his subsequent oral or written production of the language, especially when positive feedback was given by experts (i.e., teachers).

#### (c) English institutes outside school.

Student C considered that four TW tokens (4 in NS<sup>+</sup>S<sup>-</sup>) had been learned through his learning at an English institute outside school. He attended a commercially established English school, where he had two 60-minute conversation classes a week.

<sup>5</sup> Students had seven English classes every week with three strands: grammar (3 classes per week), reading & writing (2 classes), and conversation (2 classes).

He said, "These words were used in the conversation classes and I noticed that I had first seen them in the e-mail project. So, I was able to recall their meaning."

*(d) Independent study.*

During the period of the e-mail project, six out of ten students were spontaneously preparing to take the 2nd or pre-2nd grade of the STEP test, by studying workbooks that supplied mock questions from the test. These students reported that twelve TW tokens (2 in NS<sup>+</sup>S<sup>+</sup> and 10 in NS<sup>+</sup>S<sup>-</sup>) had been learned from their independent study in using the STEP workbooks. They recollected that the words had been used in the e-mail project when they met the lexis in the workbooks.

*(e) Other learning context.*

Student D mentioned he had learned his TW "physical" in another context. He was a member of the soccer team, and his coach had often used the term in his training directions to the team members. The student said:

*Since I joined the team, I've been wondering what "physical-wo kitaeru" [to build up your physical strength] meant. But when I saw "physical" in the NS's e-mail text and got to know the meaning, I finally understood what the coach wanted to say.*

According to his e-mail log, what he actually saw was the adverbial form of the word (Bullies ... hurt other students physically and mentally), but he immediately recognized it as a derivative form of "physical" (physical + ly). He then inductively applied its meaning to the word he had repeatedly heard from his soccer coach and understood the phrase at last. In this student's case, he heard the TW several times before it appeared in the e-mail project. This sequence is different from the other students' cases mentioned above, in which students saw the TW in e-mail first, and it was then supplied again on subsequent learning occasions. Whatever the sequence may have been, it seems true that re-encountering and noticing are the key to memorizing new vocabulary.

#### 4 Discussion

As was described in the Introduction, from a sociocultural perspective, imitation helps learners expand their knowledge of the target language and extend their linguistic development. In the present study too, there were some cases in which students learned the TWs by imitation. At the same time, however, it was shown that imitating the new vocabulary did not always guarantee its subsequent retention, and that there were other learning processes involved in memorizing words. Indeed, Ellis (2003: 182) pointed out that learners' imitation should be viewed just as an 'activity' of dialogue and thus imitated knowledge would not necessarily be applied to conversation. Also, Lantolf (2006: 67) stated that "internalization of the features of a L2 takes place through imitation, especially as occurs in *private speech*" (our italics). Private speech is a monologue, or talking apparently to and for the self, rather than for others, and is different in nature from social speech (i.e., dialogue) such as e-mail conversation. Therefore, learners' acts of imitation which are observable in

e-mail text are not regarded as *imitation* in a SCT sense. Given these arguments the findings of the current study, that is, imitation in e-mail text does not always lead to vocabulary learning and learners utilize various learning processes to memorize the new words, seem to be theoretically sustainable.

This study, moreover, succeeded in identifying several learning processes other than imitation, by which students learned a considerable portion of the TWs. Within the e-mail exchange activity, for example, students commented that they had studied new words in the NS's text by using dictionaries and/or asking others. Students could also memorize the TWs by repeatedly meeting them in the e-mail text. Outside the e-mail project as well, students mentioned that they had learned the TWs by noticing them in regular English classes and/or independent study, recalling the meaning of the words, and using them in writing or speaking.

These cognitive activities correspond to the three important general processes that may lead to word memorization: noticing, retrieval, and generative use of the vocabulary (Nation, 2001: 63–71). According to Nation, vocabulary learning is first encouraged when learners notice the word, that is, give attention to a particular lexical item and carefully study the word to comprehend its meaning. Then, the memory of the word is reinforced when learners retrieve its meaning in reading and listening and its form in writing and speaking. In addition, Nation suggested that repeated opportunities for retrieval are important, to further strengthen its memory. Lastly, the word is firmly remembered when learners use it in their oral and written production of the target language.

Based on the students' episodes and the theoretical accounts by Nation, it seems that students' vocabulary development in this study could be explained by various cognitive processes, rather than the simple act of imitation. We can assume that e-mail interactions with the NS did assist students' vocabulary learning, in that it provided, in many cases, their first encounter with the TWs. We know, however, from our experiences that the memory of the new words tends to fade away without subsequent repeated opportunities to meet, retrieve, and use the items. The results of this study showed that students obtained such opportunities within the e-mail activity as well as outside the project.

## 5 Conclusion

This study sought to determine whether and how students' imitation of lexical items in the e-mail interactions with the NS would facilitate their vocabulary development. The results indicated that imitating the new words provided in the NS's text was not the only process involved in their lexical gains.

Furthermore, the study identified that there were some other factors that appeared to have a positive effect on their vocabulary development. Firstly, the communicative needs and high motivation in students, both of which were generated by authentic communication via e-mail, facilitated their attempts to study new words by referring to all the resources available to them (e.g., dictionaries, classmates, teacher). Secondly, it was found that students' repeated encounters and productive opportunities to use the target words played a vital role in their vocabulary development.

In addition, some of these learning processes took place in other learning contexts subsequent to the e-mail activity, such as regular English classes and their independent study.

In conclusion, the findings of this study indicate that vocabulary learning takes place not through a single process such as imitation in e-mail exchanges but by a combination of different cognitive activities (i.e., noticing, repeated retrieval, and generative use of vocabulary) in varied contexts (e.g., regular classes, independent study). The authors of this study, therefore, suggest that, in an attempt to maximize the effect of e-mail activities in terms of students' vocabulary development, we should encourage them to positively utilize multiple learning resources and situations where they can exercise various cognitive efforts, so that they can reinforce their memory of new words.

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### Appendix: Topic-related keywords

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addiction	guilty	punishment
alcohol	hesitate	refuse
ambulance	idle	reply
annoying	illegal	rude
behavior	immediate	shoplifting
boring	interrupt	smell
bother	juvenile delinquency	social
bug	lazy	solution
butt	liquor	spit
cheating	mechanical pencil	stapler
complain	mental	stationery
confused	misbehavior	steal
criminal	parking	suspended
disagree	pedestrian	tow
disorder	permit	traffic jam
drop out	physical	transportation
drug	polite	truancy
dye	precious	upset
environment	privacy	valuable
fluorescent marker	public	weird

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