

The Effects of Instruction on Intermediate JLEs' Prepositional Accuracy: An Exploratory Study

Robert H. Taferner

1. Introduction

The effects of instruction on second language (L2) learners' grammar and lexical development remain to be an area of continued interest for classroom teachers and applied linguists. The role of second language acquisition (SLA) research has primarily been to facilitate L2 development through improved language learning theories, pedagogical approaches, and instructional methods based on robust empirical evidence. From early language error identification and correction research, the manner in which grammar and vocabulary should be taught for enhanced learning and subsequent acquisition is still far from being understood; as in the case of L2 learners acquisition of prepositions. Through the analysis of learners' prepositional errors in language output such as spontaneous written texts, and the provision of explicit corrective feedback instruction (e.g., Bitchener, Young, & Cameron, 2005; Taferner, 2015; 2014), accuracy rates have not improved. These results indicate that a more thorough understanding of prepositions is required to determine the type of instruction that is necessary to advance short-term learning and long-term acquisition.

Prepositions are seen as simple or complex with spatial, temporal (often with prototypical associations), and abstract lexical meanings that express a syntactic relationship between the prepositional complement and another part of the sentence (Quirk, Greenbaum, Leech, & Svartvik, 1985). Prepositions also often share similar functions and lexical meanings with other languages, but are not necessarily extended to abstract notions (Celce-Murcia & Larsen-Freeman, 1999). This complexity of preposition usage makes instruction very difficult (e.g., DeKeyser, 2005; Tyler & Evans, 2003) for L2 learners in particular Japanese learners of English (JLE) who need thorough explicit instructions with ample opportunities to practice new forms and meanings. Bong (2011) challenged the notion of prototypicality of English prepositions in order to facilitate acquisition by JLE. Subsequently Bong's (2012) investigation of the developmental order of the preposition *at* of JLE concluded that lemmatic properties of both L1 and L2 result in misdevelopment (Han, 2013), and that further research is needed to facilitate the development of appropriate pedagogy approaches

for the acquisition of prepositions.

In this exploratory study, the learning and acquisition of prepositions by JLE will be examined through the following general research questions as the initial stage to an ongoing investigation:

1. Is there evidence that proficiency level influences JLE's learning and acquisition of prepositions?
2. Is there evidence of interlanguage development between pre-intermediate and intermediate JLE?

2. Methodology

2.1 Participants

The 163 informants in the main part of this study were 1st-year and 2nd-year Japanese university students enrolled in English language classes at two universities in the Hiroshima area. These JLE majored in a variety of subjects including education, economics, engineering, humanities, nutrition, and science. Participants of the study who completed the pretest, immediate post-test, and delayed post-test were divided into four groups: Treatment Group 1 (TG1) ($n = 53$), TG2 ($n = 58$), TG3 ($n = 25$), and a Control group ($n = 27$). Treatment Group 1 participants (low pre-intermediate level) were enrolled in a mandatory 2nd-year English class focusing on developing speaking skills at a women's university. Treatment Group 2 (pre-intermediate level) and TG3 participants (intermediate level) attended 1st-year or 2nd-year speaking and writing classes at a national university. The Control group participants were randomly selected from a total of eight classes, four classes from each university. The approximate level of these students was determined using a combination of TOEIC and the minimal English test (MET) scores (Goto, Maki & Kasai, 2010). The MET is a listening and dictation test used to approximate proficiency levels of English as a foreign language (EFL) learners. Since TOEIC scores were not available for all students, the MET test was also

Table 1. Participants' initial proficiency scores ($N_{proficiency} = 148$)

Participant Group	<u>MET Score (M)</u>	<u>TOEIC Score (M)</u>
TG1 ($n = 53$)	34.0%	Not available
TG2 ($n = 53$)	45.1%	372.3
TG3 ($n = 24$)	58.3%	539.6
Control ($n = 18$)	38.4%	Not available

used to help rank participants' English abilities. Table 1 represents the proficiency levels of participants who took the MET. In Table 1, TG2 and TG3 MET and TOEIC test scores correlate, whereas the MET scores for TG1 and the Control indicate they are of lower proficiencies.

2.2 Instrument design

The instruments in this study function to initially determine which prepositional meanings to treat, allow for extensive practice of the targeted items through a treatment, and to test for participants' explicit knowledge of these prepositional meanings in pretest, immediate post-test, and delayed post-test sessions.

2.2.1 Preliminary survey to identify treatable prepositions

The selection of prepositions to examine in this present study was based on previous studies (e.g., Bong, 2011, 2012; Chodorow, Gamon, & Tetreault, 2010). These three studies reference and examine 10 frequently used prepositions: *at*, *by*, *for*, *from*, *in/into*, *of*, *on*, *over*, *to*, and *with*. Of these items, *from* was not selected in this study as its' meaning can be positively transferred from Japanese for most usages. Thus, nine single word prepositions were identified as candidates for treatment and analysis in this study.

To determine which prepositional meanings to focus on, five different uses of each of the nine prepositions (i.e., *at*, *by*, *for*, *in*, *of*, *on*, *over*, *to*, and *with*) were found and sentences were created with their particular use in mind. When these sentences could be translated into natural Japanese, they were included in the survey test. If a natural sentence in Japanese could not be found, a new prepositional usage with that item was found and translated into Japanese. Contrived L1 sentences were avoided as the likelihood of ever using the targeted L2 prepositional meaning in a productive language task was so low that learning its meaning was likely to only lead to short-term retention. After five different usages of each of the nine prepositions were chosen, distractor test items were created. In total, 45 grammar items and 22 distractors were included in the preliminary survey.

The prepositional meanings with the lowest accuracies were selected because they were either very difficult for JLE to learn, they were not learned yet, or some other explanation such as developmental readiness (Pienemann & Kessler, 2011) to acquire the prepositional feature was not reached by the learner, see Table 2. To ensure that all nine

prepositions were included in the experimental treatment, an accuracy limit of approximately 57% of the mean result of all of the participants was determined to be necessary to meet these criteria. By selecting 57% as the cutoff point, multiple usages of some of the preposition types were included. This approach allowed the investigation of developmental orders (Towell & Hawkins, 1994) of the prepositions treated.

Table 2. Preliminary accuracy scores (%) of selected prepositions (*N*preliminary = 157)

*Preposition	Participant Groups				
	TG1 (<i>n</i> = 53) (<i>M</i>)	TG2 (<i>n</i> = 53) (<i>M</i>)	TG3 (<i>n</i> = 24) (<i>M</i>)	Control (<i>n</i> = 27) (<i>M</i>)	All participants (<i>n</i> = 157) (<i>M</i>)
1. <i>at i</i>	52.8	54.7	79.2	37.0	54.8
2. <i>at ii</i>	32.1	56.6	75.0	55.6	51.0
3. <i>by</i>	30.2	39.6	41.7	25.9	34.4
4. <i>for</i>	34.0	49.1	50.0	37.0	42.0
5. <i>in i</i>	50.9	56.6	54.2	55.6	54.1
6. <i>in ii</i>	13.2	37.7	66.7	7.4	28.7
7. <i>in iii</i>	7.6	22.6	33.3	7.4	16.6
8. <i>of</i>	9.4	24.5	33.3	18.5	19.6
9. <i>on i</i>	18.9	5.7	4.2	3.7	9.6
10. <i>on ii</i>	45.3	49.1	66.7	44.4	49.7
11. <i>over</i>	26.4	32.1	50.0	18.5	30.6
12. <i>to i</i>	13.2	13.2	12.5	0.0	10.8
13. <i>to ii</i>	24.5	35.9	50.0	25.9	32.5
14. <i>with</i>	50.9	58.5	54.2	70.4	57.3
<i>M</i>	29.2	38.3	47.9	29.1	35.1
<i>SD</i>	15.9	17.0	21.7	21.7	16.7

*See Appendix 1 for definitions and examples of these targeted prepositions.

Once the preliminary survey of prepositional items was completed, prepositional meanings with the lowest accuracies were selected and treatment tasks were developed. The targeted items cover prepositions of place, movement, time, and abstract meanings.

2.2.2 Preposition treatment task

To aid participants in learning the targeted prepositional meanings, the design of the treatment provided: repeated exposure to the items (Bygate, Skehan, & Swain, 2001); immediate feedback on their interpretation of the meanings in the form of L1 translations of sentences; creative usage of the items; and a summary quiz on their understanding of the items. After considering these factors, a treatment task was developed; see Appendix 2 for an example

of the treatment of *at*. In Part 1 of the treatment, explicit Focus-on-Form instruction was provided through an L1 written explanation of the preposition and an example sentence in Japanese and its' equivalent meaning in English. Subsequently, three English sentences with the targeted preposition were provided for the learner to translate into Japanese. Immediately after Part 1 was completed, answers were given for students to check their own responses. In Part 2, students would then write a new sentence they created in English and draw a picture representing the sentence. This task was included to give an opportunity to personalize the usage of the targeted preposition and show meaning through a visual representation of the sentence (e.g., Purpura, 2004, p. 46; VanPatten, 1996). The final part of the treatment was a multiple-choice quiz covering all of the targeted prepositional items. Once the informants completed the quiz, they were provided with answers to each question. Taking these factors into account, a treatment task taking approximately 40 minutes was created for all of the targeted items. After the treatment, changes in the accuracies of participants' knowledge of targeted prepositional meanings were determined through the comparison of pretest, immediate post-test, and delayed post-test scores.

2.2.3 Preposition grammar tests (pretest, immediate post-test, and delayed post-test)

The grammar tests created 14 specific targeted prepositional meanings and also included distractors focusing on other grammatical features (e.g., articles, pronouns, and verb tenses). For each targeted grammatical feature, two sentences were included for a total of 28, with 32 distractors. In total, there were 60 sentences in each multiple-choice test; which took no more than 20 minutes to complete. For each question, a Japanese sentence was provided first then the equivalent English sentence followed. Each test item had five possible choices, only one of which being correct. Great care was taken to only include naturally occurring language in the items. Prior to administering the tests to the participants, they were trialed with approximately 20 students not participating in the treatment part of the experiment. As part of this trial, unfamiliar vocabulary was identified, and Japanese sentences that were not natural were modified appropriately.

2.2.4 Data collection

For this study, data collection occurred over a period of one school term and followed the schedule in Table 3. In Week 1 of the experiment, the preliminary preposition accuracy

survey was conducted. After the selection of the targeted items was made, the pretest was created, and in Week 4 it was administered. In Week 5 of the experiment, the treatment was given, followed by the post-tests in Week 6 and Week 11.

Table 3. Data collection schedule

Week 1	Preliminary survey to identify the propositions to treat
Week 4	Pretest
Week 5	One treatment of all 14 prepositions selected
Week 6	Immediate Post-test
Week 11	Delayed Post-test

3. Results and Data Analysis

When the experiment was completed, the pretest, immediate post-test, and delayed post-test data were tabulated and analyzed for changes in the accuracy of the 14 items treated. The results of the changes in accuracy scores are shown in Appendix 3, the effects of the treatment appear in Table 4, and a comparison of the pretest and delayed post-test item accuracy rankings for TG1, TG2, TG3, and the Control are in Table 5. The results in Table 6 show the changes in preposition accuracy orders of the pretest and delayed post-test items. Furthermore, Table 7 and Table 8 compare the pretest, immediate post-test and delayed post-test response rates for the items *to i* and *to ii*.

In Appendix 3, accuracy rates of selected targeted test items are summarized for each group of participants to demonstrate at what point in the experiment changes took place and to help explain why the results occurred. The χ^2 test applied to immediate post-test and delayed post-test scores shows whether or not the changes are significant and their level of significance. The immediate post-test accuracy data can indicate if there was a short-term learning effect and the delayed post-test demonstrate the possibility of long-term acquisition of the test item. Negative delayed post-test accuracy scores are also indicated to clearly demonstrate when the test item score was lower than the initial pretest score, or in some cases when the immediate post-test accuracy was lower than the pretest. For TG1, the test items *at i*, *for*, and *on i* have lower scores for the immediate post-test, but higher gains afterwards in the delayed post-test. Items *at ii*, *in i*, *in iii*, *of*, *on ii*, *over*, and *to ii* follow a pattern of improved accuracies for the immediate post-test and lower accuracies in the delayed post-test. The remainder of the items: *for*, *in ii*, *to i*, and *with* have lower scores

than the original pretest with *for* having both low immediate post-test and delayed post-test scores. The accuracy rate for TG2 and the Control also have similar results that were significant for *for* with TG3 maintaining a 100% accuracy score throughout the experiment. Negative scores for *to i* and *with* are consistent throughout the groups. Target Group 2 shows improvements with items *at i*, *by*, *in i*, *in ii*, *of*, *on ii*, *over*, and *to ii* with gains in the immediate post-test that were maintained in *at i*, *by*, and *of* with the others showing lower delayed post-test scores. The *on i* score for TG2 appears to be an anomaly with a low immediate post-test score followed by a very high delayed post-test score. The highest

Table 4. Effects of treatment on test items (χ^2 values) ($N = 163$)

Test item	TG1 ($n = 53$)	TG2 ($n = 58$)	TG3 ($n = 25$)	Control ($n = 27$)
1a <i>at i</i>	44.67	42.67	(-) 0.67--	0.00--
1b <i>at i</i>	(-) 16.67	(-) 4.67--	4.67--	(-) 4.67--
2a <i>at ii</i>	86.00	(-) 18.00	8.67*	(-) 32.67
2b <i>at ii</i>	(-) 54.00	60.67	(-) 20.67	10.67**
3a <i>by</i>	254.00	24.00	14.00	56.00
3b <i>by</i>	392.67	326.00	54.00	48.67
4a <i>for</i>	(-) 38.00	(-) 6.00*	0.00--	(-) 10.67**
4b <i>for</i>	(-) 60.67	(-) 20.67	0.67--	(-) 18.67
5a <i>in i</i>	424.67	200.00	34.67	32.00
5b <i>in i</i>	(-) 242.67	(-) 130.67	(-) 26.00	(-) 40.67
6a <i>in ii</i>	(-) 14.00	60.67	6.00*	4.67--
6b <i>in ii</i>	24.67	312.67	16.67	8.67*
7a <i>in iii</i>	74.67	(-) 104.67	4.67--	16.67
7b <i>in iii</i>	(-) 84.67	(-) 194.00	(-) 4.67--	(-) 4.67--
8a <i>of</i>	88.67	416.67	114.00	32.67
8b <i>of</i>	8.00*	216.00	14.00	26.00
9a <i>on i</i>	468.67	558.00	44.67	114.67
9b <i>on i</i>	248.67	482.67	38.00	52.67
10a <i>on ii</i>	100.67	60.67	(-) 38.00	6.00*
10b <i>on ii</i>	34.67	112.67	(-) 20.67	2.67--
11a <i>over</i>	474.00	494.00	42.00	60.67
11b <i>over</i>	52.67	64.67	4.67--	34.67
12a <i>to i</i>	(-) 292.67	(-) 920.67	(-) 228.67	(-) 38.00
12b <i>to i</i>	(-) 162.67	(-) 64.67	28.67	18.00
13a <i>to ii</i>	132.67	272.67	(-) 74.00	(-) 6.00**
13b <i>to ii</i>	134.00	114.00	160.67	8.67*
14a <i>with</i>	(-) 180.67	(-) 50.67	(-) 132.67	(-) 24.67
14b <i>with</i>	(-) 112.67	(-) 340.67	(-) 52.67	(-) 74.00

df=2 --p>0.05 (<5.99); *p < 0.05 (5.99); **p < 0.01 (9.21); p < 0.001 (13.82)

Note: (-) indicates that accuracy of item decreased after treatment at the time of the delayed post-test.

proficiency group, TG3, has test items with lower delayed post-test accuracy scores for *at i*, *on ii*, *to i*, and *with*. The change in *at i*, however, is not significant, indicating the treatment had no effect. Finally, the Control group has a mixture of very moderate changes, negative results, with *in*, *of*, *on ii*, and *over* making improvements in accuracy. Item comparison of accuracy rates of the pretest and delayed post-test shows that changes in the accuracy orders occurred.

The results in Table 4 demonstrate if the treatment had an effect on the targeted test items through the determination of χ^2 values with two degrees of freedom. Here χ^2 values measure the significance of the changes observed in the pretest, immediate post-test, and delayed post-test accuracy scores. A noticeable finding is the number of negative post-test results that are statistically significant. Target Group 1 has 11, TG2 10, TG3 and the Control group with 10 negative changes in accuracies. In addition, the majority of the χ^2 values presented in Table 4 have a $p < 0.001$ significance including very large changes for all items. Another finding is the accuracy differences between test item tokens. Ideally, each test item, for example *at i* (tokens 1a and 1b), should have similar accuracy or χ^2 results as an indicator of item or token reliability. A comparison of pretest and delayed post-test test item accuracy rates for TG1, TG2, and TG3 are shown in Table 5. While many of the

Table 5. Changes in pretest and delayed post-test accuracy rates (%) for treatment groups ($N = 163$)

	TG1 ($n = 53$)		TG2 ($n = 58$)		TG3 ($n = 25$)		Control ($n = 27$)	
	Pretest	Delayed PT	Pretest	Delayed PT	Pretest	Delayed PT	Pretest	Delayed PT
1. <i>at i</i>	56.6	*60.4	65.5	*79.3	92.0	88.0	37.0	37.0
2. <i>at ii</i>	22.6	*37.7	67.2	60.3	76.0	*92.0	44.4	14.8
3. <i>by</i>	20.8	*58.5	74.1	*84.5	80.0	*100.0	48.1	*55.6
4. <i>for</i>	92.5	90.6	98.3	98.3	100.0	100.0	88.9	88.9
5. <i>in i</i>	28.3	*67.9	53.4	*70.7	64.0	*72.0	40.7	*55.6
6. <i>in ii</i>	28.3	26.4	58.6	*68.8	84.0	*96.0	29.6	37.0
7. <i>in iii</i>	18.9	*26.4	67.2	65.5	84.0	88.0	14.8	14.8
8. <i>of</i>	26.4	*34.0	27.6	*70.7	36.0	*72.0	11.1	*29.6
9. <i>on i</i>	35.8	*79.3	62.1	*98.3	60.0	*88.0	29.6	*74.1
10. <i>on ii</i>	30.2	*39.6	55.2	*56.9	76.0	44.0	25.9	37.0
11. <i>over</i>	28.0	*67.9	44.8	*87.9	64.0	*88.0	14.8	48.1
12. <i>to i</i>	69.8	26.4	81.0	13.8	96.0	20.0	59.3	25.9
13. <i>to ii</i>	5.7	*30.2	20.7	*34.5	28.0	24.0	25.9	14.8
14. <i>with</i>	45.3	26.4	65.5	55.2	84.0	32.0	48.1	22.2
<i>M</i>	36.4	48.0	60.1	67.5	73.1	71.7	37.0	39.7
<i>SD</i>	22.8	22.2	19.9	23.3	21.1	29.0	20.6	22.6

* $p < 0.05$ indicates a significant improvement in accuracy.

targeted prepositions improved in accuracy, others decreased in accuracy indicating further instruction is necessary. Also, the Control group advanced in the use of *of*, *by*, *in i*, *of*, and *on i* without the aid of treatment. This is an interesting outcome as it demonstrates that attention to some prepositional usages require no explicit instruction to improve.

Pretest and delayed post-test accuracy orders in Table 6 show ranking differences which indicate that the treatments may have varied effects depending on proficiency levels of the participants. For example, all of the pretests have *for* and *to i* ranked with the highest accuracy rates and *to ii* with the lowest. After the treatment, *for* remained in the same position and surprisingly *to i* replaced *to ii* as the most difficult item for all of the treatment groups indicating the treatment in this study has an impact on the developmental orders of the targeted prepositions in this study.

Table 6. Changes in pretest and delayed post-test accuracy orders (N = 163)

TG1 (n = 53)		TG2 (n = 58)		TG3 (n = 25)		Control (n = 27)	
Pretest	Delayed PT	Pretest	Delayed PT	Pretest	Delayed PT	Pretest	Delayed PT
<i>for</i> (92.5)	<i>for</i> (90.6)	<i>for</i> (98.3)	<i>for i</i> (98.3)	<i>for</i> (100.0)	<i>for</i> (100.0)	<i>for</i> (88.9)	<i>for</i> (88.9)
<i>to i</i> (69.8)	<i>on i</i> (79.3)	<i>to i</i> (81.0)	* <i>on i</i> (98.3)	<i>to i</i> (96.0)	* <i>by</i> (100.0)	<i>to i</i> (59.3)	* <i>on i</i> (74.1)
<i>at i</i> (56.6)	* <i>over</i> (67.9)	<i>by</i> (74.1)	* <i>over</i> (87.9)	<i>at i</i> (92.0)	* <i>in ii</i> (96.0)	<i>by</i> (48.1)	* <i>by</i> (55.6)
<i>with</i> (45.3)	* <i>in i</i> (67.9)	<i>in iii</i> (67.2)	* <i>by</i> (84.5)	<i>with</i> (84.0)	* <i>at ii</i> (92.0)	<i>with</i> (48.1)	* <i>in i</i> (55.6)
<i>on i</i> (35.8)	* <i>at i</i> (60.4)	<i>at ii</i> (65.5)	* <i>at i</i> (79.3)	<i>in ii</i> (84.0)	* <i>on i</i> (88.0)	<i>at ii</i> (44.4)	<i>over</i> (48.1)
<i>on ii</i> (30.2)	* <i>by</i> (58.5)	<i>with</i> (65.5)	* <i>in i</i> (70.7)	<i>in iii</i> (84.0)	* <i>over</i> (88.0)	<i>in i</i> (40.7)	<i>at i</i> (37.0)
<i>in ii</i> (28.3)	* <i>on ii</i> (39.6)	<i>at i</i> (65.5)	* <i>of</i> (70.7)	<i>by</i> (80.0)	<i>at i</i> (88.0)	<i>at i</i> (37.0)	<i>on ii</i> (37.0)
<i>in i</i> (28.3)	* <i>at ii</i> (37.7)	<i>on i</i> (62.1)	* <i>in ii</i> (68.8)	<i>at ii</i> (76.0)	<i>in iii</i> (88.0)	<i>in ii</i> (29.6)	<i>in ii</i> (37.0)
<i>over</i> (28.0)	<i>of</i> (34.0)	<i>on ii</i> (55.2)	<i>in iii</i> (65.5)	<i>on ii</i> (76.0)	* <i>in i</i> (72.0)	<i>on i</i> (29.6)	* <i>of</i> (29.6)
<i>of</i> (26.4)	* <i>to ii</i> (30.2)	<i>in ii</i> (55.2)	<i>at ii</i> (60.3)	<i>in i</i> (64.0)	* <i>of</i> (72.0)	<i>on ii</i> (25.9)	<i>to i</i> (25.9)
<i>at ii</i> (22.6)	<i>in ii</i> (26.4)	<i>in i</i> (53.5)	* <i>on ii</i> (56.9)	<i>over</i> (64.0)	<i>on ii</i> (44.0)	<i>to ii</i> (25.9)	<i>with</i> (22.2)
<i>by</i> (20.8)	<i>in iii</i> (26.4)	<i>over</i> (44.8)	<i>with</i> (55.2)	<i>on i</i> (60.0)	<i>with</i> (32.0)	<i>in iii</i> (14.8)	<i>at ii</i> (14.8)
<i>in iii</i> (18.9)	<i>with</i> (26.4)	<i>of</i> (27.6)	* <i>to ii</i> (34.5)	<i>of</i> (36.0)	<i>to ii</i> (24.0)	<i>over</i> (14.8)	<i>in iii</i> (14.8)
<i>to ii</i> (5.7)	<i>to i</i> (26.4)	<i>to ii</i> (20.7)	<i>to i</i> (13.8)	<i>to ii</i> (28.0)	<i>to i</i> (20.0)	<i>of</i> (11.1)	<i>to ii</i> (14.8)

*p < 0.05 indicates a significant improvement in accuracy.

To further investigate JLEs' interlanguage development and developmental orders of prepositions, an analysis of the participants' responses to the pretest, immediate post-test, and delayed post-test items was made. Two prepositional usages of *to* were selected to demonstrate the varied effects of treatment on the abstract preposition *to i* and the preposition of time *to ii*.

The test item questions used for *to i* were:

Pretest

ペニは日本の男性と結婚している。

Penny is married (to · of · over · for · at) a Japanese man.

Immediate post-test

これは私のペンです。

This pen *belongs (of · over · at · for · to) me. *~の所有である

Delayed post-test

紙を掲示板に留めてください。

Please *pin the paper (at · for · to · over · of) the **bulletin board. *留める ** 掲示板

In Table 7, the responses to *to i* sentence items indicate a decrease in accuracy over the

Table 7. Error analysis of *to i*: Comparison of response rates (%) (*N* = 163)

	<i>to</i>	<i>at</i>	<i>by</i>	<i>for</i>	<i>of</i>	<i>over</i>	<i>in</i>	<i>with</i>
TG1 (<i>n</i> = 53)								
Pretest	69.8	-	-	13.2	17.0	-	-	-
Immediate PT	60.4	3.8	-	9.4	26.4	-	-	-
Delayed PT	26.4	22.6	-	7.5	13.2	30.2	-	-
TG2 (<i>n</i> = 58)								
Pretest	81.0	5.2	-	8.6	5.2	-	-	-
Immediate PT	74.1	1.7	-	5.2	19.0	-	-	-
Delayed PT	13.8	50.0	-	1.7	1.7	31.0	-	-
TG3 (<i>n</i> = 25)								
Pretest	96.0	-	-	-	4.0	-	-	-
Immediate PT	92.0	-	-	-	8.0	-	-	-
Delayed PT	20.0	56.0	-	-	-	24.0	-	-
Control (<i>n</i> = 27)								
Pretest	59.3	3.7	-	3.7	25.9	7.4	-	-
Immediate PT	51.9	3.7	-	11.1	33.3	-	-	-
Delayed PT	25.9	44.4	-	3.7	11.1	14.8	-	-

period of the experiment. It appears that the abstract concept of attachment for the meaning of *to* in this case, is strongly competing with other prepositional items. An interesting observation for the delayed post-test item is that the treatment groups selected the preposition *over* more often than the correct *to* response and the selection of *at* increased over time. This indicates that more extensive trialing of the test items is necessary to have more reliable results. The second item selected for error analysis, *to ii* is represented by the following test item sentences:

Pretest

英語の授業まであと10分です。

It is 10 minutes (with · for · to · at · by) English class.

Immediate post-test

私の誕生日まで3週間です。

It is three weeks (to · by · at · for · with) my birthday.

Delayed post-test

ケイトは何分で到着しますか。

How many minutes is it (with · for · to · at · by) Kate's *arrival? *到着

Participants' answers to the preposition of time *to ii* test sentences in Table 8 show a general increase in accuracy. The selection of other prepositions, *at*, *by*, and *for* demonstrates participants' confusion over which is the correct response. From this analysis of the preposition of *to*, it appears that these intermediate EFL students are more likely to learn prepositions of time sooner than abstract prepositions. Another increasing fact is that lower proficiency level learners may retain explicit knowledge about a particular usage, while more advanced learners may not. It appears that advanced learners may have many more things to think about as there are many prepositions with similar meanings to others, making it more difficult to select the correct response.

Table 8. Error analysis of *to ii*: Comparison of response rates (%) ($N = 163$)

	<i>to</i>	<i>at</i>	<i>by</i>	<i>for</i>	<i>of</i>	<i>over</i>	<i>in</i>	<i>with</i>
TG1 ($n = 53$)								
Pretest	5.7	11.3	47.2	35.8	-	-	-	-
Immediate PT	34.0	3.8	45.3	17.0	-	-	-	-
Delayed PT	30.2	15.1	20.8	30.2	-	-	-	-
TG2 ($n = 58$)								
Pretest	20.7	5.2	53.4	20.7	-	-	-	-
Immediate PT	60.3	3.4	31.0	5.2	-	-	-	-
Delayed PT	34.5	10.3	27.6	24.1	-	-	-	-
TG3 ($n = 25$)								
Pretest	28.0	-	60.0	12.0	-	-	-	-
Immediate PT	68.0	-	28.0	4.0	-	-	-	-
Delayed PT	24.0	4.0	44.0	28.0	-	-	-	-
Control ($n = 27$)								
Pretest	25.9	14.8	33.3	25.9	-	-	-	-
Immediate PT	25.9	3.7	29.6	37.0	-	-	-	-
Delayed PT	14.8	11.1	29.6	40.7	-	-	-	-

4. Discussion

The research questions in this exploratory study focused on the ability of explicit instruction to influence JLEs' learning and acquisition of prepositions. In particular, this study focused on the influence of proficiency level and interlanguage development of pre-intermediate and intermediate level JLE.

Analysis of the data in Table 4, Table 5, and Appendix 3 show the accuracy of the targeted prepositions mostly made significant changes throughout the period of this experiment, and that higher level intermediate learners were more likely to learn and retain explicit knowledge of prepositions compared to lower level pre-intermediate JLE. Many of the test items display increased accuracy in the immediate post-test results indicating a learning effect, with lower accuracies reported in the delayed post-test representing the longer lasting acquisition effects of the treatment. The results also show a relationship between proficiency level and accuracy rate with the highest proficiency group (TG3) maintaining high levels of accuracy throughout the study. This effect is evident for all of the items except for TG2's accuracy rates being higher than TG3's for the abstract

meanings of *on i* and *on ii*. The values for *with* and *to ii* also demonstrate some anomalies that are likely due to test item reliability rather than proficiency. However, at this point there is no satisfactory explanation for these findings. Furthermore, TG3's accuracy gains are not always consistent or as statistically significant as the other groups. This may be due to TG3's initially high accuracy levels and possible ceiling effects limiting the range of developmental potential.

Prior to the treatment of the targeted prepositions, the items that could improve more quickly and easily due to the treatment would predictably be the easier ones with prototypical core meanings with prepositions of location, movement and time, followed by more abstract items. If this was the case, the developmental order after treatment would follow the items from *at ii* at the top to *to i* at the bottom of the list, as presented in Appendix 1. Surprisingly, the comparison of the pretest and delayed post-test results in Table 5 with the items in Appendix 1 show very few of the items actually correlating with the logical assumption about which items could be learnt quickly and easily.

Another finding is that some items indicate little or no accuracy change in the immediate post-test one week after the treatment was administered. Additionally, many the overall changes reported in the delayed post-tests were less accurate than the initial pretest showing that the test items need further refinement prior to assigning factors such as limited treatment, working memory, ceiling effect, or learner developmental readiness as responsible for these outcomes. These negative results are difficult to explain without further investigation into the reliability of the test items (i.e., *at i*, *on ii*, *to i*, and *with*). In fact, the use of only two tokens per targeted test item makes the claims of this study less robust than they could be. To help rectify some of the limitations of this current study, prepare and trial more tokens per targeted test item, focus more closely on fewer prepositions that share related properties (e.g., prepositions of time), and provide more treatment sessions to ensure that participants have sufficient exposure to learn the item more thoroughly. With improvements in the reliability of the test items, a stronger statement regarding the factors influencing the acquisition of prepositions by JLE can be made. To further investigate participants' interlanguage development selected, learners' errors are shown in Table 7 and Table 8. Analysis of these errors demonstrates that learners of all proficiency levels struggle when determining the correct preposition to use. The immediate post-test results for *to ii* show that all of the groups can learn these items, but remembering the meaning at a future time

may not be possible with limited exposure and instruction.

5. Conclusions

The purpose of this exploratory study is to determine whether or not proficiency level influences learning and acquisition of prepositions, and to demonstrate interlanguage development between pre-intermediate and intermediate JLE. In examining these issues, it is clear that proficiency level plays a role in learning and acquiring explicit knowledge of prepositions. Through this study, it is also evident that developmental orders exist within a single preposition, as there are usages of varying conceptual complexity that lend to differences in accuracy rates. As a suggestion for future research on the acquisition of prepositions, empirical studies that enhance theoretical frameworks that clearly establishes the reasons why prepositions are difficult to learn for L2 learners should be one of the main objectives. In addition, to assist pedagogical practices, further exploration of interlanguage, developmental orders, and readiness to learn and acquire prepositions is necessary to implement an effective approach to provide classroom instruction that will lead to more efficient learning.

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Appendix 1. Definitions and examples of targeted prepositions

Item Definitions	Prepositions of Location
At ii. At is used to indicate the direction of or towards somebody or something.	女性は女の子に微笑んだ。 The woman smiled <u>at</u> the girl.
Over. Over is used when something is resting on the surface of something and partly or completely covering it.	その男の子はシャツの上に暖かいジャケットを着ていました。 The boy wore a warm jacket <u>over</u> his shirt.
	Prepositions of Movement
With. With indicates going in the same direction as something.	葉は水の流れて乗って漂っています。 *Leaves are **floating <u>with</u> the water. *葉 **漂う (ただよう)
	Prepositions of Time
At i. At is used to state the age at which somebody does something.	彼は1歳で歌を歌いました。 He sang a song <u>at</u> age one.
In i. In is used to indicate during a period of time.	彼女は午前中休憩しました。 She rested <u>in</u> the morning.
In ii. In is used to indicate after a period of time.	彼らは15分後に行きます。 They will go <u>in</u> 15 minutes.
Of. Of is used to indicate something that has a connection with a period of time.	60年代の音楽はすばらしかった。 The music <u>of</u> the *Sixties was great. *60年代
To ii. To is used to show the amount of time before the start of something.	3時10分前です。 It is 10 minutes <u>to</u> 3:00.
	Abstract Prepositions
By. By is used to show a period of time, packaging, or quantity of something (e.g., weight, number, or amount).	私たちは肉をキログラムで購入します。 We buy meat <u>by</u> the kilogram.
For. For is used to show the expected benefit of an action.	彼女は健康のためにニンジンを食べます。 She eats carrots <u>for</u> *health. *健康
In iii. In is used to indicate an object that a person is wearing.	彼はスーツで来ました。 He came <u>in</u> a *suit. *スーツ
On i. On is used to mark a group that the subject belongs to.	私はバレーボールのチームに入っています。 I am <u>on</u> a volleyball team.
On ii. On indicates a state or condition.	その本は展示してあります。 The book is <u>on</u> *display. *展示
To i. To is used to show a relationship or attachment to someone or something.	あなたのファイルを電子メールに添付して下さい。 Please *attach your file <u>to</u> the email. *添付する

Appendix 2. Example of the treatment of *at*

Part 1. Definitions パート1：定義

At i. *At* is used to state the age at which somebody does something. Form: at + noun indicating level of age

At i. *at* は人が何か行為 / 行動をする年齢を表すために使われます。形式: at+ 年齢を表す名詞

例: ジョンは30歳でニューヨークに引っ越しました。John moved to New York at the age of 30.

1. _____ . He sang a song at age one.
2. _____ . She rode a bicycle at six years old.
3. _____ . Bob began studying French at age ten.

Part 2. Definitions with pictures. パート2：写真で見る定義

Preposition (前置詞) 定義	Sentence 新しい文章を書きなさい。	Picture 絵
At i. <i>At</i> は人が何か行為 / 行動をする年齢を表すために使われます。形式: at+ 年齢を表す名詞		

Part 3. Preposition exercises. Circle the correct preposition type.

パート3：前置詞の練習。正しい前置詞を選んで○をつけなさい。

例：私は青い鳥が好きです。I like (green · yellow · orange · blue · red) birds.

なお、解答したら必ず次の文へ進んでください。一度解答したものには絶対戻らないでください。

Question #. (Over · At · Of · In · For) age 60, Tom was able to *retire. *退職する

Question #. She rode a bicycle (over · at · in · of · for) three years of age.

Appendix 3. Selected accuracy scores (%) and χ^2 results ($N = 163$)

Test item Item number	<i>at i</i> <u>1a</u>	<i>at ii</i> <u>2a</u>	<i>by</i> <u>3a</u>	<i>for</i> <u>4a</u>	<i>in i</i> <u>5a</u>	<i>in ii</i> <u>6a</u>	<i>in iii</i> <u>7a</u>	<i>of</i> <u>8a</u>	<i>on i</i> <u>9a</u>	<i>on ii</i> <u>10a</u>	<i>over</i> <u>11a</u>	<i>to i</i> <u>12a</u>	<i>to ii</i> <u>13a</u>	<i>with</i> <u>14a</u>
<u>TG1 (n = 53)</u>														
<u>Pretest</u>	56.6	22.6	20.8	92.5	28.3	28.3	18.9	26.4	35.8	30.2	28.3	69.8	5.7	45.3
<u>Im PT</u>	43.4	47.2	22.6	77.4	81.1	35.9	41.5	50.9	24.5	56.6	84.9	60.4	34.0	62.3
<u>Delayed PT</u>	60.4	37.7	58.5	90.6	67.9	26.4	26.4	34.0	79.3	39.6	67.9	26.4	30.2	26.4
χ^2	44.67	86.00	254.00	38.00	424.67	14.00	74.67	88.67	468.67	100.67	474.00	292.67	132.67	180.67
	Negative			Negative		Negative			Negative			Negative		Negative
<u>TG2 (n = 58)</u>														
<u>Pretest</u>	65.5	67.2	74.1	98.3	53.4	58.6	67.2	27.6	62.1	55.2	44.8	81.0	20.7	65.5
<u>Im PT</u>	79.3	70.7	84.5	93.1	87.9	77.6	87.9	70.7	41.4	72.4	94.8	74.1	60.4	72.4
<u>Delayed PT</u>	79.3	60.3	84.5	98.3	70.7	69.0	65.5	70.7	98.3	56.9	87.9	13.8	34.5	55.2
χ^2	42.67	18.67	24.00	6.00	200.00	60.67	104.67	416.67	558.00	60.67	494.00	920.67	272.67	50.67
	Negative			Negative			Negative		Negative			Negative		Negative
<u>TG3 (n = 25)</u>														
<u>Pretest</u>	92.0	76.0	80.0	100.0	64.0	84.0	84.0	36.0	60.0	76.0	64.0	96.0	28.0	84.0
<u>Im PT</u>	88.0	80.0	96.0	100.0	96.0	96.0	96.0	96.0	52.0	72.0	100.0	92.0	68.0	92.0
<u>Delayed PT</u>	88.0	92.0	100.0	100.0	72.0	96.0	88.0	72.0	88.0	44.0	88.0	20.0	24.0	32.0
χ^2	0.67	8.67	14.00	0.00	34.67	6.00	4.67	114.00	44.67	38.00	42.00	228.67	74.00	132.67
	Negative								Negative	Negative		Negative	Negative	Negative
<u>Control (n = 27)</u>														
<u>Pretest</u>	37.0	44.4	48.2	88.9	40.7	29.6	14.8	11.1	29.6	25.9	14.8	55.6	25.9	48.2
<u>Im PT</u>	37.0	33.3	18.5	74.1	70.4	25.9	33.3	40.7	22.2	37.0	51.9	51.9	25.9	37.0
<u>Delayed PT</u>	37.0	14.8	55.6	88.9	55.6	37.0	14.8	29.6	74.1	37.0	48.2	25.9	14.8	22.2
χ^2	0.00	32.67	56.00	10.67	32.00	4.67	16.67	32.67	114.67	6.00	60.67	38.00	22.7	24.67
		Negative	Negative	Negative		Negative			Negative			Negative	Negative	Negative

*Negative shows when there is a lower accuracy score in either the immediate post-test or the delayed post-test when compared to the pretest. Im PT=Immediate post-test