

What Does Data-Driven Learning (DDL) Bring Out in Grammar Learning?

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データ駆動型学習 (DDL) は文法学習にどのように活用されるか？

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DDL is a method of inquiry-based learning in which students use language data as learning materials to discover language rules on their own. In this study, paper-based DDL, in which language data are printed on paper, was conducted to examine how paper-based DDL improves students' grammatical knowledge, what discoveries students make, and how they reach their findings during DDL activities. Fifty-seven seventh-grade students participated in the study and learned about third-person singular present verb forms. In the treatment group, students first discovered grammatical rules individually using the paper-based DDL. Students then shared their findings collaboratively in groups. Finally, the whole class shared their findings, which the teacher summarized. In the control group, students extracted target learning items from the reading material in the textbook, and the teacher added explanations using a traditional teacher-led manner. The results of a two-way ANOVA showed that the students in the two classes had similar grammar knowledge about the third-person singular present before the instruction. The increase in scores from the pretest to the posttest showed significant grammar knowledge development in both classes. In the posttest, however, the scores of the DDL class were significantly higher than those of the teacher-led class. In summary, both the DDL class and the teacher-led class acquired grammatical knowledge, but the students in the DDL class understood the grammar target better than those in the teacher-led class. It was also found from students' notes on a worksheet that the depth and breadth of the discovery of language rules varied from student to student, and students learned from each other, deepening their learning through collaborative learning. Wrong discoveries were also corrected among students. However, some incorrect findings remain and need to be corrected.

DDLは、言語データを教材として生徒が自ら言語ルールを発見する探究型の学習方法である。本研究では、ペーパー版DDLで生徒の文法知識がどのように向上するか、また、生徒はどのような発見をし、どのようにしてその発見に至ったのか等について検討をした。中学1年生57名が3人称単数現在の動詞の形を学習した。DDLクラス(処置群)では、生徒ははじめに個人学習で、紙に印刷された言語データを観察して文法規則を発見した。その後、協働学習で発見を共有し、最後にクラス全体で発見した英語の規則を確認し、教師がまとめた。教師主導型クラス(対照群)では、教科書の本文を使って学習目標の文法項目を教師が説明して、生徒はノートを取ったり、教科書を音読したりした。文法テストの結果、両クラスともに文法知識を向上させたが、DDLクラスがよりよく3人称単数現在の規則を学んでいた。また、ワークシートの記述の分析から、生徒の英語の規則の発見の様子、協働学習で学びを深めるプロセス等が確認された。

キーワード : data-driven learning(データ駆動型学習), DDL(DDL), paper-based DDL(ペーパー版DDL), noticing(気づき), grammar learning(文法学習)

1. Introduction

In recent years, English classes have often been conducted in a communicative and meaning-oriented manner. However, grammar instruction in an ESL class is

mostly teacher-led, in which the teacher explicitly teaches the grammar. In contrast, DDL (data-driven learning) is a learner-centered approach to foreign language learning that elicits learner awareness of language rules. DDL is a new approach to grammar learning.

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In DDL, students learn by observing language data and discovering grammatical and lexical patterns from the data. Their discoveries lead them to understand how a foreign language is used in speaking and writing. The major DDL task assigned to students is to discover patterns in vocabulary and grammar on their own and to build their knowledge of grammar.

DDL was proposed by Johns (1991) more than 30 years ago. Since it was first proposed, it has been used in various ways in foreign language learning. For example, it has been used for the instruction of vocabulary (Lee & Lin, 2019; Tsai, 2019), collocation (Saeedakhtar et al., 2020; Wu et al., 2019), grammar (Lin, 2021; Vyatkina, 2013), writing (Mizumoto et al., 2017), and translation (Singer, 2016), among other language knowledge and skills, and learning outcomes have been reported.

There are two methods for presenting language data. One is to use texts (corpora) in electronic media, and the other is to print text data on paper and distribute it to learners. Gabrielatos (2005) called the former corpus-based and the latter text-based. Boulton (2010) referred to text-based DDL as paper-based DDL and reported that it was more effective in learning than traditional instructional methods for students at the beginner level. Furthermore, Chujo et al. (2009) reported the effectiveness of a presentation technique called a parallel corpus, in which the language of study and the native language are shown together.

Mizumoto et al. (2016) listed these differences and set up a spectrum of DDL with hard DDL and soft DDL at either end. They stated that hard DDL is for intermediate and advanced-level learners and uses a large corpus of natural English such as newspapers, magazines, blogs, and similar sources with a mono corpus as the teaching material. Soft DDL is for introductory and beginner-level learners, is paper-based, and uses a small corpus of simple English sentences and a parallel corpus with native language translations in the target language.

DDL is said to be “one of the most promising applications of corpus linguistics” (Wicher, 2020, p. 31). However, it has been pointed out that most DDL research has been conducted with university students, and the use of DDL is not as widespread in elementary and secondary education as one might expect (Crosthwaite, 2020). Few studies have been conducted on junior high school students in Japan; Nishigaki et al. (2015) taught consecutive paper-based DDL lessons to eighth and ninth graders in different schools. They compared a DDL approach with a teacher-led approach. In one school, DDL was used to review and deepen known vocabulary, and in the other school, to learn new grammatical items. Results showed that DDL was as effective as traditional instruction in a

posttest given one week after instruction, but after four weeks the DDL groups retained the knowledge better than the traditional groups at both schools. In Kakiba et al. (2021), seventh-grade students participated in a single DDL lesson. An analysis of writing on pre and posttests indicated that most students could learn and correctly produce not only the target grammar (demonstrative adjectives *this* and *that* and possessives) but learned the correct placement of articles in simple sentences. In addition, changes in students' grammatical knowledge before and after DDL were observed on students' written test sheets. With these studies, it has been shown that paper-based DDL can effectively improve Japanese secondary school students' grammatical knowledge and that the knowledge is retained. However, there is a lack of research on DDL, such as studies with controlled groups, what kind of discoveries students make, and how they might deepen their findings using DDL.

Based on this, the purpose of this study was to measure DDL's effectiveness and examine how students learn and develop grammatical knowledge through paper-based DDL in the seventh grade with a control group. Students begin studying grammar in the seventh grade in Japan, and target grammar and key sentences are explicitly explained in the textbooks. To achieve this goal, the research questions (RQs) of this study were set up as follows:

RQ1. Can paper-based DDL improve introductory-level students' grammatical knowledge of third person singular present verb forms?

RQ2. What discoveries do students make, and how do they reach their findings during DDL activities?

2. Research Method

2.1 Participants

We conducted an English class with a treatment group (the DDL class) and a control group (the teacher-led class). Fifty-seven students in two seventh-grade classes at a public junior high school in Chiba Prefecture in Japan participated in this study. According to achievement test results, the students' English proficiency was about average in the prefecture. Thirty-one students participated in the DDL class and learned grammar using paper-based DDL. Twenty-six students participated in the teacher-led class. The teacher taught using a government-authorized English textbook in the class, and students learned grammar from the teacher's explanations.

2.2 Learning Target

The students studied the third person singular present form of verbs. This was the students' first exposure to this grammar item in the textbook; however,

the teacher often used this verb form in the teacher's talk in the classes. Therefore, students had been orally exposed to the target grammar prior to this class. We also defined the grammatical knowledge that students acquired in this DDL class as the ability to monitor English sentences, meaning they could look at the English sentences they produced grammatically when time pressure was not applied and judge the accuracy of the sentences for errors.

2.3 Teaching Methods

Both the teacher-led class and the DDL class were implemented in the manner shown in Table 1. The teaching methods are detailed in the following sections.

Table 1. Class Procedure

Stage	Teacher-led class	DDL class
Stage 1	Class learning	Individual learning
Stage 2	Class learning + individual learning	Collaborative learning
Stage 3	Individual learning	Class learning

2.3.1 Teacher-Led Class

The lessons in the teacher-led class were based on the textbook and were conducted in the following stages: (a) whole class learning, then (b) whole class learning and individual learning, and finally (c) individual learning. In the first whole class stage, students listened to the textbook audio and read along. Next, the teacher drew their attention to new vocabulary both in a list and in context. The teacher explained the form and meaning of the third person singular present verb. The students listened to the teacher's explanation and took notes. In the second stage, the students read the textbook passages silently and looked for sentences containing the third person singular present. Then, the class checked the form of the verbs and their meaning with the teacher's guidance. In the third stage, students practiced reading the passages aloud individually. They consolidated their knowledge on the grammatical points by reading the text and changing roles in pairs.

2.3.2 DDL Class

The DDL class used paper-based DDL, also in three stages: (a) individual learning, (b) collaborative group learning, and (c) whole class learning. In the first stage, the teacher distributed three worksheets for students to study independently. These were a concordance line sheet, an error correction task sheet, and a discovery sheet with hints.

The concordance line sheet (shown in Appendix A) contained 20 English sentences that included the learning target. (The instructions were originally in Japanese for students but have been translated into English for this article.)

These sentences were selected from the DDL site (<https://h.ddl-study.org/>) created for secondary school students and modified by the teacher to suit the learners' lives and interests. Each line is called a concordance line and was presented in a Key Word in Context (KWIC) format, which places the keyword in the center of the concordance line. The Japanese translation appeared next to the English concordance lines; this form of two-language presentation is called a parallel corpus. When students did not understand a word, they looked at the Japanese to check the meaning. In addition, by comparing the English sentence with the Japanese sentence, students noticed the differences in the sentence structures of the two languages. Furthermore, students could look up and down the list of English sentences on the left and find the differences between the English sentences. The error correction task sheet used in the class is shown in Appendix B (the Japanese instructions have been translated into English).

In the first stage, students worked individually and looked at the sentences on the error correction task sheet, judged any errors in the sentences, and corrected them if there were. To correct the incorrect sentences, students carefully observed the concordance lines (in Appendix A) and the English sentences in the error correction task (in Appendix B), finding differences between the two. Through this process, the students looked analytically at the English sentences on the concordance line sheet. Next, students wrote down the rules they discovered on a discovery sheet (see Appendix C). Because some students still could not make their discoveries even after the error correction task, we gave them further questions that led students to find "where" and "how" to observe the concordance lines. The questions given to the students were: "What are likely to be the common characteristics of the verbs that follow the subject?" "Are there differences in the English sentences depending on the subject?" and "Are there differences in word order between Japanese and English?" In the second stage (collaborative learning), students worked in groups of four to share their findings, and in the third whole class learning stage, the teacher elicited and organized the English rules discovered by the students and shared them with the class. Students copied notes from the blackboard onto their worksheets.

2.4 Evaluation Methods and Practice Schedule

This study was conducted in October 2021 according to the schedule shown in Figure 1. Three evaluation tests were administered: a listening test, a pretest, and a posttest. In the following section, we describe these tests.

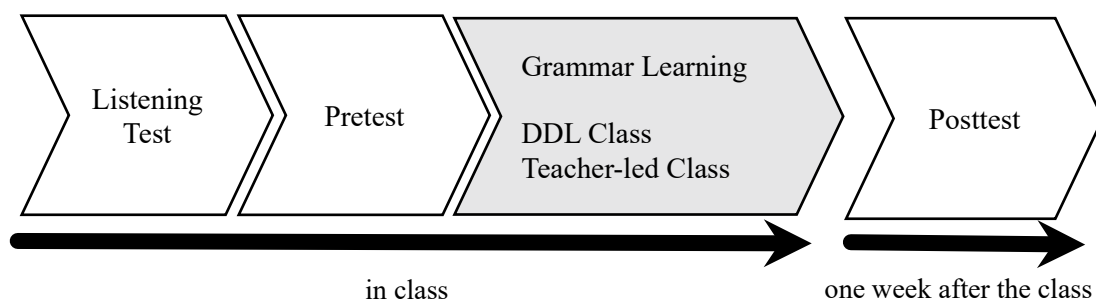


Figure 1. Instruction Schedule

2.4.1 Listening Test

First, a listening test was conducted. The students were familiar with the third person singular present form of verbs through the teacher's talk, and we administered a listening test to check their understanding of the third person singular present form (e.g., *he runs, she climbs*). We also checked whether the two classes differed in their ability to hear and understand it. We chose the test from a commercial textbook manual set. This test was designed to check students' achievement of the target grammar item after learning it. In this text, there were two questions: (a) Listen to the speeches introducing Tomoya, Ahaka, and Kazumi, and draw a line between their names and what they do; and (b) after listening to the dialogues, choose the correct answer from "A" or "B" and answer with a symbol. There were three possible points for Question 1, and two for Question 2. The maximum score was five.

2.4.2 Pretest and Posttest

We conducted pretest and posttest to measure the change in students' ability to correct incorrect English sentences. The tests used are shown in Appendix D. When a student corrected like to likes in Miki like soccer, s/he was given one point. The test consisted of seven questions, and the total mark was seven. The posttest was administered in the next class attended after the DDL lessons ended. The questions were the same as those of the pretest.

3. Results and Discussion

3.1 Listening Test

The listening test results were 90.00% points on average for the teacher-led class and 85.2% for the DDL class. There was no statistical difference in the scores between the DDL and the teacher-led classes. These results confirm that the students could listen to and understand English sentences containing the third person singular present form before the instruction.

3.2 Grammar Test

The total score on the grammar test was seven points. Its basic statistics and Cronbach's alpha are

presented in Table 2. The results are also illustrated in Figure 2. We can see from the results of the two-way ANOVA that the main effect of the test ($F(1, 55) = 47.79, p < .001, \eta_p^2 = .19$) and the interaction ($F(1, 55) = 12.63, p < .001, \eta_p^2 = .05$) were significant. However, the main effect of the class (DDL or teacher-led) was not significant ($p = .25, \eta_p^2 = .02$).

To interpret the interactions, the simple main effect test was performed for each factor. First, the scores for the DDL class and the teacher-led class on the pretest showed no significant difference. This confirms that the students in the two classes had similar grammar knowledge on the third person singular present before the instruction. Next, the increase in scores from the pretest to the posttest was significant for both DDL and teacher-led classes. This indicates that there were significant developments in grammar knowledge in both classes. The effect size was medium for the teacher-led class ($r = .38$) and large for the DDL class ($r = .80$). However, on the posttest, the DDL class scores were significantly higher than those of the teacher-led class. This suggests that the DDL class learned the target grammar better than the teacher-led class. In summary, both the DDL class and the teacher-led class acquired grammatical knowledge in class, but the students in the DDL class had a better understanding than those in the teacher-led class.

Table 2. Basic Statistics and Cronbach's Alpha

Class	Score	Pre	α	Post	α
DDL class	Mean	2.39		4.90	
	(SD)	(1.84)		(1.83)	
Teacher-led class	Mean	2.73	.79	3.54	.71
	(SD)	(1.76)		(2.14)	

Figure 3 and Figure 4 show the pretest and posttest scores from 0 to 7 and the number of students who received that score for each. Pretest results are indicated by gray bars, and posttest results by black bars. The result of the DDL class in Figure 3 shows that many students scored less than two points on the pretest (gray bars). Meanwhile, some students scored 7 points, which is shown by two peaks in the bar graph.

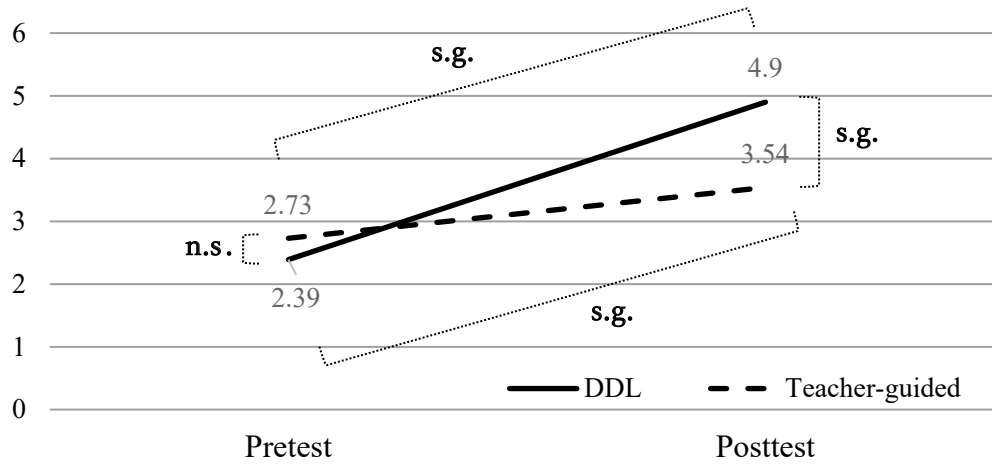


Figure 2. Results of the Pretest and Posttest

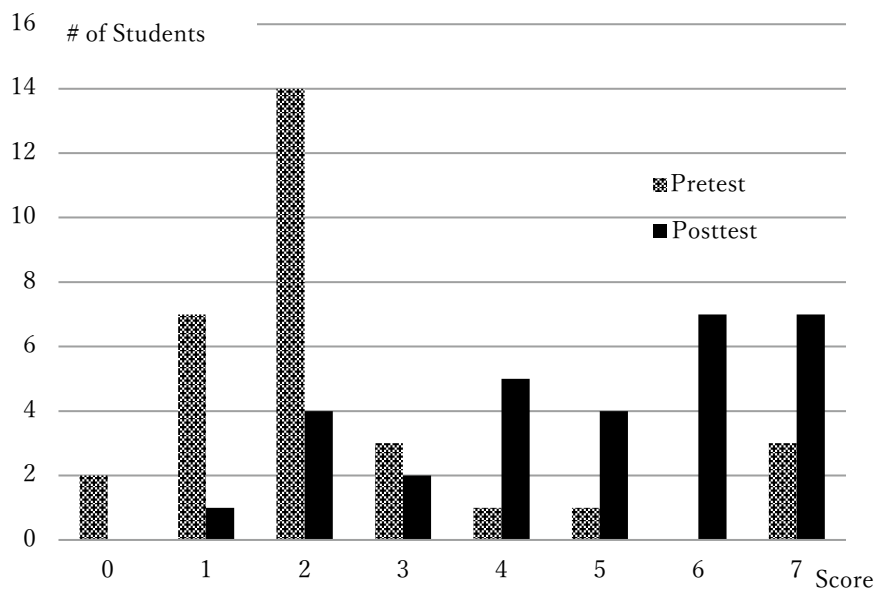


Figure 3. Test Score Distribution Gained from the DDL Class

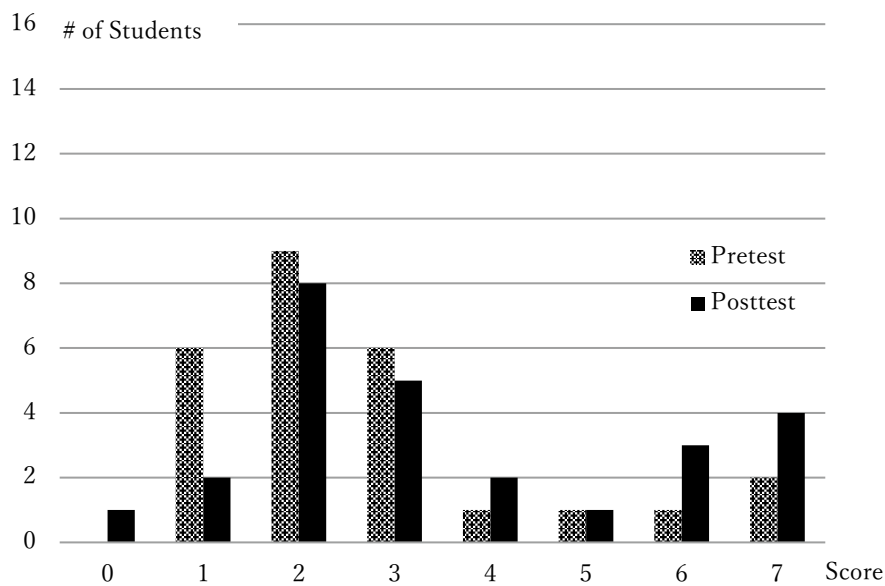


Figure 4. Test Score Distribution Gained from the Teacher-led Class

However, in the posttest (black bars), the number of students scoring four or more points increased. The students' overall scores rose, and the two peaks of their scores are resolved. However, as seen in Figure 4 for the teacher-led class, many students scored less than two points in the pretest (gray bars), and some students scored 7 points which is shown by two peaks in the bar graph. This had been similar to the DDL class.

Although the posttest showed an overall increase in students' scores and a shift of bars to the right, the two peaks remained in teacher-led class. This can be seen in Table 2 where the SD became larger in the posttest (2.14) than in the pretest (1.76) in teacher-led class. Thus, concerning RQ1, we might conclude that paper-based DDL using selected sentences is effective for grammar learning for introductory-level learners.

3.3 The Results Found from the Worksheets

We next addressed the second research question: "What discoveries do students make, and how do they make them during DDL activities?" We analyzed students' notes on the discovery sheet (Appendix C), in which students wrote what they discovered by observing the concordance lines (Appendix A) during their individual and group learning.

3.3.1 Findings From Each Step of DDL Discovery Activities

First, we counted the number of students who made discoveries in the first stage of the DDL activity, that is, individualized learning. As a result, 29 out of 31 students reported a statement in the discovery section of individual learning; two students did not make any findings. Although students were scaffolded with two types of support (the error correction task and the hint questions on the discovery sheet), it was found that some students needed additional support. Based on these results, we can understand that some students needed more personalized guidance in class.

One of the two students who did not recognize the target grammar rule in the individual learning stage did discover this in the second collaborative learning stage. This student made his discovery by exchanging ideas with his friends. The other student, who could not make discoveries at Stage 1 or Stage 2 wrote notes in Stage 3. He described the grammar rule in the final stage with the teacher's guidance.

3.3.2 Discoveries Students Made

The discoveries made by students are presented and discussed. The students' notes were in Japanese; English translations are provided here.

3.3.2.1 Target Item: third Person Singular Present Forms of Verbs

The students' findings on the third person singular present verbs are shown below. They show that some students discovered that some verbs have an *s* ending; some other students noticed that some verbs have an *es* as well as an *s*. We can see that the depth of awareness varies from student to student. The students who found more discoveries shared their findings with other students during the collaborative learning stage.

- The verbs that follow *he*, *she*, or people's names have *s* and *es* at their ends, but the verbs that follow *I*, *you*, or *they* do not.
- *S* and *es* are added at the end of a verb when its sentence has a name of the person, or *he* or *she* (e.g., *play*, *like* → ... *s*). The verbs in a sentence which have *I*, *you*, and *they* in it are without *es* and *s* as they were always so.
- *S* is attached to the verb that comes after the person's name (including *he* or *she*), not to *I* or *you*.

3.3.2.2 Limited Thinking

Some students used individual cases from the concordance lines to explain the English rules. These students did not seem to be able to generalize the rules from the examples in front of them. From this, it can be said that teachers can teach these students how to generalize the rules from finding commonalities among individual cases. Again, these examples are from student notes.

- A sentence with a name uses *plays*.
- When a speaker talks about the place of birth, he uses *comes*, not *come*.

3.3.2.3 Grammatical Term: Third Person

In the example in 3.3.2.1, when students explained the grammar rule, many of them searched specific words such as *I*, *you*, *he*, and *she* in the concordance lines. Alternatively, some students generalized the rules using the grammatical term "third person" to describe the "subject" of a sentence. In the following examples, we can see that some students' understanding of the grammar rules is based on the English examples in front of them, while others generalized the rule.

- When the subject is in the third person, the verb is followed by an *s*.

3.3.2.4 Grammatical Term: Object and Noun

When explaining the object position in English, some students used the English grammatical term "noun" which is a grammatical term common to both Japanese and English classes, rather than "object." Since the teacher did not use "object" in the English class, some students applied the knowledge of "nouns."

- In Japanese, verbs come after nouns, but in English,

verbs come before nouns.

- The noun is attached to the end of the sentence.

3.3.2.5 Terminology Gap between English and Japanese Grammar

Because students learn English objects as “modifiers” and English verbs as “predicates” in Japanese classes at elementary school, these terms appeared in their notes. The discrepancy between English and Japanese terminology might make English grammar difficult for students.

- “Verbs” after the subject are the same as “predicates” after the subject in Japanese.
- Japanese → Subject + Modifier + Predicate
- English → Subject + Predicate + Modifier

3.3.2.6 Word Order

Comparing English and Japanese sentence structure, some students noticed that the word order differs between the two languages. From this, we can see that having the Japanese sentence beside the English sentence helped students to be aware of the different structures between the two languages.

- The word order is different between Japanese and English.

I	play	soccer.
Watashi-ha	shimasu	soccer-wo

3.3.2.7 Reviewing Existing Knowledge

Some students discovered English rules on their own that were not related to the hints and guides given by the teacher. Some students found the already learned grammar rule in the concordance lines. This was a good review for students to confirm what they had learned before.

- There is more than one apple or bean, so an *s* is added.
- There are several books, so an *s* is added in the sentence.

3.3.2.8 Deeper Insight

Some students deepened their findings and thoughts through collaborative learning in groups. In the example shown in Figure 6, at the individual learning stage, the students’ discovery was simple, with a note that the verbs have an *s*. Through collaborative learning in groups in Stage 2, one student learned from another that *I* is called first person, *you* second person, and other than *I* and *you* is third person. This student finally noted that for the third person, the verb has an *s* in the sentence.

3.3.2.9 Erroneous Discoveries

Some students’ findings were erroneous. However, as shown in Figure 7, this student could also correct

his false discoveries through collaborative learning in Stage 2. In this example, the student first used his existing knowledge and thought that *chess* is repeatedly played and should be plural. Thus, the verb has an *s*. This was not correct, but through collaborative learning with friends, the student could correct his wrong assumption. Finally, he came to the idea that verbs have an *s* depending on the subject of a sentence. This is an example of a student who initially made an incorrect finding but corrected the wrong guess through collaborative learning with friends.

Thus, concerning RQ2, we might conclude that students were able to find the rules of the target grammar item by examining the concordance lines selected by the teacher for the students. The grammar rules found ranged from those based on tangible examples to more abstract forms that generalized the rules. Students who did not know the grammatical terms described the rules using words they knew. Collaboration with friends deepened students’ understanding. Some students made incorrect discoveries. Many of the false

A Note from the Individual Learning Stage

The verbs have an *s*.



A Note after Collaborative Learning

first person... *I*
second person... *you*
third person ... other person or thing



In the third person, the verb is followed by *s*.

Figure 6. Changes in a Student’s Note from the First and Second Stage

Note from Individual Learning Stage

Mike plays chess every night.
→ The reason *plays* is that there is much chess.



Note after Collaborative Learning

The verbs *s* and *es* are added when *he*, *she*, and people’s names are used, but not when *I*, *you*, or *they* are used in a sentence.

Figure 7. Additional Changes in a Student’s Notes from the First and Second Stages

findings were corrected during collaborative learning.

4. Conclusion

In this study, we focused on grammar learning. However, we do not believe that grammatical correctness is strictly required for speaking activities in school. It is also natural for junior high school students to make local errors such as the *s* for the third person singular present. However, in writing without time pressure, we want students to be able to monitor their errors and write correctly in English by using the knowledge of grammar they have learned. We believe that DDL develops such grammatical skills effectively.

In this study, we confirmed the increase between pretest and posttest scores, the comparison of the score increase gained from the DDL class and the teacher-led class, and the analysis of the notes written on the DDL findings worksheet of the treatment group. These findings and analyses suggest that:

1. Paper-based DDL improved seventh graders' grammatical knowledge. Thus, DDL can be applied to introductory level students.
2. Paper-based DDL was more effective than teacher-led learning when the third person singular present form was taught.
3. Some students could not make discoveries independently, even with different types of support.
4. The depth and breadth of discovery of language rules varied from student to student, even when observing the same concordance lines printed on paper.
5. In the DDL activities, students learned from each other and deepened their learning through collaborative learning.
6. Using DDL, some students make wrong discoveries. Such findings need to be corrected at some point.

DDL is unique in that it is a nonteaching method: students discover the rules of the language and learn them through collaborative learning without the teacher having to explain the grammar. DDL is an effective learning method that changes the traditional, teacher-directed, grammar-translation teaching style and allows students to acquire grammatical knowledge of English in a thoughtful, inquiry-based manner. However, we need to investigate further what other grammar items students can learn effectively through DDL. We also understood that some students need additional, personalized support in class.

It is also worth noting that we identified problems with this use of DDL. First, DDL exploratory activities are time-consuming. Thus, incorporating DDL into English classes should not overshadow the time spent using English in language activities. To take advantage of the benefits of DDL, if we can implement DDL activities in the classroom with a less time-consuming

format, we can regularly incorporate them into the classroom.

Second, the paper version of DDL takes time to prepare. To solve this problem, the authors have developed an online DDL tool for secondary school students that anyone can use without charge or registration (Nishigaki, et al., 2022, <https://h.ddl-study.org/>). This tool has a Japanese version and an international version. It allows students to study English grammar using a parallel corpus with English and its Japanese translation at the secondary school levels. Students can select grammar items from a list or enter a search formula to extract concordance lines, sort the sentences, and observe and explore the sentences. The tool also includes a "quiz" that allows students to check their mastery of grammatical knowledge. This online tool eliminates the need to create worksheets for teachers. In addition, the English sentences in the program are copyright-free. Teachers can use the English sentences in this tool and modify them to make them easier to use in their classes; this is especially useful if each student has a computer terminal at school. Thus, we would like to verify the method and effectiveness of DDL instruction using such a terminal.

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Language Hints			
Mike	plays	chess every night.	マイクは毎晩チェスをします。
Benjamin	plays	football.	ベンジャミンはサッカーをします。
Clare	plays	hockey.	クレアはホッケーをします。
I	play	soccer every day.	私は毎日サッカーをします。
You	play	the drums after school.	あなたは放課後にドラムをします。
Aya	likes	apples.	アヤはりんごが好きです。
Kim	likes	beans.	キムは豆が好きです。
He	likes	badminton.	彼はバドミントンが好きです。
I	like	books.	私は本が好きです。
You	like	tennis.	あなたはテニスが好きです。
They	like	Sydney.	彼ら(彼女ら)はシドニーが好きです。
Mike	comes	from France.	マイクはフランス出身です。
Sami	comes	every Saturday.	サミは毎週土曜日に来ます。
I	come	from London.	私はロンドン出身です。
You	come	here often.	あなたはよくここに来ます。
Tom	goes	to church.	トムは教会に行きます。
Emma	goes	to kindergarten.	エマは幼稚園に行きます。
Rie	often goes	fishing.	リエはよく魚釣りに行きます。
I	go	skating.	私はスケートに行きます。
You	go	to school on foot.	あなたは学校に歩いて行きます。

Appendix A Worksheet for Concordance Lines

Language Search	
Please correct any mistakes in the following English sentences when making them fit the Japanese. When you have finished answering the questions, look at the clues on the Discovery Sheet to check your answers.	
Example	Are you have a bicycle? あなたは自動車を持っていますか? Do car
1. Tom have a new bike.	トムは新しい自転車を持っています。
2. Brenda like Tom.	ブレンダはトムが好きです。
3. Mary play badminton every day.	メアリは毎日バドミントン进行します。
4. Ken go to school on foot.	ケンは自転車で学校に行きます。
5. Ami come from Sydney.	アミはシドニー出身です。

Appendix B Error Correction Task

Discovery Sheet	
Look for mistakes on Error Correction Sheet by paying attention to the following Hints.	
Hint 1 What are likely to be the common characteristics of the verbs that follow the subject?	
Hint 2 Are there differences in the English sentences depending on the subject?	
Hint 3 Are there differences in word order between Japanese and English?	
Write your findings.	Add what your friends have discovered that you did not notice.
Summary	
	

Appendix C Discovery Sheet

What Does Data-Driven Learning (DDL) Bring Out in Grammar Learning?

English Quiz

If the English below is correct, please put ○.

If there are any mistakes, please correct them by following the example.

Example	I are happy. am
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	<input type="radio"/>	If there are any mistakes, correct them.	
1		I play baseball.	私は野球をします。
2		Miki like soccer.	ミキはサッカーが好きです。
3		Ken go to school on foot.	ケン歩いて学校に行きます。
4		Kim have two pencils.	キムはえんぴつを2本持っています。
5		Jim comes to my house today.	ジムは今日、私の家に来ます。
6		You have many books.	あなたはたくさんの本を持っています。
7		Ben want an eraser.	ベンは、消しゴムがほしいです。

Appendix D Pre and Posttests