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## The Association between the Score and the Vocabulary in the Waka Essay by High School Student with Waka Learning System.

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### Abstract

We were allowed to examine the Waka essays (below: 'Kanshouhun') of high school students studying language arts. The Kanshouhun is about understanding works of art. Waka is a Japanese fixed-form poem. We focused on the association between Kanshouhun scoring results and the vocabulary used in the Kanshouhun.

We found that 'there is correlation between scoring results and the vocabulary used in the Kanshouhun' and 'the students becomes to use more words by WAKATON, new learning method proposed by authors.'

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*Keywords:* e-Learning ; Japanese Language Art Education ; Waka Poem Comprehension ; Essay Writing ; Evaluation ; Wakaton

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### 1. Introduction

Kanshouhun, essay on Waka essay is written to understand works of art. In this research, we were allowed to examine the Kanshouhun of high school students studying language arts. Waka is a Japanese fixed-form poem. The materials for this research include Tanka, a type of Waka. Briefly, the Tanka is a short poem written in 31 sounds. The governmental curriculum guideline suggests that the students need to learn to read and critique novels and stories<sup>1</sup>.

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The Waka is included in “novels and stories.” So the students are required to increase not only ability to read but also ability to critically read the Waka. It is difficult for high school students to write Kanshoukun. The Kanshoukun’s writing ability of many students is poor.

Based on these realities, we have studied new educational methods for increasing the Kanshoukun’s writing ability. To understand meaning of the Waka, the students need to understand the meaning of archaic words used in the Waka. In addition, the Waka involves many representation techniques. The students are required to learn about these representation techniques in order to understanding meaning of the Waka. The Waka as a teaching material of this research is written in 35 sounds. To increase the ecological vailligyd<sup>2</sup> (Trochim, 2005), the experiment described in this paper was conducted in an actual classroom as a part of the Japanese Language Art class (i.e, the in-vivo study).

We have carried out a study on “Wata Kansei technology supported online learning method (WAKATON)” previously<sup>3</sup>. WAKATON is new learning method aimed at enhancing ability of Kanshoukun’s writing proposed by the authors. In this study, we have carried out an experiment that verifies the learning effect of the WAKATON on Kanshoukun’s writing ability. About score of Kanshoukun, total of adjective and total of adjectival verb used in Kanshoukun, these values of Wakaton Condition (using WAKATON) were higher than its of Control Condition (not using WAKATON). The study shows a strong correlation between the score and the total of adjective, and between the score and the total of adjectival verb. We have confirmed that the WAKATON enhances learning of Kanshoukun’s writing ability regardless of whether the students’ ability is rich or not.

## 2. Learning Waka

The Waka teaching materials of this research were written more than 800 years ago. Hence, they were written in old Japanese. Because Waka is short-form poem, it often only describes things in the abstracted or vague way with limited number of words. From the limited vocabulary used in the Waka, the reader is required to imagine what is represented in the Waka. To write a Kanshoukun, the students need to understand the meaning of words used in old Japanese, have knowledge about the representation techniques, and have the ability to imagine from limited amount of words used in Waka.

We conducted a survey on the skills and abilities required for well-written Kanshoukun for eight high school language arts teachers. One question was posed to the teachers, and the respondents were free to answer in any way they wanted.

Question: What are the skills and abilities required for well-written Kanshoukun?

Table 1. Skills and abilities required for well-written Kanshoukun

Vocabulary	7	Ability to imagine	1
Expressive ability	4	Writing skill	2
Sensibility	4	Acquiescence	1
Literary knowledge	2	Reading ability	1
Sentence structure ability	2	Historical knowledge	2
Experience reading the Waka	2	Life knowledge	1
Life experience	2	Sentiment	1
Creative capability	1	Living environment	1

Table1 is a result of the survey responses. The result shows that 16 skills and abilities are required for well-written Kanshoukun. The number in the Table 1 represents head-count which the teachers answer the question. 7 out of 8 teachers responded that vocabulary is required. Many teachers feel confident that the students are required a lot of experience for improving their vocabulary. Therefore, we focused on the association between teachers’ scoring and the students’ vocabulary used in the Kanshoukun (Vocabulary at Kanshoukun).

We have defined that increase in the number of words used in Kanshoukun show to improve students’ vocabulary. In this study, we were verified only the number of words.. We do not consider the following.

- Meaning of word

- Relation between Waka and word
- Relation between word and word

### 3. Research question / Hypothesis

Can we predict Scores based on the student's proficiency with Japanese vocabulary?

We hypothesize that there are reliable correlations between the use of Kansei words and Scores.  
We also hypothesize that if there are reliable correlations, then we can predict Score with the vocabulary count.

The purpose of this paper is to determine: what relationship exists between Score and a student's vocabulary at the time of the Kanshoukun lesson? This is the central research question. Is learning using Wakaton learning method significantly to use greater number of words than the learning that does not use Wakaton learning method? This is another research question.

To answer the research question, we verify the following two hypotheses:

Hypothesis 1. There is a correlation between Score and vocabulary at the time of the Kanshoukun.

Hypothesis 2. After learning, Wakaton Condition use more words than Control Condition, not only adjective and adjectival verb.

In this study, we verify these three hypotheses through actual class.

Validation 1. Test of the correlation between Score and vocabulary at the time of the Kanshoukun.

Validation 2. Comparison of the vocabulary at the time of the Kanshoukun between Wakaton Condition and Control Condition.

### 4. WAKATON

In this research, we used the Wakaton and to take advantage of ICT and SD questionnaires in learning the "meaning, scene and feelings (the core of the excitement), causing summarizes the expressive techniques and important phrase" with the Wakaton system. Learning to answer the SD questionnaire is called SD learning ( See Fig. 1, Fig. 2).

For example, we can view a meaning, scene and feelings (the core of the excitement), a description of the such an important word or phrase. In addition, one may learn by comparing the multiple Waka. SD questionnaire response results are calculated automatically. Students can confirm the meaning and their input results instantaneously. Students recognize their sensitive characteristics by performing a comparison of the average of the other student responses. Such recognition shows that the averages of the SD questionnaire have prompted the meta cognitive activities. In addition, this recognition encourages the act of consciousness in the individual's ability to cope with emotions.<sup>4</sup> (Emotional intelligence; EI, Salovey & Mayer (1989) )

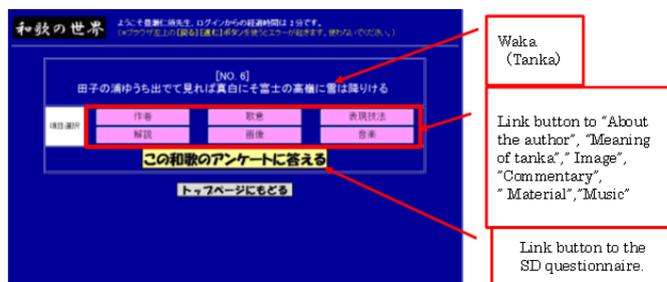


Fig. 1. kansaiDB

再生されている音楽について、下のアンケートに答えてください。

美しい	--07 06 05 04 03 02 01--	醜い
わびしい	--07 06 05 04 03 02 01--	わびしくない
情熱的	--07 06 05 04 03 02 01--	情熱的でない
さびしい	--07 06 05 04 03 02 01--	にきやか
激しい	--07 06 05 04 03 02 01--	激しくない
強い	--07 06 05 04 03 02 01--	弱い
つれない	--07 06 05 04 03 02 01--	つれなくない
恋しい	--07 06 05 04 03 02 01--	恋しくない
ほかない	--07 06 05 04 03 02 01--	ほかなくない

アンケートに答えたので次にすすむ

Rating scale  
 (Adjective)  
 (An adjectival verb)

Fig. 2. SD questionnaire.

Learning by Wakaton is an example of situational learning in language education<sup>5</sup> (Anderson, J. R., Reder, L. M., & Simon, H. A. 1996, Brown, J. S., Collins, A., & Duguid, P. 1989). This approach is expected to lead to the improvement of the quality of teaching the Waka in high school.

## 5. Experiment

### 5.1. Method

We used three Wakas as teaching materials. The meaning of each Waka is in parentheses. Waka

#### Waka1

銀も金も玉も何せむにまされる宝子にしかめやも 山上憶良  
 (Upscale silver and gold and beautiful ball, I think probably that they be what. What a wonderful treasure wonder extends to children? No does not extend.)

#### Waka2

花の色は移りにけりないたずらにわが身世にふるながめせしまに 小野小町  
 (Color of flowers and my beauty have disappeared anymore. I think vain myself was quite old wane. While I'm looking to indulge in thought, as flowers go scattered been struck in the spring of long rain,)

#### Waka3

玉の緒よたえなば絶えね永らへば忍ぶことの弱りもぞする 式子内親王  
 (My life. Please would be finished if from being finished. If I live in this state, my endure heart becomes weak, I will not be completely hidden.)

Wakaton Condition was studied using the Wakaton system. Control Condition was studied using the viewable material (Material) in the browser. The contents of the Material comprise a meaning of Waka, representation techniques, commentary, and images (Fig. 3). There is no SD questionnaire in the Material; it is divided into two groups, but this experiment is not a randomized controlled trial of two groups. We use a different system, but students wrote a pre-Kanshou bun and post-Kanshou bun before and after study. Students wrote a delayed-Kanshou bun after two months of study. We verified whether correlations exist between Vocabulary at Kanshou bun and Score. We show the flow of the study Wakaton Condition and Control Condition in Fig. 4. We conducted 9 sessions of 50 minutes in class for both groups.

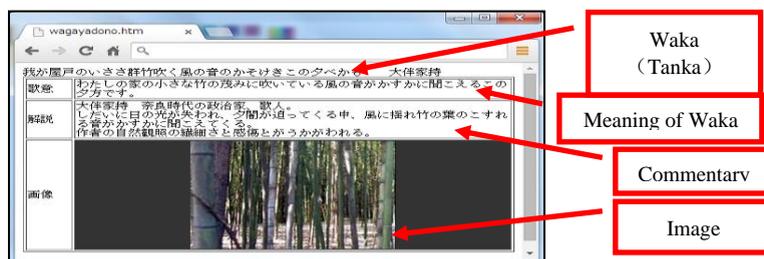


Fig. 3. Material

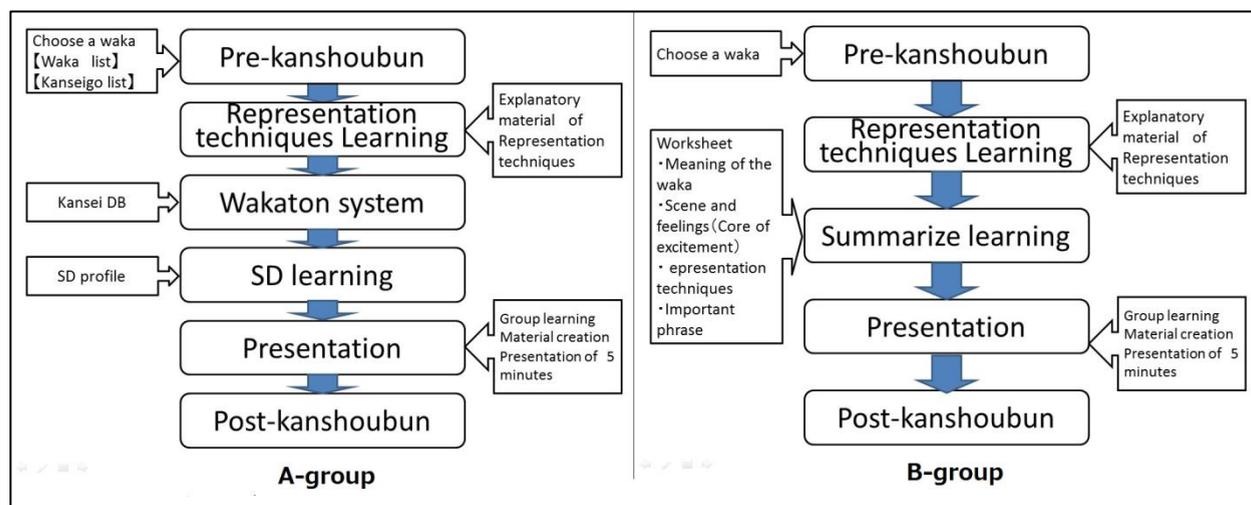


Fig. 4. The flow of education for Wakaton Condition and Control Condition.

## 5.2. Participant

Participants include 36 students from a Japanese high school. They are in 9th grade. Wakaton Condition includes 20 students, and Control Condition includes 16 students. We show the number of students using each of the Waka in Table 2.

Table 2. The number of students using each Waka

	Wakaton Condition	Control Condition
Waka1	19	11
Waka2	1	1
Waka3	0	4

## 5.3. Measure

We use Score and vocabulary at the time of the Kanshoubun to verify the hypothesis. Two language arts teachers scored the Kanshoubun on a 12-point scale. We ensured the results by using two teachers for the scoring. The scoring criteria are shown in Table 3.

Table 3. The scoring criteria

Do students correctly describe the author?
Do students correctly describe what is the author at any situation?' What is the view of the author? What are the author's feelings?' What does the author think?'
Do students correctly describe the representation techniques, etc.?
Do students correctly describe how well the representations are doing?
Are students writing their impressions?
Do students write the modern translation correctly?

As shown in Table 1, 7 out of 8 teachers responded that vocabulary is required for well-written Kanshoukun. So we thought that there is the correlations between the numbers of vocabularies in Kanshoukun with these criteria. We do text mining for vocabulary at the time of the Kanshoukun. We used the "KH Coder" for text mining. We did text mining with KH Coder. A word that has been used is classified as a word class. The number of uses of each word is displayed. We classified these words into the following three groups: Total, Taigen, and Yougen. Total is the total number of all the words. Taigen is a noun and a pronoun. Yougen is a verb, an adjective, and an adjectival verb. We in Japan defined as taigen the nouns and pronouns, is defined as yougen the verbs and adjectives and adjective verb. In addition to this, we use adverbs, rentaishi, conjunctions, interjections, postposition, the auxiliary verb in Japanese. Postposition, the auxiliary verb is attached word. Some of the students did not use adverbs, rentaishi, conjunctions, and interjections in Kanshoukun. For these reasons, we classified into the three groups.

#### 5.4. Results

We ensured the inter-coder reliability of two teachers who scored Kanshoukun prior to the analysis. The data confirmed that there is a strong correlation between the scoring of both teachers. : $r=0.984, p<0.001$ . Then, it was shown that there was no significant difference in the two scores by paired t-test. ; $t(108)= 0.53, p = 0.16$ . The chances of two people scoring in this way based on coincidence are low. Therefore, in the following analysis, we used the average of the scoring of two people's score.

We assayed the correlation between Score and vocabulary at the time of Kanshoukun. We show the correlation coefficient of Total ,Taigen, Yougen, "Others"and Score below. We used the "R" in the assay. The values in Table 4 are the correlation coefficients.

Table 4. The correlation coefficient of between Total, Taigen, Yougen, Others and Score

	Total	Taigen	Yougen	Others
Score	$r=0.91, p<0.0001$ $t(106)=22.14$	$r=0.90, p<0.0001$ $t(106)=21.36$	$r=0.88, p<0.0001$ $t(106)=18.95$	$r=0.67,$ $p<0.0001$ $t(106)=9.31$

We have repeated measures analysis of variance<sup>6</sup> Total and Taigen and Yougen and Others. (Huck, S.W. & McLean, R.A. 1975) ( Fig.5, Fig.6, Fig.7, Fig.8, Table5). There was a reliable interaction between Time (pre vs. post vs. delays) and Group (Wakaton vs. Control). Also, we computed the correlation between pre- and post- count of Total and Taigen and Yougen and Others. (Gelman, A. 2005) (Table6)

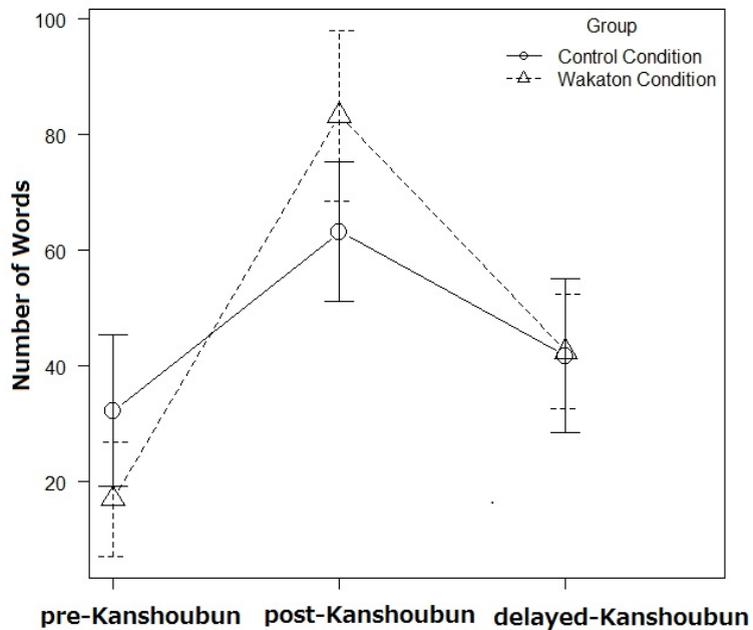


Fig. 5. Repeated measures analysis of variance Tota.

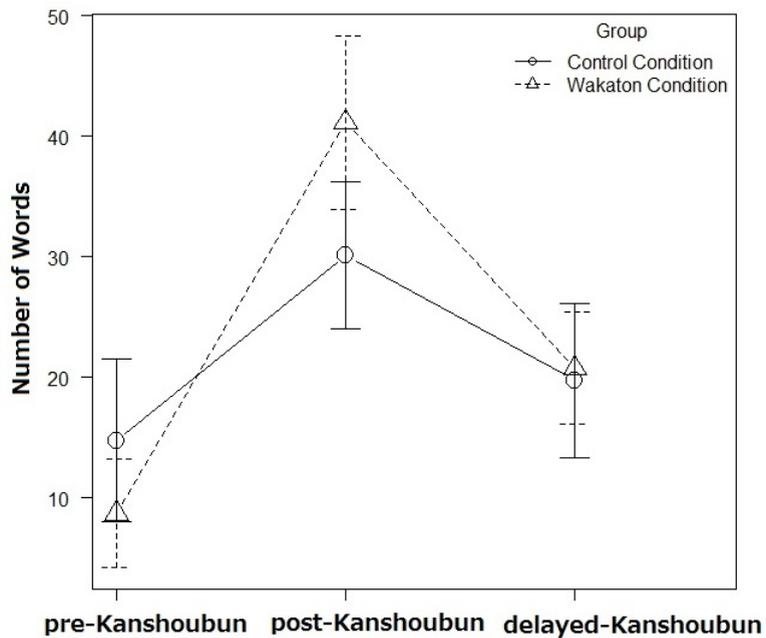


Fig. 6. Repeated measures analysis of variance Taigen.

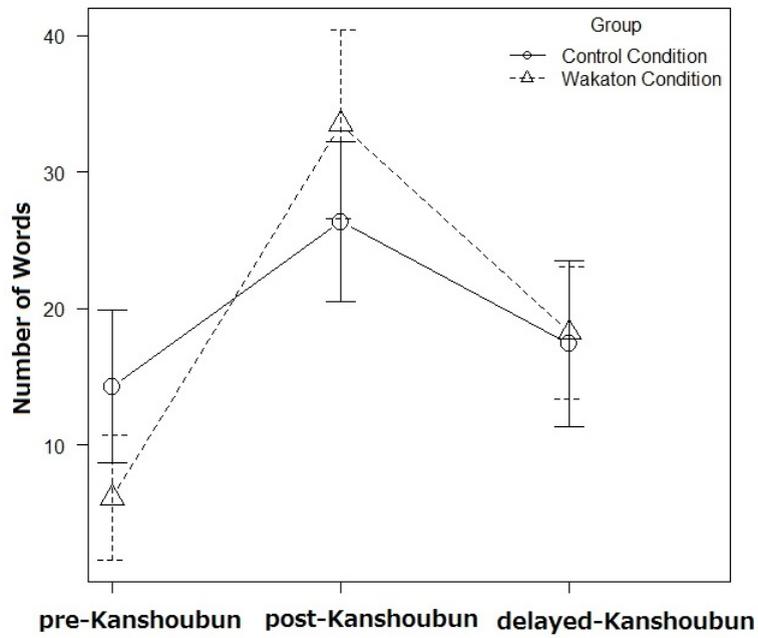


Fig. 7. Repeated measures analysis of variance Yougen.

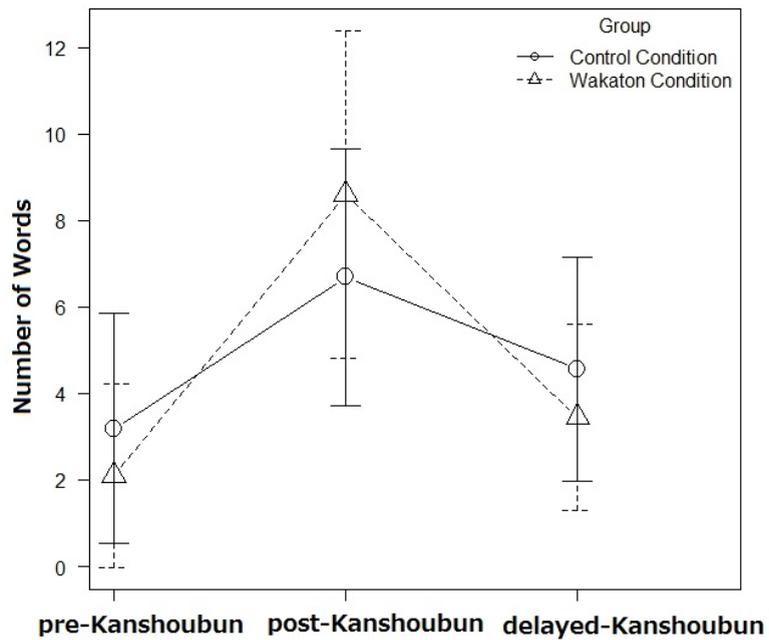


Fig. 8. Repeated measures analysis of variance Others.

Table 5. Repeated measures analysis of variance( $p$ -value)

	Total	Taigen	Yougen	Others
Group:Time	F(2, 34) = 31.61 $p < 0.01$	F(2,34) = 32.98 $p < 0.01$	F(2,34) = 22.71 $p < 0.01$	F(2,34) = 4.90 $p < 0.01$

Table 6. Analysis of covariance

	Total	Taigen	Yougen	Others
Group:Time	F(1,33) =10.34 $p < 0.01$	F(1,33) =9.75 $p < 0.01$	F(1,33) =5.23 $p < 0.05$	F(1,33) =4.21 $p < 0.05$

## 6. Discussion

### 6.1. Correlation between Score and Vocabulary at Kanshouibun

Is there the correlation between Score and vocabulary that was used in the Kanshouibun?

The correlation coefficient indicates that there is a correlation, and the  $p$  value indicate that the correlation coefficients are significant-. Therefore, our data confirm that there is correlation between Score and the vocabulary that was used in the Kanshouibun. We think that we need many vocabulary to increase Score.

But the factors that increase Score is not only the number of words. As described previously, we do not consider about "Meaning of word", "Relation to Waka", "Relation between word and word". High school language arts teachers answered "Expressive ability" and other ability as skills or things required to write a Kanshouibun. In the future, we must also studied about factors (except number of words) that increase Score.

### 6.2. Comparison of the vocabulary at the time of the Kanshouibun between Wakaton Condition and Control Condition.

Between three of Kanshouibun, there are significant difference to the way used the words. Number of words used for Kanshouibun is very different because of time of appreciation statement (pre, post, delay) the difference in. The results of the assay, we found that the number of words of Wakaton Condition used is significantly larger than the number of words used by Control Condition in post-Kanshouibun. Regardless of the number of words in the pre-Kanshouibun in Wakaton Condition, we found that the number of words in the post-Kanshouibun increase uniformly. This trend is observed in Total, Taigen, Yougen.

We think SD questionnaires may become hints for writing the Kanshouibun. We used the adjective and the adjective verb in the SD questionnaires. So we have to confirm the number of adjectives and adjective verb students used in Kanshouibun(Table 7).

Table 7. Analysis of covariance

	Agroup			Bgroup		
	NotSDword	SDword	All word	NotSDword	SDword	All word
pre	24	6	30	54	10	64
post	145	49	194	91	21	112

"NotSDword" is not related to the SD questionnaire. "SDword" is related to the SD questionnaire. "All word" is the sum of "NotSDword" and "SDword". It has increased the number of words that have been used in the post-Kanshouibun in all scores.

By Wakaton learning method, we found that students become to use the more words. And regardless of the state of students understanding the waka before learning, we can say the effect of Wakaton learning method is high.

## 7. Conclusion

We reached two conclusions in this study.

- (1) There is a correlation between Score and the vocabulary at the time of the Kanshoukun.
- (2) Students become to use more words by Wakaton learning method compared to the conventional learning method.

Conclusion that we have obtained is about Kanshoukun. We have not been verified for other descriptive text and sentences. In the future, we need to research about what obtains the same conclusion for the other explanatory text and sentences.

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