

# Three-Year Longitudinal Survey of Changes in Consciousness about English in Junior High School Students and its Relationship with Academic Achievement

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## Abstract

This study explored correlation between changes of consciousness and academic achievement about English across the 3 years on junior high school in Japan. The purpose of this study was to develop and assess the item of consciousness about English in junior high school. For that reason, a 3-year longitudinal survey of exploratory factor analysis was conducted, which extracted three factors: “Interest score”, “Quantitative learning score” and “Quality of learning score”. Then, correlation between the three factors and academic achievement was investigated. Results indicated that Interest score and Quality of learning score have a strong correlation with academic achievement for English and the Quantitative learning score had a weak correlation with academic achievement. In mathematics education, there was a strong correlation between interest in the 1<sup>st</sup>-year and academic achievement (Okado et al., 2019), whereas in English, there was a strong correlation between interest from the 2<sup>nd</sup>-year to 3<sup>rd</sup>-year, and academic achievement. These results suggest that educational activities focusing on the consciousness about English are useful for improving English education of junior high school students.

## Keywords

English Education in Junior High School, Evidence-Based Education, Students’ Interest and Quality of Learning, Correlation between Consciousness and Academic Achievement about English, Adolescence

## 1. Introduction

Practice of evidence-based education is necessary at school sites where a large

amount of data can be accumulated in modern education. However, there are many school sites with a large amount of data that cannot be analyzed. Even in the era of large amounts of data, there is the current state of schools where traditional teaching methods are continuing to take part of educational methods and educational contents. In order to conduct the evidence-based education, it is important to provide the way of analysis and the results of a large amount of data by analysis.

Early adolescence (12 - 15 years of age) is a period of many changes (Okado et al., 2019). Many young people experience a decline in academic achievement and motivation during this period (Eccles & Midgley, 1989; Eccles et al., 1993). Simmons and Blyth (1987) reported that changes during this period sometimes lead not only to a decline in academic achievement but also to failure and withdrawal from school. In addition, studies of private junior high schools in Japan show that learning habits decline dramatically in the first year after the transition from elementary to junior high school (Okado et al., 2017). Anderman and Midgley (1997) analyzed differences in learning between elementary school and junior high school students and reported that elementary school students try to improve their abilities and seek better task performance. This could be an indication of junior high school students' declining interest in learning, which is known to have a significant influence on academic achievement. The above findings are related to the learning of junior high school students in general and do not include specialized subjects.

### 1.1. Studies on Mathematics Education

Okado et al. (2019) studied changes in consciousness about mathematics in junior high school students and its relationship with academic achievement. This study explored correlation between changes of consciousness and academic achievement about mathematics across the 3-year on junior high school in Japan. A 3-year longitudinal survey was conducted in a private junior high school for three generations. In this study, two factors were extracted: "Interest score" and "Quantitative learning score". Results indicated that Interest score had a strong correlation with academic achievement for mathematics. Moreover, correlational analysis of consciousness and academic achievement indicated a significant positive correlation between improvement of academic achievement and the Interest scores in the fall of the 1<sup>st</sup>-year and the spring and the fall of the 2<sup>nd</sup>-year. This indicates that the Interest scores from the fall of the 1<sup>st</sup>-year to the fall of the 2<sup>nd</sup>-year were particularly important for improving academic achievement in mathematics.

### 1.2. Literature Reviews

There are many studies about second-language education focusing correlations between motivation and academic achievement.

Gardner & Lambert (1959) conducted a survey to Montreal high school stu-

dents studying French as a second language completed a battery of tests including measures of linguistic aptitude, verbal intelligence, and various attitudinal and motivational characteristics. In this study, two factors: “linguistic aptitude” and “motivation” were extracted. Moreover, this study suggested that maximum prediction of success in second -language acquisition was obtained from tests of: verbal intelligence, intensity of motivation to learn the other language, students’ purposes in studying that language, and one index of linguistic aptitude.

In Japan, research on foreign language education (English education) focusing on motivation for learning includes the following. The first one focused on the change in willingness to learn, Kurahashi (1997) revealed that the communication-oriented lesson increases the motivation for learning. The second focus is on the relationship between learning motivation and academic achievement, and Horino & Ichikawa (1997) suggest the importance of motivation to recognize the importance of learning content. The third focuses on factors that affect learning motivation, and self-efficacy and self-esteem etc. have been shown to influence learning motivation (Fuju, 1991).

### **1.3. Research Purpose**

This study explored correlation between changes of consciousness and academic achievement about English across the 3 years on junior high school in Japan. The purpose of this study was to develop and assess the item of consciousness about English in junior high school. It is necessary to develop a scale for assessing changes in junior high school students’ consciousness about English and clarify correlations between academic achievement and consciousness about English, to understand this relationship better. This study was designed to clarify correlation between the transformation of consciousness on English that occur during junior high school and changes in motivations and academic achievement by conducting a longitudinal investigation. The study was designed to sample three generations of junior high school students during three years. It is expected that the results would help develop useful methods of supporting the English education of individual junior high school students.

## **2. Method**

### **2.1. Participants**

Participants were three generations of students that were enrolled in a private junior high school. A longitudinal survey was conducted in 5 waves (the fall of 1st, 2nd, and 3rd year, and the spring of 2nd and 3rd year). Each generation participated for 5 waves, from fall of their 1st-year to fall of their 3rd-year. Each wave represents a semester of school. Participants included 1st generation (N = 128), 2nd generation (N = 130), and 3rd generation (N = 122) students.

### **2.2. Survey Contents and Survey Period**

The participants responded to nine questions that assessed their consciousness

about English. The company of Benesse Corporation conducted the questionnaire and the results were quantified and provided to our school.

The questions are “Tell me the learning time to study English on weekdays?” “Tell me learning time of English on holiday?” “How do you take a note in class?” “How do you do homework of English?” “How do you prepare for regular examination of English?” “Do you like studying English?” “What kind of impression do you have about English learning until now?” “Do you review the results of mathematics examination?” “How do you look up the meaning of words?”

Answers to the question items were evaluated with a five-point scale, a six-point scale, and an eight-point scale and the answers were normalized to 100points and used for analysis. This longitudinal investigation that continued for over three years was conducted in two waves during each year in the spring and the fall.

The examination that was conducted in two waves during each year in the spring and the fall was collected. The company of Benesse Corporation conducted this examination. This examination was conducted for about 40,000 students in Japan, and in this study deviation value was collected as academic achievement.

The comprehensive academic achievement of English was assessed during the spring and the fall terms. The achievement in the 3rd year was predicted from the comprehensive academic in the English test that was held in the spring term of the first-year. The residual between predicted achievement in the fall of the 3rd year and the actual score was calculated. These residuals were considered as the increase in achievement.

### 2.3. Data Analysis

The structures of the consciousness concerning English were analyzed using factor analysis. Then, an analysis of variance (ANOVA), multiple comparisons, correlation analysis, and multiple regression analysis was conducted. SPSS 23.0 was used for data analysis.

## 3. Results

### 3.1. Factor Analysis

First, average values and standard deviations for the nine item of the consciousness about English were determined. In order to identify the ceiling and floor effects for each item, the average values  $\pm$  standard deviation of the range from the minimum to the maximum value was determined. The average values and standard deviation of each item are shown in **Table 1**.

As can be seen from **Table 1**, all items excluding items 3 and 7 satisfied the criterion minimum value  $\leq$  the average rating value  $\pm$  standard deviation  $\leq$  the maximum value. A ceiling effect was observed in items 3 and item 5, but as they were considered important to exploratory factor analysis in this study, they were not excluded from the analysis.

**Table 1.** The average value and standard deviation of each item.

	Items of Questionnaires	AV $\pm$ SD	Min	Max
1	Learning time after English class	29.44 $\pm$ 13.0	12.5	100.0
2	Holidays learning time (English)	36.08 $\pm$ 16.4	12.5	87.5
3	Taking notes (English)	86.21 $\pm$ 19.9	20.0	100.0
4	Homework (English)	75.74 $\pm$ 21.4	20.0	100.0
5	Learning for regular examination of English	90.95 $\pm$ 14.1	20.0	100.0
6	About learning English (likes and dislikes)	66.05 $\pm$ 25.9	20.0	100.0
7	Impression of English	75.78 $\pm$ 20.4	16.7	100.0
8	Review after regular examination of English	66.05 $\pm$ 16.8	20.0	100.0
9	Look up the meanings of words	67.00 $\pm$ 23.7	20.0	100.0

An analysis using the re-likelihood method with Promax rotation was performed on the 9 items, and those items with an insufficient factor-loading (0.40) were excluded from the analysis.

The final factor patterns and factor correlations are displayed in **Table 2**.

Three factors were extracted as a result of the factor analysis. The first factor was named the “Interest score” because it consisted of items showing an interest in English and item expressing liking or disliking English had a high loading on this factor. The second factor was named the “Quantitative learning score” because items indicating English learning time had a high loading on this factor. The third factor was named “Quality of learning score” because it consisted of items showing a quality of learning in English.

In addition, the  $\alpha$  coefficients of items constituting each factor was calculated to examine the internal consistency of the factors, which indicated the following coefficients: Interest score factor ( $\alpha = 0.72$ ), Quantitative learning score factor ( $\alpha = 0.78$ ), and Quality of learning score factor ( $\alpha = 0.54$ ). Moreover a correlation analysis between the factor scores indicated a significant correlation between the Interest score and the Quantitative learning score ( $r = 0.20$ ,  $p < 0.01$ ), the Interest score and the Quality of learning score ( $r = 0.61$ ,  $p < 0.01$ ), and the Quantitative learning score and the Quality of learning score ( $r = 0.51$ ,  $p < 0.01$ ).

### 3.2. Differences Based on Timing

The average value and the standard deviation at each time point in the Interest score, the Quantitative learning score, and the Quality of learning score are shown in **Table 3**.

A one-factor analysis of variance conducted for each score with time as the between factor variance indicated no significant main effect on the Interest score, whereas a significant main effect was observed on the Quantitative learning score and the Quality of learning score.

The results of multiple comparisons indicated that the Quantitative learning score in the spring of 2<sup>nd</sup> and 3<sup>rd</sup> year and the fall of 2<sup>nd</sup> year was significantly

**Table 2.** The final factor patterns and factor correlations.

	F1	F2	F3
F1			
Impression of English	1.057	-0.013	-0.118
About learning English (likes and dislikes)	0.530	0.011	0.132
F2			
Learning time after English class	-0.009	0.827	-0.031
Holidays learning time (English)	-0.001	0.817	0.017
F3			
Taking notes (English)	-0.074	-0.113	0.568
Review after regular examination of English	0.031	0.047	0.533
Look up the meanings of words	0.069	0.038	0.499
Factor correlation			
F1		0.20	0.61
F2			0.51

**Table 3.** The average value and the standard deviations at each time point in the Interest score, Quantitative learning score, and quality of learning score.

	1st year		2nd year		3rd year		
	fall	spring	fall	spring	fall	spring	
	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	M ± SD	
interest score	0.05 ± 0.94	0.01 ± 1.00	-0.09 ± 1.02	-0.02 ± 1.00	0.05 ± 1.02		
quantitative learning score	0.18 ± 0.92	-0.17 ± 0.80	-0.05 ± 0.89	-0.13 ± 0.86	0.18 ± 0.98		spring of 2nd and 3rd, fall of 2nd < fall of 1st and 3rd
quality of learning score	0.15 ± 0.77	-0.02 ± 0.80	-0.07 ± 0.84	-0.04 ± 0.84	-0.04 ± 0.86		spring of 2nd and 3rd, fall of 2nd < fall of 1st

\* $p < 0.05$ ; \*\* $p < 0.01$ .

lower than fall of 1<sup>st</sup> and 3<sup>rd</sup> year. Moreover, the Quality of learning score in the spring of 2<sup>nd</sup> and 3<sup>rd</sup> year and the fall of 2<sup>nd</sup> year was significantly lower than the fall of 1<sup>st</sup> year.

### 3.3. Relationships between the Interest Score, the Quantitative Learning Score, the Quality of Learning Score, and Academic Achievement

**Table 4** shows the correlation coefficients between the Interest score in each period with comprehensive academic achievement in English at each time point, for each problem group.

It can be seen from **Table 4**, that there is a significant positive correlation between all comprehensive academic achievement scores and the Interest score. A significant positive correlation was also observed the Interest score from the fall of the 1<sup>st</sup>-year and the fall of the 3<sup>rd</sup>-year as well as improvement in academic achievement. And the Interest score from the fall of 2<sup>nd</sup>-year to fall of 3<sup>rd</sup>-year

**Table 4.** The correlation coefficients the Interest score in each period with comprehensive academic achievement, for each problem group.

	1st year		2nd year		3rd year		improvement
	fall	spring	fall	spring	fall	improvement	
the Interest score	comprehensive academic achievement						
fall of first year	0.531 **	0.491 **	0.519 **	0.464 **	0.469 **	0.111 *	
spring of 2nd year	0.534 **	0.497 **	0.523 **	0.477 **	0.491 **	0.129 *	
fall of 2nd year	0.465 **	0.477 **	0.528 **	0.495 **	0.534 **	0.234 **	
spring of 3rd year	0.500 **	0.505 **	0.570 **	0.536 **	0.565 **	0.257 **	
fall of 3rd year	0.463 **	0.482 **	0.529 **	0.534 **	0.573 **	0.295 **	
the Interest score	listening test						
fall of first year	0.312 **	0.305 **	0.288 **	0.285 **	0.326 **		
spring of 2nd year	0.316 **	0.297 **	0.262 **	0.294 **	0.352 **		
fall of 2nd year	0.278 **	0.277 **	0.298 **	0.255 **	0.383 **		
spring of 3rd year	0.266 **	0.284 **	0.277 **	0.312 **	0.382 **		
fall of 3rd year	0.226 **	0.228 **	0.296 **	0.266 **	0.391 **		
the Interest score	grammar comprehension						
fall of first year	0.376 **	0.354 **	0.420 **	0.429 **	0.389 **		
spring of 2nd year	0.379 **	0.303 **	0.441 **	0.454 **	0.376 **		
fall of 2nd year	0.349 **	0.292 **	0.457 **	0.495 **	0.439 **		
spring of 3rd year	0.334 **	0.331 **	0.499 **	0.520 **	0.428 **		
fall of 3rd year	0.355 **	0.280 **	0.417 **	0.497 **	0.467 **		
the Interest score	conversational reading comprehension						
fall of first year	0.309 **	0.337 **	0.372 **	0.397 **	0.342 **		
spring of 2nd year	0.359 **	0.372 **	0.338 **	0.362 **	0.328 **		
fall of 2nd year	0.299 **	0.379 **	0.317 **	0.402 **	0.357 **		
spring of 3rd year	0.322 **	0.374 **	0.366 **	0.439 **	0.370 **		
fall of 3rd year	0.271 **	0.315 **	0.347 **	0.415 **	0.395 **		
the Interest score	long reading comprehension						
fall of first year	0.262 **	0.301 **	0.367 **	0.197 **	0.289 **		
spring of 2nd year	0.309 **	0.251 **	0.347 **	0.186 **	0.335 **		
fall of 2nd year	0.253 **	0.223 **	0.334 **	0.227 **	0.367 **		
spring of 3rd year	0.260 **	0.261 **	0.344 **	0.219 **	0.395 **		
fall of 3rd year	0.299 **	0.269 **	0.332 **	0.243 **	0.378 **		

\* $p < 0.05$ ; \*\* $p < 0.01$ .

were higher correlation than the score from fall of 1<sup>st</sup>-year to the spring of the 2<sup>nd</sup>-year.

Moreover, the scores for each problem group indicated a significant correlation between the Interest score at all periods and listening test score, as well as

grammar comprehension test score, conversational reading comprehension test score, and long reading comprehension test score.

**Table 5** shows the correlation coefficients between the Quantitative learning score in each period with the comprehensive academic achievement in English at each time point, for each problem group.

**Table 5.** The correlation coefficients between the quantitative learning score in each period with comprehensive academic achievement, for each problem group.

	1st year		2nd year		3rd year	
	fall	spring	fall	spring	fall	improvement
the Quantitative score	comprehensive academic achievement					
fall of first year	0.001	-0.051	-0.032	-0.044	-0.012	-0.068
spring of 2nd year	-0.014	-0.037	-0.029	-0.021	-0.010	-0.017
fall of 2nd year	0.001	-0.034	-0.002	-0.014	0.023	-0.022
spring of 3rd year	0.045	0.021	0.041	0.046	0.024	0.020
fall of 3rd year	-0.050	-0.062	-0.030	-0.038	0.029	-0.002
the Quantitative score	listening test					
fall of first year	0.013	-0.050	-0.052	-0.072	-0.028	
spring of 2nd year	-0.036	-0.073	-0.039	-0.005	-0.005	
fall of 2nd year	-0.041	-0.081	-0.082	-0.091	0.071	
spring of 3rd year	-0.023	-0.011	-0.053	-0.003	0.040	
fall of 3rd year	-0.065	-0.156**	-0.107*	-0.091	0.007	
the Quantitative score	grammar comprehension					
fall of first year	-0.055	0.005	0.021	-0.003	-0.020	
spring of 2nd year	-0.014	-0.001	0.017	-0.009	-0.025	
fall of 2nd year	-0.011	-0.006	-0.029	-0.008	-0.025	
spring of 3rd year	0.013	0.084	0.010	0.050	-0.021	
fall of 3rd year	0.006	-0.061	-0.031	-0.032	0.006	
the Quantitative score	conversational reading comprehension					
fall of first year	0.019	-0.059	-0.091	-0.030	-0.015	
spring of 2nd year	-0.029	-0.009	-0.066	-0.053	-0.034	
fall of 2nd year	-0.020	-0.055	-0.053	-0.003	-0.046	
spring of 3rd year	0.007	-0.010	0.001	0.057	-0.038	
fall of 3rd year	-0.048	-0.082	-0.098	-0.054	-0.038	
the Quantitative score	long reading comprehension					
fall of first year	-0.053	-0.039	-0.014	-0.040	-0.012	
spring of 2nd year	-0.036	0.000	-0.055	-0.027	-0.022	
fall of 2nd year	-0.026	0.006	0.004	-0.021	-0.007	
spring of 3rd year	-0.038	0.018	0.044	0.027	-0.026	
fall of 3rd year	-0.090	-0.047	-0.022	-0.027	0.015	

\* $p < 0.05$ ; \*\* $p < 0.01$ .

It can be seen from **Table 5** that there is a significant positive correlation between the Quantitative learning scores in the fall of 3<sup>rd</sup>-year and listening test score in the spring and the fall of the 2<sup>nd</sup>-year.

**Table 6** shows the correlation coefficients between the quality of learning score in each period with comprehensive academic achievement in English at each time point, for each problem group.

**Table 6.** The correlation coefficients between the quality of learning score in each period with comprehensive academic achievement for each problem group.

	1st year		2nd year		3rd year	
	fall	spring	fall	spring	fall	improvement
the Quality of learning score	comprehensive academic achievement					
fall of first year	0.195 **	0.182 **	0.190 **	0.157 **	0.181 **	0.020
spring of 2nd year	0.231 **	0.219 **	0.239 **	0.194 **	0.234 **	0.036
fall of 2nd year	0.252 **	0.246 **	0.320 **	0.276 **	0.322 **	0.138 **
spring of 3rd year	0.256 **	0.284 **	0.334 **	0.306 **	0.313 **	0.180 **
fall of 3rd year	0.244 **	0.256 **	0.306 **	0.296 **	0.349 **	0.178 **
the Quality of learning score	listening test					
fall of first year	0.052	0.042	0.037	-0.011	0.155 **	
spring of 2nd year	0.070	0.070	0.068	0.054	0.216 **	
fall of 2nd year	0.059	0.122 *	0.139 **	0.080	0.276 **	
spring of 3rd year	0.062	0.133 **	0.126 *	0.121 *	0.243 **	
fall of 3rd year	0.103 *	0.109 *	0.105 *	0.128 *	0.288 **	
the Quality of learning score	grammar comprehension					
fall of first year	0.150 **	0.058	0.127 *	0.114 *	0.123 *	
spring of 2nd year	0.228 **	0.114 *	0.177 **	0.183 **	0.141 **	
fall of 2nd year	0.218 **	0.105 *	0.223 **	0.253 **	0.235 **	
spring of 3rd year	0.206 **	0.131 *	0.224 **	0.270 **	0.198 **	
fall of 3rd year	0.212 **	0.156 **	0.224 **	0.270 **	0.262 **	
the Quality of learning score	conversational reading comprehension					
fall of first year	0.117 *	0.030	0.069	0.120 *	0.086	
spring of 2nd year	0.115 *	0.174 **	0.134 **	0.151 **	0.136 **	
fall of 2nd year	0.152 **	0.137 **	0.170 **	0.165 **	0.170 **	
spring of 3rd year	0.132 **	0.159 **	0.188 **	0.241 **	0.178 **	
fall of 3rd year	0.097	0.115 *	0.156 **	0.217 **	0.201 **	
the Quality of learning score	long reading comprehension					
fall of first year	0.152 **	0.122 *	0.141 **	0.080	0.142 **	
spring of 2nd year	0.196 **	0.081	0.173 **	0.057	0.174 **	
fall of 2nd year	0.220 **	0.101 *	0.209 **	0.142 **	0.237 **	
spring of 3rd year	0.214 **	0.131 *	0.227 **	0.149 **	0.228 **	
fall of 3rd year	0.184 **	0.120 *	0.205 **	0.137 **	0.228 **	

\* $p < 0.05$ ; \*\* $p < 0.01$ .

It can be seen from **Table 6**, that there is a significant positive correlation between all comprehensive academic achievement scores and the Interest score.

A significant positive correlation was also observed the Interest score from the fall of the 2<sup>nd</sup>-year and the fall of the 3<sup>rd</sup>-year as well as improvement in academic achievement.

The listening test problem by the point of view and the Quality of learning scores in the fall of the 1<sup>st</sup>-year and the spring of the 2<sup>nd</sup>-year were significantly and positively correlated with the results in the fall of the 3<sup>rd</sup>-year. And the Quality of learning scores in the fall of 2<sup>nd</sup>-year was significantly and positively correlated with the results in the spring and the fall of the 2<sup>nd</sup>-year and the fall of the 3<sup>rd</sup>-year. And the Quality of learning scores in the spring of 3<sup>rd</sup>-year was significantly and positively correlated with the results in the spring and the fall of the 2<sup>nd</sup>-year and the spring and the fall of the 3<sup>rd</sup>-year. And the Quality of learning scores in the fall of 3<sup>rd</sup>-year was significantly and positively correlated with the results at each time period.

The grammar comprehension problem by the point of view and the Quality of learning scores in the fall of the 1<sup>st</sup>-year was significantly and positively correlated with the results in the fall of the 1<sup>st</sup>-year and the 2<sup>nd</sup>-year and the spring and the fall of the 3<sup>rd</sup>-year. And the Quality of learning scores from the spring of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year were significantly and positively correlated with the results at each time period.

The conversational reading comprehension problem by the point of view and the Quality of learning scores in the fall of the 1<sup>st</sup>-year was significantly and positively correlated with the results in the fall of the 1<sup>st</sup>-year and the spring of the 3<sup>rd</sup>-year. And the Quality of learning scores from the spring of the 2<sup>nd</sup>-year to the spring of the 3<sup>rd</sup>-year were significantly and positively correlated with the results at each time period. And the Quality of learning scores in the fall of the 3<sup>rd</sup>-year was significantly and positively correlated with the result in the spring and the fall of the 2<sup>nd</sup>-year and the 3<sup>rd</sup>-year.

The long reading comprehension problem by the point of view and the Quality of learning scores in the fall of the 1<sup>st</sup>-year was significantly and positively correlated with the results in the fall of the 1<sup>st</sup>-year, 2<sup>nd</sup>-year, and 3<sup>rd</sup>-year and the spring of the 2<sup>nd</sup>-year. And the Quality of learning scores in the spring of the 2<sup>nd</sup>-year was significantly and positively correlated with the results in the fall of the 1<sup>st</sup>-year, 2<sup>nd</sup>-year, and 3<sup>rd</sup> year. And the Quality of learning scores from the fall of the 2<sup>nd</sup>-year to the 3<sup>rd</sup>-year were significantly and positively correlated with the results at each time period.

### **3.4. Relationships between Changes in the Interest Scores, the Quantitative Learning Scores, the Quality of Learning Scores, and Academic Achievement**

The correlation coefficients between changes in the Interest at each time period and comprehensive academic achievement at each time period, improvements in achievement, and the results of listening test score, grammar comprehension test

score, conversational reading comprehension test score, and long reading comprehension test score by the point of view are shown in **Table 7**.

It can be seen from **Table 7** that no significant correlations were observed between any time period and comprehensive academic achievement. However, changes in the Interest score from the spring of 2<sup>nd</sup>-year to the fall of 2<sup>nd</sup>-year were significantly and positively correlated with improvements in academic achievement. Also, changes in the Interest score from the spring of the 3<sup>rd</sup>-year to the fall of the 3<sup>rd</sup>-year were significantly and negatively correlated with the results of grammar comprehension test score by the point of view in the fall of the 2<sup>nd</sup>-year.

**Table 7.** The correlation coefficients between changes in the Interest score at each time period and comprehensive academic achievement each time period, for each problem group.

	1st year		2nd year		3rd year		improvement
	fall	spring	fall	spring	fall	improvement	
Change in Interest	comprehensive academic achievement						
fall of 1st year to spring of 2nd year	0.037	0.040	0.038	0.048	0.059	0.032	
spring of 2nd year to fall of 2nd year	-0.076	-0.013	0.020	0.036	0.069	0.141**	
fall of 2nd year to spring of 3rd year	0.038	0.027	0.045	0.044	0.030	0.025	
spring of 3rd year to fall of 3rd year	-0.067	-0.047	-0.073	-0.016	-0.001	0.051	
Change in Interest	listening test						
fall of 1st year to spring of 2nd year	0.026	0.008	-0.017	0.030	0.057		
spring of 2nd year to fall of 2nd year	-0.041	-0.018	0.054	-0.043	0.049		
fall of 2nd year to spring of 3rd year	-0.022	0.003	-0.035	0.071	-0.009		
spring of 3rd year to fall of 3rd year	-0.066	-0.089	0.023	-0.076	0.005		
Change in Interest	grammar comprehension						
fall of 1st year to spring of 2nd year	0.028	-0.047	0.055	0.062	0.007		
spring of 2nd year to fall of 2nd year	-0.030	-0.006	0.032	0.066	0.092		
fall of 2nd year to spring of 3rd year	-0.027	0.045	0.047	0.023	-0.025		
spring of 3rd year to fall of 3rd year	0.023	-0.083	-0.133**	-0.047	0.048		
Change in Interest	conversational reading comprehension						
fall of 1st year to spring of 2nd year	0.088	0.068	-0.022	-0.022	0.003		
spring of 2nd year to fall of 2nd year	-0.069	0.019	-0.019	0.062	0.047		
fall of 2nd year to spring of 3rd year	0.024	-0.015	0.059	0.042	0.010		
spring of 3rd year to fall of 3rd year	-0.084	-0.097	-0.036	-0.046	0.028		
Change in Interest	long reading comprehension						
fall of 1st year to spring of 2nd year	0.081	-0.049	-0.004	-0.002	0.080		
spring of 2nd year to fall of 2nd year	-0.066	-0.030	-0.008	0.058	0.051		
fall of 2nd year to spring of 3rd year	0.005	0.047	0.006	-0.015	0.030		
spring of 3rd year to fall of 3rd year	0.051	0.006	-0.025	0.029	-0.035		

\* $p < 0.05$ ; \*\* $p < 0.01$ .

**Table 8** shows the correlations between changes in the Quantitative learning score at each time period and comprehensive academic achievement at each time, for each problem group.

It can be seen from **Table 8** that no significant correlations were observed between any time period and comprehensive academic achievement. Moreover, no significant correlations were observed between any time period and improvement in academic achievement. However, changes in the Quantitative learning score from the spring of 3<sup>rd</sup>-year to the fall of the 3<sup>rd</sup>-year were significantly and negatively correlated with the results of listening test score by the point of view in the spring of the 2<sup>nd</sup>-year. Also, changes in the Quantitative learning score from the fall of the 2<sup>nd</sup>-year to the spring of the 3<sup>rd</sup>-year were significantly and

**Table 8.** The correlation coefficients between changes in the quantitative learning score at each time period and comprehensive academic achievement each time period, for each problem group.

	1nd	2nd year		3rd year		
	fall	spring	fall	spring	fall	improvement
Change in Quantitative learning	comprehensive academic achievement					
fall of 1st year to spring of 2nd year	-0.014	0.023	0.009	0.029	0.004	0.060
spring of 2nd year to fall of 2nd year	0.015	-0.003	0.026	0.006	0.036	-0.008
fall of 2nd year to spring of 3rd year	0.052	0.064	0.050	0.069	0.001	0.047
spring of 3rd year to fall of 3rd year	-0.092	-0.082	-0.067	-0.080	0.008	-0.019
Change in Quantitative learning	listening test					
fall of 1st year to spring of 2nd year	-0.047	-0.011	0.022	0.075	0.026	
spring of 2nd year to fall of 2nd year	-0.011	-0.020	-0.054	-0.098	0.085	
fall of 2nd year to spring of 3rd year	0.020	0.080	0.032	0.100	-0.034	
spring of 3rd year to fall of 3rd year	-0.046	-0.149**	-0.062	-0.090	-0.028	
Change in Quantitative learning	grammar comprehension					
fall of 1st year to spring of 2nd year	0.048	-0.006	-0.008	-0.004	-0.001	
spring of 2nd year to fall of 2nd year	0.001	-0.006	-0.050	-0.001	-0.003	
fall of 2nd year to spring of 3rd year	0.028	0.105*	0.045	0.067	0.003	
spring of 3rd year to fall of 3rd year	-0.006	-0.137**	-0.041	-0.078	0.025	
Change in Quantitative learning	conversational reading comprehension					
fall of 1st year to spring of 2nd year	-0.048	0.057	0.041	-0.015	-0.014	
spring of 2nd year to fall of 2nd year	0.007	-0.053	0.005	0.049	-0.018	
fall of 2nd year to spring of 3rd year	0.030	0.051	0.061	0.070	0.009	
spring of 3rd year to fall of 3rd year	-0.055	-0.075	-0.100	-0.106*	-0.005	
Change in Quantitative learning	long reading comprehension					
fall of 1st year to spring of 2nd year	0.026	0.043	-0.035	0.020	-0.006	
spring of 2nd year to fall of 2nd year	0.006	0.006	0.058	0.002	0.013	
fall of 2nd year to spring of 3rd year	-0.015	0.014	0.047	0.056	-0.022	
spring of 3rd year to fall of 3rd year	-0.058	-0.064	-0.062	-0.052	0.039	

\* $p < 0.05$ ; \*\* $p < 0.01$ .

positively correlated with the results of grammar comprehension score by the point of view in the spring of the 2<sup>nd</sup>-year. And changes in the Quantitative learning score from the spring of the 3<sup>rd</sup>-year to the fall of the 3<sup>rd</sup>-year were significantly and negatively correlated with the results of grammar comprehension score by the point of view in the spring of the 2<sup>nd</sup>-year. And changes in the Quantitative learning score from the spring of the 3<sup>rd</sup>-year to the fall of the 3<sup>rd</sup>-year were significantly and negatively correlated with the results of conversational reading comprehension score by the point of view in the spring of 3<sup>rd</sup>-year.

**Table 9** shows the correlations between changes in the Quality of learning score at each time period and comprehensive academic achievement at each time, for each problem group.

**Table 9.** The correlation coefficients between changes in the quality of learning score at each time period and comprehensive academic achievement each time period, for each problem group.

	1st year		2nd year		3rd year		improvement
	fall	spring	fall	spring	fall	improvement	
Change in Quality of learning	comprehensive academic achievement						
fall of 1st year to spring of 2nd year	0.051	0.051	0.067	0.050	0.069	0.019	
spring of 2nd year to fall of 2nd year	0.037	0.045	0.114*	0.113*	0.123*	0.130*	
fall of 2nd year to spring of 3rd year	0.014	0.062	0.031	0.051	-0.003	0.064	
spring of 3rd year to fall of 3rd year	-0.021	-0.047	-0.047	-0.019	0.048	-0.007	
Change in Quality of learning	listening test						
fall of 1st year to spring of 2nd year	0.023	0.034	0.037	0.075	0.078		
spring of 2nd year to fall of 2nd year	-0.011	0.069	0.093	0.035	0.087		
fall of 2nd year to spring of 3rd year	0.007	0.020	-0.014	0.060	-0.038		
spring of 3rd year to fall of 3rd year	0.058	-0.037	-0.032	0.008	0.061		
Change in Quality of learning	grammar comprehension						
fall of 1st year to spring of 2nd year	0.097	0.068	0.064	0.084	0.026		
spring of 2nd year to fall of 2nd year	-0.002	-0.005	0.067	0.098	0.127*		
fall of 2nd year to spring of 3rd year	-0.009	0.040	0.009	0.031	-0.045		
spring of 3rd year to fall of 3rd year	0.005	0.034	-0.003	-0.004	0.090		
Change in Quality of learning	conversational reading comprehension						
fall of 1st year to spring of 2nd year	0.004	0.167**	0.079	0.042	0.061		
spring of 2nd year to fall of 2nd year	0.053	-0.038	0.052	0.025	0.050		
fall of 2nd year to spring of 3rd year	-0.023	0.035	0.030	0.112*	0.017		
spring of 3rd year to fall of 3rd year	-0.053	-0.068	-0.050	-0.039	0.030		
Change in Quality of learning	long reading comprehension						
fall of 1st year to spring of 2nd year	0.059	-0.042	0.043	-0.022	0.044		
spring of 2nd year to fall of 2nd year	0.040	0.030	0.053	0.109*	0.088		
fall of 2nd year to spring of 3rd year	0.000	0.045	0.033	0.014	-0.005		
spring of 3rd year to fall of 3rd year	-0.048	-0.018	-0.036	-0.020	-0.003		

\* $p < 0.05$ ; \*\* $p < 0.01$ .

It can be seen from **Table 9** that changes in the Quality of learning scores from the spring of the 2<sup>nd</sup>-year to the fall of the 2<sup>nd</sup>-year were significantly and positively correlated with academic achievement from the fall of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year and improvement in academic achievement. Also, changes in the Quality of learning scores from the spring of the 2<sup>nd</sup>-year to the fall of the 2<sup>nd</sup>-year were significantly and positively correlated with the results of grammar comprehension score by the point of view in the fall of the 3<sup>rd</sup>-year. Moreover, changes in the Quality of learning scores from fall of the 1<sup>st</sup>-year to the spring of the 2<sup>nd</sup>-year were significantly and positively correlated with the results of conversational reading comprehension score by the point of view in the spring of the 2<sup>nd</sup>-year. And changes in the Quality of learning scores from the fall of the 2<sup>nd</sup>-year to the spring of the 3<sup>rd</sup>-year were significantly and positively correlated with the results of conversational reading comprehension scores by the point of view in the spring of the 3<sup>rd</sup>-year. And changes in the Quality of leaning scores from the spring of the 2<sup>nd</sup>-year to the fall of the 2<sup>nd</sup>-year were significantly and positively correlated with the results of long comprehension score by the point of view in the spring of the 2<sup>nd</sup>-year.

## 4. Discussion

### 4.1. Items on Consciousness about English

Items were developed to facilitate the quantitative evaluation of the consciousness about English in the education of junior high school students. As a result, three factors were extracted as subscales: the Interest score factor, the Quantitative learning score factor and the Quality of learning score factor. Then, an analysis of English education in junior high schools was conducted on academic achievement, interest in English, English learning time, and quality of learning about English.

### 4.2. About the Interest Score

The results have no significant difference in the Interest scores after the fall of the 1<sup>st</sup>-year, suggesting that interest in English is determined before entering six months after entering junior high school.

The analysis using the Consciousness Scale for English indicated that the Interest score was strongly correlated with academic achievement. Also a significant positive correlation was observed in the Interest score from the fall of the 1<sup>st</sup>-year and the fall of the 3<sup>rd</sup>-year as well as improvement in academic achievement. And the Interest score from the fall of 2<sup>nd</sup>-year to fall of 3<sup>rd</sup>-year has higher correlation than the score from fall of 1<sup>st</sup>-year to the spring of the 2<sup>nd</sup>-year.

Based on the above results, in Japan, students start learning English in junior high school as a formal subject. There was no significant difference in the Interest scores after fall of the 1<sup>st</sup>-year, regarding consciousness about English. It is important for improvement in academic achievement to maintain and improve the Interest in English from the fall of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year.

### 4.3. About the Quantitative Learning Score

The quantitative learning score in the fall of the 1<sup>st</sup>-year and 3<sup>rd</sup>-year was significantly higher than other period. The analysis using the Consciousness Scale for English indicated that the quantitative learning score was weakly correlated with academic achievement. Moreover, in several periods, there is significant and negative correlation. Furthermore, no significant correlations were observed between the changes of quantitative learning score in any time period and comprehensive academic achievement, and improvement in academic achievement.

Based on the above results, in order to improve academic achievement of English, it was suggested the importance of continuing learning.

Also, it indicated that temporary learning was not effective for academic achievement of English. In order to maintain continuing learning of students, schools and teachers have to understand the status in quantitative learning of students and support their students to maintain their continuing learning. So for that reason, the scale of consciousness about English that was developed in this report could contribute to improve the English education.

### 4.4. About the Quality of Learning Score

The quality of learning score in the fall of the 1<sup>st</sup>-year was significantly higher than other period, and all period had a strong correlation with academic achievement. Moreover, a significant positive correlation was observed the Interest score from the fall of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year as well as improvement in academic achievement. Also, changes in the Quality of learning scores from the spring of the 2<sup>nd</sup>-year to the fall of the 2<sup>nd</sup>-year were significantly and positively correlated with academic achievement from the fall of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year and improvement in academic achievement.

Based on these findings, it was suggested that educational interventions were particularly important for maintaining and improving the quality of learning in English during the spring of the 2<sup>nd</sup>-year to the fall of the 3<sup>rd</sup>-year of English education in junior high schools.

### 4.5. Conclusion

This study developed items assessing the Interest, the Quantitative learning, and the Quality of learning, which are related to English consciousness. Two question items assessed the Interest factor, two question items assessed the Quantitative learning factor, and three question items assessed the Quality of learning factor. These factors are considered highly reliable because a longitudinal survey was conducted for three years with three generations of students. Therefore, the items of the Consciousness about English Scale could accurately identify the consciousness of junior high school students about English. Moreover, these items were expected to be effective for developing interventions to improve students' education.

In mathematics education, while there was a strong correlation between in-

terest in the 1<sup>st</sup>-year and academic achievement (Okado et al., 2019), in English, there was a strong correlation between interest from the 2<sup>nd</sup>-year to 3<sup>rd</sup>-year and academic achievement. These results indicate the possibility of development effective educational guidance method by recognizing the difference of characteristics by subject.

It is generally believed that motivation and interests are strongly related to academic achievement. Therefore, guiding students by using items on consciousness about English, obtained from this research, would facilitate identifying students' situation from the perspectives of "Interest", "Quality of learning" and "Quantitative learning". These could be effective indices for selecting strategies of educational intervention.

However, this research could identify only average values by grouping each items score. Therefore, the applicability of these findings to understanding students could be limited. It is suggested that future studies should deeply analyze the students' unique situation. Moreover, there are certain unresolved issues in this research.

Nevertheless, this study could identify question items for evaluating students' consciousness about English from the perspectives of the Interest, Quality of learning and the Quantitative learning. These items can be used for developing educational interventions for English classes in junior high schools.

The results suggested that educational interventions for preventing the decline of Interest and Quality of learning to 3<sup>rd</sup>-year are required for high academic achievement in the fall of the 3<sup>rd</sup>-year. The study also indicated that it is important to intervene in education to enhance the Interest in English between the spring of 1<sup>st</sup>-year to the fall of the 1<sup>st</sup>-year.

It is expected that these new and important findings on correlations between the consciousness of junior high school students and academic achievement in English would contribute to English and 2nd language education in Japan and other countries in the future.

From this, it is considered that the findings indicated by this study and Okado et al. (2019) are extremely useful for educational sites of junior high schools.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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