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# Theory and Research for Developing Learning Systems

Volume1 / March 2015



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**Theory and Research for Developing Learning Systems  
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## **Incorrect Answer in Pretest and Memory Fixation**

Saeko Tanaka and Makoto Miyatani

In schools, tests are given mainly to evaluate learning achievements. Receiving a test is also known to promote learning and long-term retention of memory. Recently, even incorrect test answers have been revealed to improve scores in later evaluation tests (pre-test effect). To develop an effective teaching method by using the pre-test effect, it is necessary to understand how the effect differs between individual students depending on their characteristics. However, it has not been investigated whether the pre-test effect in promoting long-term retention of memory differs by the characteristics of students or not. In this study, the authors examined whether the pre-test effect appeared or not in a paired-associate learning task of new words, which has been widely used in studies on learning, by using Japanese stimulus words (Experiment 1). Then, the working memory capacity of each student was measured as an index for personal characteristics, and the effects of the personal difference on pre-test effect was investigated (Experiment 2). The experiments showed that the group that experienced pretest scored better in a subsequent evaluation test than the group that did not receive a pretest, confirming the pre-test effect as in preceding studies. However, no relationship was found between the pre-test effect and working memory capacity. Therefore, the pre-test effect is possibly a phenomenon independent of working memory capacity.

Key Words: memory, pre-test effect, paired-associate learning, incorrect answer, working memory

### **Topic and objectives**

In schools, tests are given to evaluate the acquisition of knowledge and/or skills. In studies on memory, recall and recognition tests have been used as indices to evaluate performances. Besides being a tool for assessing performances, testing is also known to be as effective as repetitive learning for students to memorize information. This phenomenon is called the “testing effect”, and has been widely investigated (Endo, 2007; Richland & Karpicke, 2006; Tajika, 2008) .

### **Effects of succeeding and failing a test on memory fixation**

The first question is whether answering a correct or incorrect answer in a test is more effective. In terms of behaviorist learning theories, incorrect test answers were believed to compete with correct answers (stimulus words to be answered in an evaluation test) and inhibit retention of memory. Thus, only correct pre-test answers were believed to promote memory retention. However, incorrect answers, or recalling wrong information, have recently been found to promote learning of correct information. Kornell, Hays, & Bjork (2009) and Richland, Kornell, & Kao (2009) conducted experiments consisting of paired-associate learning tasks of two words (cue word and target word to recall at an evaluation test, e.g. “tide” and “beach”) that were not mutually deeply related and reported that the “pre-test effect”, which involved recalling incorrect information, was observed. They divided the participants into Pretest and No-Pretest groups, assigned them paired-associate learning tasks, and conducted an evaluation test of recalling the target words based on cue words. For each cue word, the pretest group received a pretest

to find an associated word (e.g. wave) . The evaluation test score of the pretest group was significantly better than that of the no-pretest group. In the study by Kornell et al. (2009) , word pairs were used as stimulus words. Similar results have also been reported by a study in which the subjects read a prose and later tested for the contents (Richland et al., 2009) and a study that compared evaluation test scores between groups subjected and not subjected to pretest on university lecture (Butler & Roediger, 2007) .

No consistent knowledge has been acquired on the generation mechanism of the pre-test effect; but two theories have been proposed: 1 ) an associated word acts as a mediator between the cue word and target word, and 2 ) an associated word stimulates elaboration. According to the mediator theory, pretesting assists recalling an associated word from the cue word, from which the person recalls the target word, and thus enhances memory (Pyc & Rawson, 2010) . On the other hand, the elaboration theory hypothesizes that retrieval from the cue word activates a search set of candidates of the meaning covering an associated word and the target word and the activation promotes recalling of the target word (Grimaldi & Karpicke, 2012; Hays, Kornell & Bjork, 2013) .

### **Personal difference factors affecting the pre-test effect**

Another question is whether there is pre-test effect for all persons or not regardless of their personal characteristics. There has been no study that directly investigated the effects of individual difference on memory promotion of correct information by retrieval of incorrect information, i.e. the pre-test effect. Related

studies include the following ones.

**Monitoring ability.** If memory is promoted only by retrieval of correct information from a set (network) of candidates containing various information as mentioned by Grimaldi & Karpicke (2012) and Hays et al. (2013), the pre-test effect should vary depending on the ability of an individual to judge whether the information is correct (the one demanded) or not. Source monitoring ability is one of the abilities involved in making such judgment and is believed to be supported by working memory. Working memory is a cognitive system indispensable for complicated cognitive activity and is in charge of simultaneous processing and remembering of information. The capacity of working memory is limited and is commonly measured by a span test. Because the results of a span test is related to those of higher cognitive activities such as language processing, reasoning and problem solving, working memory is believed to be a mechanism that supports such cognitive functions (e.g. Osaka, 2006; Tsuchida, 2009).

False memory has been investigated by using various paradigms. It has been shown that persons who have larger working memory have better source monitoring ability and are less prone to false recalling and false recognition. According to Leding (2012), this is because a person having a large working memory can monitor the information source in his or her memory more correctly than a person who has a small working memory and thus is capable of judging correct learning during a retrieval process that is liable to cause false memory.

Based on this theory, the pre-test effect observed during a task that requires judging whether information included in a retrieval network is correct (one demanded) or not is

expected to be similar to the results of the studies on false memory. The effect of memory promotion by pretest is likely to be larger in persons who have larger working memory and higher source monitoring ability than in their counterpart.

**Use of strategy.** Personal differences in strategies used for performing a task are known to affect the scores of span test for measuring working memory (Endo & Osaka, 2012; Saito & Miyake, 2000). Endo & Osaka (2012) compared the strategies used by participants while they performed a reading span test between low- and high-working memory span groups. The high-working memory span group used efficient strategies more frequently than the low-working memory span group. This suggests that a person who is scored to have small working memory is just not capable of selecting an effective strategy for remembering. Actually, the score of span test has been reported to have increased by training use of effective strategy (McNamara & Scott, 2001).

Based on the results, for people having small working memory, the Pretest condition, in which they are provided with a strategy of generating incorrect information, is likely to better promote memory retention than the No-Pretest condition, in which they have to devise a strategy for remembering. On the other hand, people having large working memory use their own effective strategies and are thus expected to score high also in the No-Pretest condition. Therefore, the differences in score between the No-Pretest and Pretest conditions would be larger in the low-working memory span group.

### **Objectives of this study**

With such a background, this study was conducted aiming to investigate the effects of



personal working memory difference on pretest effect. If the memory promotion effect by pretesting is larger in the high-working memory span group than in the low-working memory span group, the mechanism of pre-test effect may involve source monitoring for discriminating correct information from incorrect one. It will also suggest that pretesting is not an effective method for enhancing memory retention for people having small working memory, who are believed to have low source monitoring ability. On the other hand, if the difference in score between the No-Pretest and Pretest conditions is larger in the low-working memory span group than in the high-working memory span group, the pretest may have presented a strategy for remembering and can be concluded to be effective for people having small working memory. If pretesting enhances memory retention in all persons regardless of their working memory capacity, pretesting can be concluded to be a memory retention strategy for which individual difference does not need to be considered. In all cases, it is important to investigate personal difference factors that affect the pretest effect in order to develop new teaching methods.

Experiment 1 was first conducted by preparing stimulus words in Japanese and performing a test similar to that of Kornell et al. (2009) as a preliminary test to decide a list of stimulus words that are appropriate to investigate the pretest effect in subsequent experiments. In Experiment 2, the working memory of the participants was measured to classify them into the low- and high-working memory span groups. The participants were then subjected to paired-associate learning tasks each consisting of two words, and the

differences in pretest effect by working memory capacity was investigated.

### **Investigating the pretest effect using Japanese stimulus words (Experiment 1)**

Experiment 1 was conducted to select Japanese stimulus words to be used for investigating the pre-test effect.

#### **Methods**

**Participants.** 24 undergraduate and graduate university students (consisting of 9 males and 15 females) participated in this experiment. Their age was 19 to 25 years old (mean: 20.13 years,  $SD=1.51$ ). The participants were randomly divided into Pretest group (11 persons including 4 males) and No-Pretest group (13 persons including 5 males). The contents of the experiment was explained orally, and their written consents were obtained.

**Stimulus words.** Kornell et al. (2009) selected cue and target words based on their association strength (the percentage of people who recall the target word upon being presented the cue word). In this Experiment, 60 word pairs of cue and target words (120 words in total) of association strength of 0.045 to 0.054 were selected by referring to a similar study by Mizuno (2011). Cue words consisted of 3 morae, and the target words consisted of 2 to 4 morae. The words were expressed in kanji, hiragana and/or katakana.

**Assignment.** The experiment consisted of the study phase, a distractor task, and evaluation test as in the study by Kornell et al. (2009). In preceding studies, the participants were to type their answers during evaluation tests. In Japanese, typing requires additional time for kanji or katakana conversion; so the

participants were asked to say their answers aloud while looking at the display. No visual feedback by the associated word was presented.

During the study phase, the Pretest group took a pretest and learned pairs of cue and target words (paired-associates learning task). The No-Pretest group was only assigned with paired-associates learning task. During the study phase for the Pretest group, a cue word and an empty box were displayed on the computer screen for 7 seconds. The participant was asked to think of a word (hereinafter referred to as the “generated word”) that can be a target word for the cue word and answer the word orally (pretest). The empty box disappeared in 7 seconds. Five-hundred milliseconds later, the picture changed, and the correct target word was presented together with the cue word for 5 seconds. The participant was asked to remember not the generated word but the correct word as a set with the cue word in 5 seconds (paired-associates learning). Five-hundred milliseconds later, the participant was to answer the pretest on the next cue word and learn a new pair of words. The study phase for the No-Pretest group consisted of only paired-associates learning task of word pairs. The order of presenting word pairs was determined randomly on a participant-by-participant basis.

The distractor task involved 5 minutes of mental arithmetic (four rules of arithmetic of integers of 2 to 3 digits). A numerical formula and an empty box were displayed on the computer screen. The participant inputted the answer in the box by typing the ten keys. In the evaluation test, both groups performed the same cue-recall test. A cue word and an empty box were displayed on the computer screen for 7 seconds. Within the period, the participant was to recall and answer the paired target word

orally. Seven seconds later, the cue for the next word was displayed. The order of word presentation was determined randomly on a participant-by-participant basis.

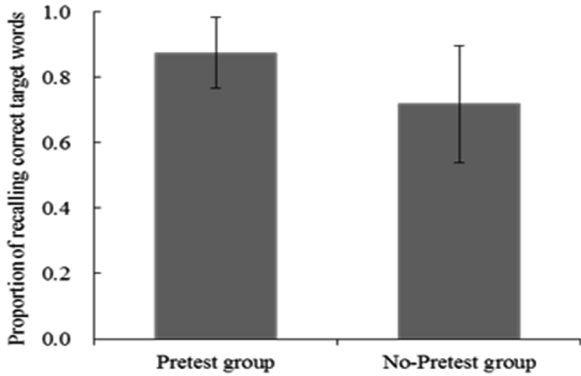
**Procedure.** All participants were first explained that they were to learn word pairs and later be tested for how much they remembered the word pairs. Before studying word pairs, the participants practiced 10 problems. The scores in the practice were not used in the analysis. Then the Pretest group proceeded to the study phase consisting of pretest and paired-associate learning task. The No-Pretest group worked only on paired-associate learning task during the study phase. After learning all 60 word pairs, the participants were assigned to perform the distractor task for 5 minutes. The participants were instructed to solve the problems as correctly and as quickly as possible during the five minutes. After the distractor task, the evaluation test was performed, which involved recalling all of the 60 word pairs. The duration of the experiment was about 35 to 40 minutes in the Pretest group, and 25 to 35 minutes in the No-Pretest group.

## Results

In the Pretest group, the percentage of target words retrieved from their cue words (i.e. the generated word was the target word) in pretests was 6.0%. The cue words from which the target words were retrieved in the pretests were excluded from the analysis.

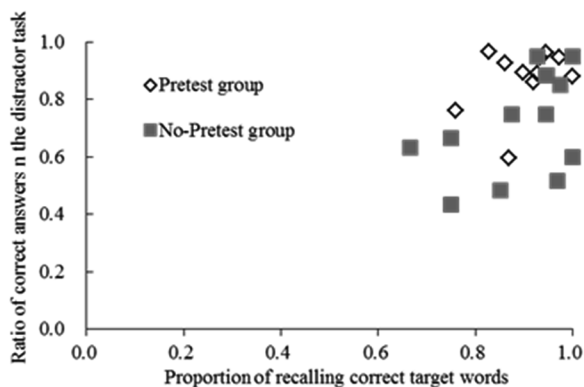
**Pre-test effect.** An unpaired t test was conducted to examine whether there was a difference in mean score between the Pretest and No-Pretest groups to investigate the effect of pretesting (Figure 1). The proportion of recalling correct target words was 0.88 (SD = 0.11) in the Pretest group and 0.72 (SD = 0.18)

in the No-Pretest group. The cued-recall accuracy was significantly higher in the Pretest group than in the No-Pretest group ( $t(20.18) = 2.64, p < .05$ ).



**Figure 1. Proportion of recalling correct target words in Experiment 1 (Error lines denote standard deviation)**

**Relationship between distractor task score and the pretest effect.** To investigate whether personal difference affected the pre-test effect or not, Pearson product-moment correlation coefficients were calculated between the scores of the distractor task and recall scores in the evaluation test for each group. A positive correlation of an intermediate degree was found in the No-Pretest group between the ratio of correct answers in the



**Figure 2. Correlation between the ratio of correct answers in the distractor task and the proportion of recalling correct target words**

distractor task and proportion of recalling correct target words ( $r = 0.49$ , Figure 2).

Participants who scored higher and lower than the median during the study phase were classified as high- and low-score groups, respectively (those whose score was on the median were excluded). A two-way analysis of variance was conducted on recall score in the evaluation test (Table 1) for the group in the study phase (2: Pretest group, No-Pretest group)  $\times$  distractor task score (2: high-score group, low-score group). Only the main effect of the group in the study phase was found to be significant ( $F(1, 17) = 6.28, p < .05$ ), and the main effect of the distractor task score and interaction were not significant ( $F(1, 17) = 2.28, n.s.$  and  $F(1, 17) = 0.01, n.s.$ , respectively).

**Table 1**

**Proportion of recalling correct target words for each score group in the distractor task**

Group		Number of participants	Proportion of recalling correct target words	
			Mean	SD
Pretest	High-score	3	.93	.04
	Low-score	7	.76	.19
No-Pretest	High-score	4	.83	.15
	Low-score	6	.65	.19

**Discussion**

**Pre-test effect by Japanese stimulus word.** An objective of Experiment 1 was to confirm whether the results by Kornell et al. (2009) is reproducible even when Japanese stimulus words are used and to determine the stimulus words to use in subsequent and future studies. A comparison of recall scores between the groups in the study phase showed that the Pretest group scored better in the evaluation test than the No-Pretest group, confirming the

enhancement of memory by pretesting as in preceding studies. The Japanese words used in Experiment 1 were thus likely to have been appropriate stimuli for investigating the pre-test effect.

**Distractor task score and the pre-test effect.** A positive correlation of an intermediate degree was found in the No-Pretest group between the recall score in the evaluation test and distractor task score (mental arithmetic), showing that persons who scored better in the distractor task scored high in cued-recalling in the No-Pretest group. Working memory capacity has been reported to be deeply involved in mental arithmetic (e.g. Saito & Miyake, 2000). Based on the knowledge, in Experiment 1, participants of high distractor task score, or of high working memory, scored high in cued-recalling even under No-Pretest condition. Participants who had low working memory scored lower in cued-recalling than those who had high working memory when there were no pretests, but scored similarly when they received pretests. Pretesting was likely to have improved the recall scores.

Strategies used to memorize word pairs were asked to high-score participants in the No-Pretest group. They mentioned that they grouped the presented word pairs based on some standards, such as the cue and target words have a similar meaning and the target word is a *katakana* conversion of the cue word, and used the standard as a clue for recalling the correct target word. This supports the idea mentioned by Endo & Osaka (2012) that people having larger working memory can better select and use a strategy effective for memorizing. On the other hand, participants who had low working memory scored low under No-Pretest condition, in which strategy was not presented. Their scores improved to a

degree similar to those of participants with high working memory by the pretests, which presented strategy for remembering. In other words, it was suggested that the pre-test effect is possibly more effective for those who have low working memory than those who have high working memory.

### **Effects of working memory capacity on the pre-test effect (Experiment 2)**

#### **Objectives**

The results of Experiment 1 suggested that pretesting (presentation of learning strategy) may not affect the recall score of people of high working memory but may improve the score of people having low working memory by presenting strategy for assisting memorization. In Experiment 2, it was investigated whether the effect of pretesting on word recall score differs by working memory capacity or not.

Reading span test developed by Daneman & Carpenter (1980) is a most widely used method for measuring working memory capacity (Saio & Miyake, 2000). However, it has been indicated that it is better to combine two or more span tests to correctly measure working memory (e.g. Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005; Endo & Osaka, 2012; Otsuka & Miyatani, 2007). In Experiment 2, working memory was measured by using the reading span test and the operation span test (Turner & Engle, 1989).

#### **Methods**

**Participants.** 71 undergraduate and graduate students (consisting of 17 males and 54 females) of 4 universities in total in two prefectures participated in this experiment.

Their age was 18 to 25 years old (mean: 21.8 years, SD=1.61) . The participants were randomly divided into Pretest group ( 36 persons including 9 males) and No-Pretest group (36 persons including 8 males) . The contents of the experiment was explained orally, and their written consents were obtained.

**Assignment.** Experiment 2 consisted of two working memory tests (span tests) and the word pair learning task described in Experiment 1. An automated version of the operation span test developed by Unsworth, Heintz, Schrock, & Engle(2005) and a Japanese translation version of the reading span test were used.

The word pair learning task was the same as that in Experiment 1. During the study phase, the Pretest group was assigned to perform pretests and paired-associate learning task, and the No-Pretest group had paired-associate learning task only. Both groups then performed the distractor task and took the evaluation test.

**Procedure.** The two kinds of span test were performed first, and word pair learning followed. The order of the operation span test and reading span test was determined randomly on a participant-by-participant basis. After the span tests, the word pair learning task followed, which consisted for the study phase, distractor task and evaluation test as in Experiment 1. The duration of Experiment 2 was about 70 and 60 minutes for the Pretest and No-Pretest groups, respectively.

## Results

**Span test score.** Traditional span scores proposed by Daneman & Carpenter (1980) have been widely used. However, the traditional span scores have been indicated to strongly reflect the relationship between the ability of

the person and the difficulty of the questions because the scores are determined by the final item size (Conway et al., 2005) . In this study, the proportion of correct answers (the mean ratio of correct answers during the trial) , which has been shown valid by several studies, was calculated for each span test. The mean scores of the span tests were 0.78 (SD = 0.12) and 0.80 (SD = 0.13) for the reading span and operation span tests, respectively. The correlation coefficient between the span tests was  $r = 0.64$  ( $p < .01$ ) . The average of the scores of a person was adopted as the “composite span score” of the person. An analysis was conducted between the span test scores and the scores of the distractor task (the number of answers, the number of correct answers and the ratio of correct answers) to examine their correlation, but the correlation coefficients were not significant (Table 2) . In the subsequent analysis, the composite span score was used as the working memory score of the person.

**Table 2**  
**Correlation between span test scores and distractor task score**

	Number of answers	Number of correct answers	Ratio of correct answers
Reading span	-.01	.04	.17
Operation span	.05	.09	.16
Composite span	.02	.08	.18

**Pre-testing effect.** In the Pretest group, the percentage of cue words from which target words were retrieved in pretests was 5.2%. Those words were excluded from the analysis.

An unpaired t test was conducted to examine whether there was a difference in mean score between the Pretest and No-Pretest groups to investigate the effect of pretesting.

The proportion of recalling correct target words was 0.81 (SD = 0.09) in the Pretest group and was 0.72 (SD = 0.21) in the No-Pretest group, showing a significantly higher score in the Pretest group ( $t(44.63) = 2.37, p < .05$ ). Significant pre-test effect was observed also in Experiment 2.

As in Experiment 1, correlation coefficient was calculated between the pretest effect and distractor task score. In Experiment 2, a weak positive correlation was found in the Pretest group, and a weak negative correlation was observed (particularly with the number of correct answers) in the No-Pretest group (Table 3).

**Table 3**  
**Correlation between evaluation test and distractor task scores**

	Number of answers	Number of correct answers	Ratio of correct answers
Pretest	.28 *	.32 *	.16
No-Pretest	-.30 *	-.30 *	-.08

\* $p < 0.10$

**Effects of working memory capacity on pre-test effect.** To investigate the effect of working memory capacity on the pre-test effect, the participants whose composite span scores were higher and lower than the median were classified as high- and low-score groups, respectively. The median of the composite span score was 0.82, and persons whose score was on the median were excluded from the analysis.

To examine whether the pre-test effect differed by working memory or not, a two-way analysis of variance was conducted for the group in the study phase (2: Pretest group, No-Pretest group)  $\times$  composite span score (2: high-score group, low-score group). Only the main effect of the group in the study phase was found

to be significant ( $F(1, 63) = 4.43, p < .05$ ), and the Pretest group showed higher recall scores than the No-Pretest group. The main effect of the span score and interaction were not significant ( $F(1, 63) = 0.38, n.s$  and  $F(1, 63) = 0.04, n.s$ , respectively). The number of participants, mean score and SD of each group are shown in Table 4.

**Table 4**  
**Proportion of recalling correct target words for each study phase group and each composite span score group**

Group	Number of participants	Proportion of recalling correct target words		
		Mean	SD	
Pretest	High-score	14	.79	.10
	Low-score	20	.83	.08
No-Pretest	High-score	19	.71	.20
	Low-score	14	.73	.25

## Discussion

The objective of Experiment 2 was to investigate the possibility of working memory capacity affecting the effect of pretesting on improving word recall scores.

**Working memory.** A high correlation was observed between the reading span score and operation span scores showing that these two span tests measured the same aspect. However, there was almost no correlation with the distractor task score (mental arithmetic), showing a result different from preceding studies (e.g. Hecht, 2002). This was possibly because the mental arithmetic task in this study was a distractor task performed in the middle of a memorization task. The participants may have solved the arithmetic problems while saving their resources for the coming evaluation test, and this may have hidden the correlation. It was also possible that the span test used in

Experiment 2 measured a working memory dimension little involved in mental arithmetic. There are still many discussions and interpretations on the mental process reflected by each of diverse span tests (Saito & Miyake, 2000). It is necessary to further investigate whether the span tests used in Experiment 2 are appropriate or not for studying personal difference in pretest effect.

**Pre-test effect.** Experiment 2 also showed the pre-test effect, or better recall scores in the Pretest group than in the No-Pretest group. On the other hand, unlike in Experiment 1, a weak positive correlation and a weak negative correlation were observed between the distractor task score and recall score in the Pretest and No-Pretest groups, respectively. In other words, pretesting was more effective in people of higher working memory, and the difference in recall score between the study phase group was smaller in people of lower working memory than in those of higher working memory. The reason for the difference from the result in Experiment 1 is discussed in General Discussion.

**Effects of working memory capacity on the pre-test effect.** The participants were classified by their working memory capacity, and the difference in pre-test effect was investigated. No significant interaction was observed, and there was no difference in pre-test effect by working memory capacity. Based on the results by Leding (2012) and Endo & Osaka (2012), it is unlikely that there is no correlation between working memory capacity and pre-test effect. The absence of such a correlation in Experiment 2 is possibly attributable to either of the following reasons.

The first possibility is that the span tests used in this experiment could not measure the

working memory dimension that affected the pre-test effect. As described above, the span tests and mental arithmetic were likely correlated to different dimensions of working memory. Similarly, the span tests may have measured a working memory dimension that differed from the dimension that affects the pre-test effect. However, it is also possible that the span and mental arithmetic scores did not correlate with each other because mental arithmetic was performed as a distractor task as described above. Tests other than the span tests used in this experiment need to be tested to investigate the relationship with the pre-test effect.

Another possibility is that the pre-test effect is not affected by working memory capacity because it does not involve source monitoring or presenting memorization strategy. Bixter & Daniel (2013) investigated the relationship between false memory and working memory and reported that there was no relationship between working memory and word recall score unless the participants were informed that the word list presented was designed so as to generate false memory. This is believed to occur because people allot little attention to source monitoring unless they notice the false-memory generating characteristic of a word list. In this Experiment, it was entrusted to the participants to decide by themselves how to use the incorrect information presented in the pretest during the evaluation test. Therefore, the participants did not monitor the information source for correctness and use it as a clue for the evaluation test. Because little attention was allotted to source monitoring in this study, working memory capacity was not related to the pre-test effect. Thus the results may imply that

personal differences, such as abilities of monitoring and using strategies and others abilities determined by working memory, do not affect the pre-test effect, or in other words, the effect of pretesting in improving memory retention is a strategy independent from personal difference. However, if source monitoring was not used during the evaluation test, it is difficult to conclude that there was pre-test effect involving activation of a network of candidates containing various information as proposed by Grimaldi & Karpicke (2012). Therefore, further investigation is needed on how people use incorrect information during an evaluation test.

### **General Discussion**

The objectives of this study were to 1) confirm the presence of the pre-test effect even when Japanese stimulus words are used, and 2) investigate the effects of personal differences on the pre-test effect from the viewpoint of working memory. It was found that there is no relationship between the pre-test effect and working memory, suggesting that the pre-test effect is a phenomenon independent from personal differences. Pretesting is thus probably effective for improving memory retention also for pupils and students who have low working memory, for whom it has been believed that pretesting lowers the scores of final test, as mentioned, for example, by Butler & Roediger (2007). However, to actually use pretests in schools, the mechanisms of the pre-test effect should be further investigated such as by identifying most efficient testing methods.

The relationship between the word recall score and the score of mental arithmetic problems used as the distractor tasks was inconsistent between Experiments 1 and 2. In

Experiment 1, pretesting was suggested to have presented a strategy for memorization and thus improved the recall score in participants who scored low in mental arithmetic. On the other hand, Experiment 2 showed a possibility that source monitoring is an important aspect of pretesting as it improved the recall scores in participants of high mental arithmetic scores. To solve such an inconsistency, it will be necessary to thoroughly investigate how people use incorrect information presented in pretests in an experimental paradigm for investigating the pre-test effect. The possibility of working memory having both promoting and preventing effects on the pre-test effect should also be considered.

In a study on the effects of personal working memory differences on the testing effect, Brewer & Unsworth (2012) investigated not the pre-test effect but the effects of testing after learning (testing effect) on evaluation test score and of personal differences such as working memory, attention function and other recognition abilities on the testing effect. No effect was observed by individual working memory difference on the testing effect, and they reported a weak negative correlation between episodic memory and general fluid intelligence. Their results suggested that individual differences in recognition function do not directly affect the testing effect, but testing has an indirect effect in people of low recognition function by assisting them learn a more effective strategy. In Experiment 1 of this study, the pre-test effect was more apparent in the group of low distractor task score than in the counterpart. Experiment 2 did not show relationship between working memory capacity and the pre-test effect. Therefore, like the testing effect mentioned by Brewer &



Unsworth (2012) , the pre-test effect is likely to be effective for all persons regardless of their working memory capacity but enhanced memory retention to a larger extent in the people of low working memory than in those who have high working memory because pretesting presented a strategy for learning.

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## **Graduate Teaching Assistant Work as a Learning System and its Significance: The Lessons of Chris Park's Article for Pedagogy Researchers and Teacher Educators**

Takumi Watanabe, Yu Osaka and Kazuhiro Kusahara

This study aims to elucidate (1) the setbacks graduate students face as Graduate Teaching Assistants (GTAs) , (2) the mechanisms through which overcoming these setbacks is possible, and (3) the meaning of the GTA experience, particularly for graduate students specializing in subject education. To answer these questions, we consider Chris Park's article "The Graduate Teaching Assistant (GTA) : Lessons from North American Experience." This study was introduced by Sherry Field when she took the podium at the RIDLS lecture meeting as a beneficial reference that provides an overview of North American trends in GTA research. Indeed, it is a comprehensive review that has been quoted and consulted by many previous studies. Thus, for this study we decided to approach the above questions by reviewing Park's article. The following three points became clear from this analysis. First, as GTAs, graduate students tend to suffer setbacks in terms of constructing relationships with others, allocating time between research and education, inadequate knowledge and experience, and demonstrating an open attitude toward diverse ideas that differ from their own. Second, it is none other than the GTA system itself that can overcome difficulties GTAs face. A GTA program for this purpose must offer opportunities for legitimate peripheral participation in a community of researchers and educators. Furthermore, there is need for coherent selection and preparation, training, and supervision and mentoring mechanisms. Third, the GTA experience is an opportunity for heightening not only capacities and abilities as educators (teacher trainers) , but capacities as researchers and educators (teachers in training) . For graduate students specializing in subject education (one in which the methodologies of educators and researchers are closely connected) , learning as a GTA can be expected to be effective.

Key Words: Learning of Graduate Students, Graduate Teaching Assistant (GTA) , Curriculum and Instruction, Pedagogy Researchers, Teacher Educators

## I . Issues at Hand

In the future, doctoral program graduate students will become researchers. Simultaneously, they will also take on the role of educators at universities and in the community. As will be subsequently discussed, education and subject education graduate students will do so in an even more integrated manner.

However, it is not always the case that graduate education programs train students for these roles deliberately and systematically. Indeed, such programs at institutions of higher education in Japan are often thought to provide an “apprentice system,” where students follow the lead of their advisors and senior students, and being made to compete with those in the same year as them. In this way, students have effectively obtained capacities and abilities with regard to research, education, and office duties. Issues in this apprentice-type learning bound by research departments and divisions have been pointed out in Ikeno (2014a) in the context of education studies. Tasks confronting graduate students include overcoming the walls of research departments and divisions and cultivating their capacities and abilities as researchers and educators on the basis of widely accepted and established achievement standards.

In Japan, one of the aims of introducing the TA system was to methodologically cultivate the capacities and abilities of graduate students as educators and researchers (Koyasu and Fujita (1996)) . However, according to Koyasu et al. (1997) , inadequacies remain with regard to implementation and operation.

Research in Japan on TAs has centered on issues surrounding the taking root and establishment of this TA system and can be

divided into two types.

First, there is research on the actual operation and meaning of such programs for graduate students. Representative research in this vein includes Kawai (2000) , Kitano (2002) (2003) , and Tamamura and Kogo (2008) . While showing that TAs are effective for improving classes and heightening the teaching abilities of graduate students; these studies point out that issues still remain in the system.

Second, there is research that analyzes progressive initiatives in the TA system. Examples include Udagawa (2006) , Konno and Mitsuishi (2008) , Kira and Kitano (2008) , and Kira (2014) . Kira (2014) offers particularly rich suggestions. After comprehensively analyzing existing research and the TA system in the United States, Kira proposes dividing TA education into three stages: that of new TAs, veteran TAs who mentor new TAs, and preparing to be a full-fledged teacher at a university.

In research on Japan’s TA system, the activities of Akio Kitano’s group and Masaaki Ogasawara’s Hokkaido University group have been attracting attention. Hokkaido University and Tsukuba University have brought together and published the findings of collaborative research carried out with US, Chinese, and Korean universities as Professional Development: International Comparison of Training for University Teachers and Teaching Assistants. Authors include Jody D. Nyquist, the leading TA researcher from the University of Washington, K. Lynn Taylor, and Linda von Hoene.

In this way, discussions in TA research in Japan have been carried out with regard to how to introduce and independently reconstruct the United States’ TA system to improve graduate

students' research and educational abilities, or as will be described below, provide economic support for them. This kind of discussion appears to have also been carried out in Europe. Chris Park, in his article "The Graduate Teaching Assistant (GTA) : Lessons from North American Experience" and elsewhere, has worked to establish a TA system in UK. Being a comprehensive review, Park's article has also been referenced and/or cited by the aforementioned Taylor and Kira et al. articles.

The article was published in 2004 in *Teaching in Higher Education* (Vol. 9, No. 3) . Below, we refer to it as "Park's article." Following Park's article, we will refer to graduate student TAs as GTAs.

The issues that concern Park in his article overlap with those found in the history of TA research in Japan. Seeing as the paper constitutes a considerable accomplishment, we here provide a synopsis of it. In doing so, we aim to clarify the following questions regarding the cultivation of graduate students' capacities and abilities as researchers and educators.

- (1) What kind of setbacks do graduate students encounter in the process of learning as GTAs?
- (2) With what kind of support program is it possible to overcome these setbacks?
- (3) For graduate students specializing in subject education, who are both scholars (of education) and educators (of teachers) and are expected to simultaneously fulfill both responsibilities, what is the meaning of the GTA experience?

The background to the writing of Park's article considerably overlaps with the situation facing research universities in Japan today. We believe that the proposals in Park's articles offer beneficial suggestions in the context of

higher education reform in Japan.

## II . Chris Park and His Article

### 1. The Individual Background to the Article's Selection

On September 18th, 2014, the Research Initiative for Developing Learning Systems (RIDLS) held a lecture meeting on the theme of using TAs in the teacher training course.<sup>1)</sup> Sherry Field, the Dean of Arkansas Tech University's College of Education, and Elizabeth Bellows, Assistant Professor at Appalachian State University, were invited to give lectures.

Both these individuals previously belonged to The College of Education at The University of Texas at Austin, where the latter was a student and GTA and the former her advisor.<sup>2)</sup>

Field specializes in research on social studies teacher education and the elementary social studies curriculum. At the lecture meeting, she discussed in detail The University of Texas at Austin's GTA system and its operation. Bellows discussed the results and meaning of the GTA system based on her personal experience of having worked as a GTA. At this lecture meeting, Park's article was introduced as a reference work that provides a comprehensive outline of the GTA system in the United States.

Park's article "seeks to highlight key lessons by reviewing published literature on the use of GTAs in North America" and is primarily written for education-related individuals in the UK.<sup>3)</sup> However, the article's comprehensive and accurate explanation also appears to have led to its receiving acclaim in the United States.

## 2. Author Introduction

Chris Park is a researcher who specializes in physical geography and is particularly well known for his scholarship on environmental and economic geography. As of 2015, he retired from the front line and is now a Professor Emeritus at Lancaster University in the UK.

Park has written many monographs and academic articles that cover physical geography, religious studies, and higher education. In the 1990s, he published research findings primarily related to geography on the topics of tropical rainforests, acid rain, and environmental destruction. Of these, his monograph *Tropical Rainforests* was translated into Japanese by Tadashi Inui in 1994 as *Nettai urin no shakai keizaigaku* and published by Associate of Agriculture and Forestry Statistics.

Park was also an editor of the environmental geography dictionary *Dictionary of Environment and Conservation*. Many of his works have been republished, and the results of his scholarship have been accepted widely.

In the first decade of the new millennium, Park's interests spread to higher education, about which he wrote many articles. This spread of interest appears to have been influenced by both his experience in graduate school research, education, and management as well as his work at The Higher Education Academy (HEA) and The Quality Assurance Agency (QAA).

In fact, the list of publications on Park's website include more than a few studies regarding doctoral degrees and graduate students. Park's 2002 study that considers the meaning of the UK's GTA system using Lancaster University as an example entitled "The Donkey in the Department? Insights into

the Graduate Teaching Assistant (GTA) experience in the UK" overlaps in terms of issues covered in this study and is a stimulating read. In this article, along with calling for a UK-wide discussion on the GTA role and framework, Park also inquiries into the training of GTAs at research-led UK universities. We would like to consider this article at another point in the future.

## III. An Overview of Chris Park's Article

The composition of Park's article can be seen in Table 1. First, we will quote from and provide summaries of the content of each section.

**Table 1 The Composition of Park's**

1. Introduction
2. Context
3. Selection and Preparation
4. Training
5. Supervision and Mentoring
6. Practical Issues
7. Personal Issues
8. Professional Development Issues
9. Conclusion

(Created and numbered by authors)

### 1. Aim of Park's Article

#### (1) Introduction

At the beginning of his article, Park points out that while "higher education institutions (HEIs) in the UK are increasingly making use of graduate students to help with the teaching of undergraduate students," there are issues in the assumed GTA role of graduate students. Park then compares GTAs in North America and the UK.

Park says that, in North America, "the GTA is a recognized position, with its own

status and niche within the higher education system.” Furthermore, the main purpose of the GTA position is “to provide teaching support, and it often serves as the first career step for an aspiring academic.” In contrast, the “more common model in the UK is still the graduate student who teaches—whose main role is as a research student.” The aim of working as a GTA is understood as being first “to secure financial support” and “ (often secondarily) to gain teaching experience.” Therefore, the reality of GTAs in the UK and GTAs in the United States “differ in emphasis and orientation, and their postgraduate experience differs greatly.”

Having touched upon these differences, Park hopes to learn from the North American System, and obtain lessons for reforming the UK’s institutions of higher education.

## **(2) Context**

Park notes, “Many HEIs across the UK are confronting the challenges of teaching ever-increasing numbers of undergraduate students, whilst coping with serious and mounting resource constraints ( including funding, facilities and staffing) ” and says that in order to overcome these issues, the GTA model in place in North America might be useful.

Park argues that in North America, the role of GTAs is not only to cope “with large classes,” stating that there are three merits of universities employing GTAs. The first is “reducing teaching loads and thus increasing research time for academics.” The second is “providing financial support for graduate students.” The third is “offering an apprenticeship model for future professors.”

## **2. GTA Training Model**

### **(1) Selection and Preparation**

Regarding the selection of GTAs, Park

asserts that the “process must be fair, transparent, and consistent” and that its “outcome can seriously influence GTA effectiveness and thus student learning.” Park notes that there are three concrete selection criteria: “appropriate subject knowledge, aspects of the student’s undergraduate university ... previous training and teaching experience, and written and spoken language proficiency for non-native speakers.” He also states that “effective GTAs” have competencies such as the ability to handle stress and “how to conduct productive class discussion.” Furthermore, Park touches upon work by Simpson and Smith (1993) that identifies twenty-six important GTA competencies.

Selected GTAs are prepared “at both departmental and institutional levels” through a “carefully constructed programme of appropriate activities.” Park points out that “preparation is both a discovered and a learned experience, as students find out what it means to be teachers as well as graduate students.” Park cites Staton and Darling (1989) to emphasize the significance of GTA preparation: “This early socialization is vitally important because the skills, behavior, and attitudes developed as a GTA have a major impact on future development as an academic.”

Park says that preparation programs are also effective for “significantly increasing ... the perceived level of self-confidence” of international GTAs who are not native speakers of English regarding their “ability to teach in English.”

### **(2) Training**

Training “involves the process of bringing the GTA to an agreed standard of proficiency by practice and instruction.” Park points out that “much of the North American



GTA literature explores this important theme.” Furthermore, “Many North American universities have developed GTA training programmes based on the premise that teaching can be learned, practiced, and continually improved.”

While Northern American GTA training programs are headed by “full-time professional trainers,” they “use experienced teachers as role models” and incorporate “peer mentoring.”

Furthermore, Park states that “attention has been paid in North America to the design of effective GTA instructional programmes,” stating that they share in common “the use of active learning strategies ... such as in-class activities, written assignments and modeling and observation of the teaching/learning process.” Also, Park finds strategies such as “reading and analyzing papers, and discussions of their teaching experience” as well as “the provision of formative evaluation ... and summative assessment.” Furthermore, “the effectiveness of GTA training programmes can be assessed in a variety of ways, including classroom evaluations, student feedback, and self-evaluations.”

These training programs are all “oriented toward generic teaching skills, because this is usually a cost-effective way of delivering training to large groups of aspiring GTAs, but also because every GTA should have a sound grounding in core skills.” However, “it is certainly not a case of ‘one size fits all,’ and decisions about appropriate forms and amounts of GTA training should be informed by a range of factors, many of them specific to the student and their background.” For example, since international graduate students pose “particular challenges because of linguistic differences and cultural diversity and sensitivity,” they have

“specific training needs.”

### **(3) Supervision and Mentoring**

Park explains that “in North America the GTA’s teaching is usually supervised by the leaders of the courses they are attached to. Peer mentoring—the pairing of a new GTA with an experienced one—can also provide extremely useful support and guidance.” Park notes, “Supervisor and mentor play different roles, the former as line manager and director and the latter as role model and peer support.”

The “role of GTA supervisor is often a complex and demanding one, with success contingent upon an effective inter-personal relationship between supervisor and supervised.” Park also points out an issue that “supervisors are often closely involved with the evaluation of GTA performance and effectiveness, although the feedback and opinions of those they teach can be highly informative.”

## **3. Issues in the Growth and Training of GTAs**

### **(1) Practical Issues**

Park lists lack of knowledge, dress, communication, and teaching-research balance as practical issues for GTAs, noting that “a variety of practical issues have to be successfully addressed by an GTA intent on performing the role properly.”

Park states that, of these practical issues, generally those relating to communication are particularly serious: communicating with students, socializing with GTA peers, and professional relationships with supervisors and other academic colleagues.

The issue of communication is “a major concern to international GTAs,” and Park draws attention to the fact that providing help to international GTAs is an important issue in

terms of internationalization.

Park also points out, based on the results of his own survey, that finding balance between “fulfilling teaching duties” as a GTA and “engaging in research” in order to obtain a PhD is a frequently observed issue.

### **(2) Personal Issues**

Park presents “effectiveness and identity” as two personal issues for GTAs. Effectiveness refers to the meaning acquired by working as a GTA and is an issue that can be overcome through “self-reflection and reflective practices.” Tools for doing so include “the keeping of a diary or journal,” “analysis of videotaped teaching sessions, and sharing of ideas and feedback with peers and mentors.” He also notes that “effectiveness should logically increase with experience” because “many universities adopt a journeyman approach in which the GTA is given more responsibility, independence, and authority with successive years’ experience.”

With regard to identity, Park asserts, “GTAs often confront issues relating to identity and notions of self-worth, as their views, beliefs, and ideas are tested and refined in the crucible of classroom contact with students” and cites as an example the work of Lal (2000) on gender, race, and culture.

### **(3) Professional Development Issues**

Much scholarship on North American GTAs concerns professional development issues, a result of the unstable position of GTAs as “students and novice teachers.” Furthermore, Park points out that while “many GTA training programmes are based on an apprenticeship learning model, ... this is only really appropriate if every GTA wishes to pursue a career as an academic.”

Although there are such restrictions, “for

those GTAs who aspire to remain in academia, as teachers and researchers, advice is available on a number of key themes, including preparation of a teaching philosophy statement ..., developing a professional reputation ..., and effective strategies for academic job searches...”

Park continues, stating that “GTAs occupy a somewhat ambiguous niche, simultaneously serving as teachers and students, employees, and apprentices,” noting that there is “little wonder they are often seen by others, and often see themselves, as ‘neither fish nor fowl.’” Such worries frequently arise, which has led to the “unionization of GTAs.” Park concludes that unions have “changed the nature of relationships between the GTAs and their employers, but that this has also brought GTAs benefits.”

## **4. Conclusion of Park’s Article**

Park states that the important lesson of his review on the literature regarding the use of GTA students in North America is the necessity of “a cohesive framework for the employment of GTAs.” Based on this conclusion, at the end of his article Park presents thirty-one items summarizing “lessons drawn from North American experience.”

These can be found in Table 2. It is Park’s hope that, if these are incorporated into the GTA system, they could be “enjoyed by the different groups of stakeholders ( the department, academic staff, graduate students, and undergraduates) ” besides teachers. Park summarizes his conclusions by stating that the benefits of hiring GTAs are “delivering teaching to large numbers of undergraduate students, releasing teaching staff time for research activities, increasing funding

opportunities for research students, and offering an apprenticeship for future professors.”

#### **IV. GTA as a Learning System for Graduate Students**

In closing, let us answer the research questions from the beginning of this study on the basis of Park’s analysis and the lessons he delivered. Below, the numbers in parentheses correspond to those found in Table 2.

##### **1. What kind of setbacks do graduate students encounter in the process of learning as GTAs?**

First, constructing relationships with others is difficult. Here, “others” refers to students, peer GTAs, and supervisors. If GTAs, who are placed in an ambiguous position as newcomers to both research and education, cannot construct appropriate relationships with those around them, this can become a source of stress. This is also related to items 14 to 17 and 30 in Table 2.

Second, it is difficult to allocate time between research and education. For graduate students who are trying to obtain a PhD within a set period, time is the most important factor. The more a GTA tries to seriously engage in both education and research, the more troubled they will be by the issue of balance.

Third, difficulties arise from a lack of knowledge and experience. This typically takes the form of troubles related to knowledge of university resources (18), conflict with students (19), and communication abilities (20). For GTAs who are leading their first classes and providing guidance to students, things they do not know or cannot do are certainly serious issues.

Fourth, difficulties arise from GTA’s

developing identities. For example, Park’s article introduces a conflict experienced by a GTA who taught “a text that included works by women of color that were critical of white, middle class feminism.” It is more difficult than one thinks to show an open attitude to understandings or cultural and ethical standpoints that go against one’s own beliefs.

Park frequently points out that international GTAs whose native language is not English have troubles relating to their language usage abilities and cultural backgrounds.

Many of these difficulties are universal ones that may be encountered after finding a job as a researcher and/or educator and are not necessarily setbacks limited to GTAs.

##### **2. What kind of support program enables it to overcome such setbacks?**

While, as described above, GTAs encounter many difficulties, the GTA system is there for overcoming them. If the role of the GTA is just something that offers an experience, then these setbacks will accumulate. However, Park’s lesson is that GTA programs must offer an opportunity for legitimate peripheral participation in communities of researchers and educators. For this purpose, Park seeks the creation of mechanisms for selection and preparation, training, and supervision and mentoring.

In specific terms, the GTA denotes a status clearly located within an “academic hierarchy” (1). There are “experienced teachers” (14) who are role models. To work as an educator it is necessary to receive training in advance regarding “generic and subject-specific elements” (13) and to receive support in solving issues through appropriate “peer mentoring” (15). Furthermore, Park

**Table 2 Summary of Lessons Drawn from the North American Experience**

**Overall**

1. A GTA is more than simply a postgraduate student who teaches—it is a recognized post with a respected and clearly understood niche within the academic hierarchy.
2. Universities in North America have long experience of developing effective GTA systems, and HEIs in the UK have much to learn from the experience of GTA systems, most of which is very positive.
3. Employment of GTAs to help teach undergraduates brings a range of benefits, including the following:
  - reduced teaching loads and increased research time for academics;
  - secure and sustained funding for postgraduate research students;
  - relevant teaching experience for the GTA; and
  - an apprenticeship model for future professors.
4. Carefully designed systems and procedures are required to ensure that GTAs are able to perform their teaching role in an effective manner.
5. Appropriately trained GTAs can teach in a variety of contexts, including demonstrating in lab, practical, and field classes; leading tutorials and seminar groups; and lecturing (particularly in introductory undergraduate courses)
6. The design of sustainable GTA models must recognize and consider the recurrent tension graduate students feel between time spent teaching and time spent on research. This has significance for job satisfaction, research completion, thesis submission, and completion rates.

**Selection and Preparation**

7. The selection process for GTAs:
  - should be fair, transparent, and consistently applied
  - affects GTA effectiveness and thus student learning
8. Selection criteria for GTAs:
  - should be appropriate to the task the GTA is expected to perform
  - should include subject knowledge and previous training and teaching experience
  - should include written and spoken language proficiency for non-native speakers
9. The competencies expected of a GTA should be defined and included as part of the selection process
10. A thoughtfully designed GTA preparation programme:
  - can be of great help in preparing GTAs for duty
  - might include compulsory and voluntary elements
  - should be a multi-stage process, involving orientation, induction, and assimilation
  - can significantly increase self-confidence and thus the potential effectiveness of international GTAs
  - should aim to build and sustain supportive relationships
11. Properly prepared GTAs can play a part in developing and sustaining an effective ‘teaching community’ in a department, which can add vibrancy and enhance learning experiences

**Training**

12. Teaching can be learned, practiced, and continually improved upon.
13. A thoughtfully designed GTA training programme:
  - can enhance the learning experience for both teacher and student
  - should include both generic and subject-specific elements
  - should include active learning strategies, constructivist learning strategies, activities that foster social interaction, and motivational strategies
  - should include both formative evaluation and summative assessment

- should be informed by a proper needs assessment process
- should make special provision for International GTAs, required due to linguistic differences, and cultural diversity and sensitivity
- should involve ongoing activities and opportunities not just the formal training programme
- should evolve through time, by adaptation and improvement

14. Experienced teachers can be highly influential role models for GTAs in training.

15. Peer mentoring can greatly assist the GTA training process.

#### **Supervision and mentoring**

16. TA supervisors:

- are traditionally the course leader
- should be properly supported and empowered
- should meet regularly with their GTAs
- should preferably have a collegial rather than a task-oriented style of supervision

17. Peer mentoring can provide a GTA with useful support and guidance.

#### **Practical issues**

18. GTAs should have good knowledge of, and be able to advise students about, the availability of campus resources.

19. GTAs need to be able to deal effectively with conflict (particularly with the students they teach), and this should be an element in GTA training.

20. Many of the tensions confronting GTAs are related to communication issues, and these should also be an element in GTA training.

21. Communication issues are a particular concern for international GTAs.

22. Attention must be paid to striking the right balance for GTAs between teaching and research.

#### **Personal issues**

23. GTA effectiveness can be improved through self-reflection and reflective practices, which increase self-awareness.

24. GTAs should be encouraged to evaluate the difference between their actual and theoretical teaching styles, using appropriate reflective activities.

25. GTAs should be encouraged to continually redefine their personal goals in the context of department-imposed conditions.

26. GTAs often confront issues relating to identity and notions of self-worth, particularly relating to gender, race, and culture.

#### **Professional development issues**

27. The GTA experience can be valuable preparation for aspiring academics.

28. High quality supervision as a research student can have a very positive influence on a GTAs choice of academic career.

29. Preparing Future Faculty programmes can be very useful in encouraging and enabling GTAs to make the transition from student to academic.

30. GTAs sometimes experience difficulties arising from their ambiguous status as students and teachers, employees, and apprentices.

31. Unionization of GTAs changes the nature of the relationship between the GTAs and their employers.

(Originally Table 1 in Chris Park Article)

envisions encouragement of growth as a GTA through continual “self-reflection and reflective practices” (23) .

**3. For graduate students specializing in subject education, who are both scholars (of education) and educators (of teachers) and are expected to simultaneously fulfill both responsibilities, what is the meaning of the GTA experience?**

For graduate students specializing in subject education, the GTA experience is an opportunity to heighten their capacities and abilities as both educators (teacher trainers and teachers-in-training) as well as researchers. This is because in subject education studies, academic research and education practices are inseparable from each other (Ikeno 2014b, Kusahara et al. 2014) .

When graduate students who study subject education are hired by universities as researchers, they are embedded in the teacher education (teacher training) system. Graduate students who have just completed their PhDs are released into the unknown world of teacher training and have no choice but to provide guidance based on the education they themselves have received. Nakahara et al.

( 2006 ) express apprehension regarding “personal theories on education” backed by “one person’s experience of being educated” becoming a model for human resources cultivation. This is a valid concern. The experience of being a GTA above all provides an opportunity for heightening one’s capacities and abilities as an educator (teacher trainer) .

However, the GTA experience is not only this; it can also be an opportunity for heightening one’s capacities and abilities as a researcher and educator (teacher in training) because one: (1) develops and carries out

classes, (2) analyzes and assesses them, and (3) improves them. While the emphasis in terms of the capacities and abilities sought in this training of teachers and those sought in research and studying to become a teacher are different, they overlap considerably. There is a difference between: (a) the practice and training of teachers—in other words, teaching university students while doing(1) (and (2) and (3)) ; and (b) research and studying to become a teacher—in other words, (2) , (3) (and 1) , for the purpose of actually teaching in elementary, middle, and high school settings. However, that which is sought in both cases are essentially the same.

Graduate students who study subject education—in which the methodologies of both educators and researchers are strongly connected—can expect their learning as GTAs to be effective. In fact, the results of Goto (2012), Okada and Kusahara (2013), (2014), and Tanahashi, Watanabe, Osaka, and Kusahara (2014) suggest that true learning in which students gradually participate in the carrying out of university education as GTAs heightens their capacities and abilities as both educators and researchers.

In the future, it is necessary to (while learning from the results of previous research) systematize objectives that can be understood regardless of departmental or division walls for pedagogy and subject education GTAs. It is also necessary to develop and verify the effectiveness of education programs that guarantee their legitimate participation in the community of (education) researchers and (teachers’) educators. In this sense, the issues that faced the UK research universities during the first half of the 2000s, their solutions, as well as the lessons Park found from the North

American experience, offer much to learn from.

### Notes

- 1) For details on presentations, see Elizabeth Bellows (Takumi Watanabe, Yu Osaka, trans.) (2014), *Amerika gasshukoku ni okeru rikiryō aru kyōshi wo sodateru tame no kyōdoteki kokoromi* [Collaborative Efforts to Educate Effective Teachers in the United States], in Norio Ikeno, rep. *Gakushu shisutemu sokushin kenkyū senta (RIDLS) koen kai shirizu No. 1* [Research Initiative for Developing Learning Systems (RIDLS) Lecture Meeting Series No. 1], pp. 38–49.
- 2) On Field and Bellow's teacher education practices, see Hiroko Taguchi (2012), *Characteristics of Research Methods on Social Studies Education in the United States: Focusing on "Elementary Social Studies Methods"* at University of Texas at Austin, *Bulletin of Japanese Educational Research Association for the Social Studies*, 48, pp. 77–86.
- 3) Four of the five head editors of the journal *Teaching in Higher Education* are UK-affiliated individuals, and sixty-nine of the eighty-two members of the editorial committee are affiliated with the UK or the British Commonwealth of Nations, which have close ties with the UK.

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## **How Do Social Studies Pre-Service Teachers' Learn Lesson Planning Skills? : Factors that Heighten Abilities Following University Enrollment and Support Measures**

Yu Osaka, Takumi Watanabe, Jongsung Kim and Kazuhiro Kusahara

To have students in university teacher education courses independently explore what a “good lesson” is, there is a need to first eliminate the gap between university courses and courses students have taken up through high school and disentangle the formalities unconsciously shaped during their K-12 experiences. Keeping this in mind, this study focuses on students who, after enrolling in university classes, have accepted a theory of teaching different from that which they had supported up until then. These students were able to create high-quality lesson plans, and this study investigates and analyzes why they were able to heighten their lesson planning skills. Based on analyses of the lesson plans of three students and interviews with them, the following three points were identified: (1) students tried to reflect upon and refine their own lesson plans by being enlightened by others' purpose-rational lesson plans, (2) their own views of social studies and theories of teaching were relativized by learning about multiple theories of teaching with different goals, and (3) they had little formality with regard to the subjects and fields (geography) that they had not taken during high school. Rather, they were able to independently envision educational content in a purpose-rational fashion. Furthermore, our findings suggest the potential of guidance for supporting the improvement of social studies lesson planning skills that (1) draws from within students criteria and conflicts with regard to their own latently-held ideas of a “good lesson” through the experience of evaluating exceptional classes taught by others and creating their own lessons (rather than forcing upon them good lessons from the outside through university classes), and (2) makes them understand the importance of engaging in teaching materials study and content construction in accordance with subject objectives, using as material subjects and fields that students have not fully understood the importance of.

Key Words: Teacher Education, Lesson Planning Skills, K-12 Experiences, Gap, Views of Social Studies

## I. The Issues at Hand

### 1. Returning to Traditional Lessons

In recent teacher education reforms, connections between learning at the university and actual educational settings as well as the training of novice teachers with practical competence is being sought both in research and policy. For example, there are policy-based demands dictating the direction of teacher education reform from Japan's Ministry of Education, Culture, Sports, Science and Technology (2012) to "establish a model of teachers as those who continually learn," have a "mutually influential relationship between theory and practice, which considers the basics and fundamentals regarding subjects and the teaching profession" to "cultivate practical competence at the stage of training teachers-to-be," and so on. In response, at teacher education universities and faculties in Japan, the competencies sought in new teachers have been academically defined, teacher-training standards that systematically form these capacities in teacher education have been actively developed, and survey research for this purpose has flourished. The Curriculum Center for Teachers at Tokyo Gakugei University (2006) led this research, and other efforts followed, such as Naruto Kyouiku Daigaku Tokushoku GP Project (2010) and the Bessou and Watanabe (2012) and Nasukawa and Watanabe (2014).

In the field of subject education, research on and implementation of "good lessons" and "desirable lessons" for various subjects has progressed, and it has become possible to return these findings to the benefit of education in actual school settings. Here, methods for lesson planning are the product of research based on theories from the field of subject education

studies. These results have come together in, for example, Umeno et al. (2010), which proposes methods for teacher development and training based on the practical competencies required for specific subjects.

On the other hand, in many middle schools and high schools, even today, teachers carry out so-called "chalk and talk" lessons in a didactic manner. Issues with this approach have continually been pointed out.<sup>1)</sup> This tendency is the same amongst both veteran as well as new teachers who have just learnt the latest educational theories at their alma maters. Van Hover & Yeager, 2004 discuss how three new teachers surveyed in the study returned to a traditional teaching style due to the environment that surrounded them. Kawakami (2012) and Slekar (1998) found that not only new teachers but teachers-in-training are also hesitant to use the new educational theories they learnt at university.

### 2. Gaps and Formalities

As discussed above, the results of research and theories in the field of subject education studies are not always incorporated by teachers-in-training and current teachers, and bridges are not always built between theory and practice. Previous studies have suggested two factors relating to K-12 experiences of teachers themselves as a background to this issue.

First, there is a gap between classes taken at university and those taken up in high school. Pointing to a factor that renders the reforms of K-12 history education ineffective, VanSledright (1996) notes the gap between the perspective of the field of history at universities (which doubts objectivity) and the traditional philosophical rationale of history

education at the K-12 level (represented by the understanding and memorization of objective facts) . When students feel a large gap between the history and other classes they have taken up through high school and those at university, university education needs to find an effective method for overcoming it. If not, as Zeichner & Tabachnick (1981) point out, the many ways of thinking and educational concepts developed while training to be a teacher will be “washed out” as students accumulate experience, and the students will again return to traditional lesson styles.

Second, there is the unconsciously created formality during students' K-12 experience. Lortie (1975) points out that students aiming to become teachers do not undergo teacher training education with a blank slate; they should be seen as having engaged in innumerable classroom observations during their K-12 experience. According to McGuire (1996) , pre-service teachers' primary models for education and instruction have already been formed through their own K-12 experience. Zeichner & Liston (1987) clarify that at a certain US university, students could not be made to reflect upon their past experiences and beliefs just by being taught subject instruction methods in classes.

All these studies show the danger of training teachers-to-be in a way that ignores their K-12 experiences. Regardless of how enthusiastically one teaches the newest educational theories, if they do not match the formalities derived from students' K-12 experiences, students will either reject them or forget them afterwards. Furthermore, upon finding employment as teachers, the theories learnt in the past will be “washed out” by the situation in actual school settings, and as a

result, they will return to reproducing the classes that they took up through high school. To overcome this cycle, it is necessary to disentangle, in university teacher training, the formalities (views of specific subjects) formed in students' K-12 experiences, and lay the groundwork that helps them accept up-to-date theories and create new teaching practices.

### **3. Accomplishments and Issues in Social Studies Education**

The influence of the K-12 experience comes to the surface when students are made to create lesson plans. Specifically, there are students who can create high-quality lessons utilizing the theories which university professors or affiliated schools' supervising teachers would like them to adopt, and students who either are unable to do so despite theoretical understanding, or who remain theoretically unconvinced. This can be seen at the stage when students are in the introductory portion of the teaching education course as sophomores.

Tanahashi et al. (2014) focuses on students who, in a social studies instruction methods class for sophomores, are able to, from the beginning stages of learning, create high-quality lesson plans that university teachers expect and survey the reasons they were able to do so. The results of the study show that these students all took high-quality classes (ones with little gap between practice and teaching theory) from elementary school to high school that resemble the teaching theories they were assigned. In addition, the concretization of these theories was encouraged through the new knowledge obtained and the learning assignments given at university. Tanahashi et al.'s survey shows again that (at least at the

time of sophomore year) whether students can produce high-quality lesson plans is influenced by their K-12 experiences. It also shows that their education experience at university may encourage them to restructure their own views of social studies and make adjustments between these views and the theories they are taught.

In the case of students beginning a teacher education course who do not have such “fortunate” K-12 experience and who, due to the gap between high school and university, stumble due to an inability to create lessons that their teachers expect, how lesson planning skills<sup>2)</sup> can be improved by university learning is an open question. To approach it, it is necessary to focus on students who grew considerably thanks to their classes, or in other words, those who came to be able to create such lesson plans. This paper builds upon Tanahashi et al. (2014) and seeks to answer the following research question:

**Why were the lesson planning skills of students who learnt to create appropriate lesson plans able to be improved upon?**

In answering this question, we hope to find ideas for effective teacher education to improve students’ social studies instructional abilities.

## **II. Method**

To answer the above question, we conducted a qualitative survey research on the students of the class surveyed in Tanahashi et al. (2014) as follows.

First, to gauge the improvement of pre-service teachers’ lesson planning skills in introductory level teacher education course, we conducted a survey of ninety students enrolled in the 2014 “Social Studies Education Theory” course, held primarily for sophomores.<sup>3)</sup> Since

this course is required to obtain a middle school social studies teaching license, those taking the course came from the Faculty of Letters, the university’s graduate schools, and other places besides Faculty of Education students.

Second, comprising basic data gauging the improvement of students’ lesson planning skills, two lesson plans Kusahara assigned to students were selected. The eight-class course which Kusahara, one of the authors of this study, led had two portions. In the course’s first half, Kusahara provided an overview of “understanding” and “scientific explanation”-based lesson planning, and as a final assignment, instructed students to create lesson plans in the latter style. In the second half of the course, Kusahara compared and provided an overview of problem-solving and social participation-based lesson planning, and in closing, had students create lesson plans in the latter style.<sup>4)</sup>

The lesson plan for the course’s first half was on the middle school social studies history subject concerning the Mongol invasions of Japan. Instructor Kusahara sought from students’ lesson plans that went beyond an elementary school history level (“the Mongol’s Army invasion was repelled twice due to the hard work of Kamakura warriors like Takezaki Suenaga and rainstorms ... ”) and sparked children’s intellectual curiosity. In other words, Kusahara asked students to develop classes that would cultivate children’s historical awareness, allowing them to interpret the cause and effects of historical phenomena in a multifaceted way that gets to their essence.

For the lesson plan in the second half of the course, the social studies geography subject “lives and culture in the United States” was used. Specifically, using US societal norms

regarding consumption and multi-cultural co-existence as well as related points of debate, Kusahara sought lesson plans from students that would heighten the children's interest in society. In other words, students were asked to develop lesson plans that consider societal issues that arise from conflicts in values and have children make judgments through discussion and decision making about the way the state and society should be.

Students' assessment points and scores for the above two assignments are listed in Table 1.

Third, we extracted, as "students whose lesson planning skills improved through the class," the nine students who either reached a B level in the first "Mongol invasions of Japan" assignment (those with average lesson planning skills) and those who reached A level in the second "lives and culture in the United States" assignment (in other words, those with lesson planning skills that exceeded expectations) . Below, we refer to them as the "improved group."

Fourth, from this nine-person improved group we selected a six-person group with a representative range of characteristics in terms of affiliation within the university and gender and asked for their cooperation in providing the lesson plans they created for the two assignments and in participating in an additional interview survey. The three students shown in Table 2 agreed to do so.

Fifth, we carried out a semi-structured interview with these students using question items that asked about five points: their attributes; intention behind and the background to the creation of their "lives and culture in the United States" lesson plan; their learning after enrolling in university; the classes they took in

elementary, middle, and high school; and their image of social studies classes.<sup>5)</sup>

Sixth, after creating a transcript of their statements from the interview survey, we summarized them while ensuring not to change their meaning. Taking into account students' privacy, we organized the content of their statements in Reference Material B. We used this and the slides students created for their lesson plans (some are presented as Reference Material A) as basic data for our study.

### **III. Discussion of Results (1) : How Did Their Abilities Improve?**

In this section, by analyzing the changes in the lesson plans these three students created for the "Mongol invasions of Japan" (hereafter "Mongol") and "lives and culture in the United States" ( hereafter "United States") , we confirm the improvements in students' lesson planning skills.

For both assignments, students were required to create and submit slides made with the presentation software Microsoft PowerPoint®. Additionally, the assignments stipulated in detail and in advance the number of slides as well as their content and format. Students were instructed to include "lesson objectives (this class hour's aim) ," "lesson development (composition) ," and "lesson sketch ( model diagram, blackboard plan, worksheets, etc. ) ." Therefore, while the spheres and themes of the two assignments differed, it is possible to compare students' achievement levels for each.

After comparing each individuals' two lesson plans, we included aspects that showed a particularly salient improvement in lesson planning skills in Reference Material A. Below, while referring to Reference Material A, we



Table 1: Assessment Points and Students' Scores in Two Lesson Plan Assignments<sup>6)</sup>

Score/Level (Up to 15 Points)	Assessment Points	First Assignment (Mongol)	Second Assignment (United States)
15 points	( Perfect score not given out of educational considerations; students at the beginner level)	0	0
13–14 points [A Level]	(1) Social studies objectives appropriate for the respective theory of teaching were clearly set in accordance with the topic dealt with in the lesson. (2) The student engaged in teaching materials study while consulting specialized works. Also, the presented educational content was structured, and a framework was presented to a certain degree. (3) The lesson had a flow. Key questions (KQ) were established, and an introduction, development, and conclusion were shaped into an exploratory process in which the children engaged. The lesson included aspects that jolted the children, encouraging changes in perspective.	18	13
10–12 points [B Level]	(1) Objectives described were somewhat vague, and the type of awareness children were supposed to form was articulated, yet done so inadequately. (2) While specialized works were not used, the student provided teaching materials based on the textbook by reading between the lines and understanding its intent. (3) While the lesson developed in a linear line and did not jolt the children or include changes in perspective, KQ was established and the student tried to run these consistently throughout class.	64	65
5–9 points [C Level]	Students did not meet the criteria (1) through (3) .	4	9
0–4 points [Not Reached]	Students below C level (those who did not hand in their assignments)	4	3

(Created by authors based on anonymous data)

Table 2. Basic Information Regarding the Three Students<sup>7)</sup>

Name	Faculty & Major	Year	“Mongol” Score	“United States” Score
Masuda	Faculty of Education/Elementary School Education	Sophomore	12 points	13 points
Takayama	Faculty of Education/Educational Studies	Sophomore	12 points	14 points
Kagawa	Faculty of Education/Middle School Social Studies Education	Sophomore	12 points	14 points

\*Students have been given pseudonyms  
(Created by authors)

describe the characteristics of and changes in students' lesson plans, focusing in particular on the extent to which they met the assessment points in their geography lesson plan after their lesson plans had changed.

## 1. Students' Lesson Plans

### (1) Pre-Change: “Mongol” (History)

The objectives and development seen in the first, in other words pre-change, “Mongol” lesson plans were basically the same for all three students.

All students took as their objective having children explain the reason behind the downfall of the Kamakura Shogunate from the perspective of the Mongolian Army's two invasions, and their influence on warrior society while focusing on changes in the relationship between the Kamakura Shogunate and gokenin (vassals). The key question (hereafter KQ) of Masuda and Kagawa's lesson plans was “What led to the downfall of the Kamakura Shogunate?” While Takayama did not clearly indicate a KQ, it can be surmised from his lesson development that his was the same.

While there were some differences in terms of the order in which topics were covered and content, all three students' lessons developed in a didactic manner. They described

historical phenomena in terms of their chronological progression using genetic explanation;<sup>8)</sup> i.e., the situation surrounding the two Mongol invasions of Japan → the reaction of the Kamakura Shogunate at the time of the invasions → the influence of the invasions on the downfall of the Kamakura Shogunate.

Furthermore, as a learning aid, they used worksheets in which children could fill in the items they were taught. However, there was some difference in the forms these worksheets took. For example, Kagawa organized in a chronological fashion the set of events relating to the invasions; Takayama categorized and organized the similarities and differences between the two invasions in terms of dates, military composition, battlefield, strategies, and results; and Masuda incorporated into chronologically presented information the invasions' influence on the relationship between the Kamakura Shogunate and gokenin. In other words, there was diversity in the students' choice of phenomena to cover as well as the meaning imported to them.

### (2) Post-Change: “United States” (Geography)

On the other hand, the teaching materials used in the development of the students' second “lives and culture in the United States” lessons were different. Here, we explain this by

focusing on their worksheets and blackboard plans, which highlight these differences.

First, Masuda centered in on the problem of racism in the multi-ethnic United States, taking as the lesson's objective enabling students to articulate and defend a way for multiple ethnic groups to co-exist. While Masuda did not clearly present any KQs, the worksheet he created included a blank map for children to indicate by coloring the distribution of African-Americans as well as a pie chart showing the racial makeup of the United States, and a question asking about the cultural composition of the country. Furthermore, based on these facts, Masuda presented what could be seen as the lesson's KQ: "What kind of policies should the government adopt to alleviate discrimination against black people?" As reference works, a book by an activist engaged in the anti-racism movement, an article from an economics magazine discussing racial issues, the Embassy of the United States' website, and so on were listed, indicating that Masuda composed the lesson's educational content the lesson plan was based on independent teaching materials study.

Takayama's plan zeroed in on the issue of language in the multi-ethnic United States and took as its object the cultivation of students who could make decisions while taking into account diverse cultural backgrounds. A lesson KQ was not presented. However, judging from the passage in the lesson development section "examining bilingual education that forces Hispanic people to speak English," it can be surmised that the KQ was, "Should Hispanic people also be made to learn English?" Takayama consulted area studies works on the United States, and assuming a situation in which there is a group that supports doing so

for the purpose of a unified national consciousness and a group against doing so on the grounds that cultural backgrounds within the country should be respected, created time for discussion and decision making in groups and in class. In accordance with this, the worksheet was laid out so that children could first summarize the opinions of their groups, then describe differences of opinion in the class as a whole and finally, articulate their own individual opinions.

Kagawa's plan considered the issue of high-volume, large-scale agriculture, taking as its objective the cultivation of children who could hold and assert opinions regarding Japan's future agricultural policies while drawing clues from the issues facing the industry in the US. This objective was turned into a concrete lesson KQ: "What should the path of Japan's agriculture in the future be?" The lesson plan included having children discuss as a class four possibilities for Japanese agriculture after having learned its characteristics in the US. At the end of the lesson, Kagawa included time called "Let's Act" to allow children to create posters proposing agricultural policies and post to the public comment section of the Ministry of Agriculture, Forestry and Fisheries' website. Kagawa envisioned using not a worksheet but a blackboard plan as a teaching aid, designed such that the lesson's development and flow of the discussion could be grasped at a glance. Furthermore, as groundwork for organizing important points of contention related to the subject, Kagawa consulted a report focusing on the issue of poverty in the United States.

### **(3) Post-Change Characteristics**

Comparing the three students, it can be seen that Masuda and Takayama planned their

lessons as so-called issue-centered education, taking the intention behind the assignment straightforwardly. However, the former emphasized teaching how to argue based on facts, and the latter gave precedence to clarifying differences in opinion. These differences in the abilities that the two students wanted children to acquire were reflected in their worksheet designs.

Kagawa turned into a means learning about the United States, and the composition of his lesson sought to apply the results of this learning to where children live (Japan, their region within the country, etc.) . Anticipating differences in opinion and not turning them into a simple A vs. B binary opposition, a more profound issue-centered education was envisioned that understood these differences as a horizontal-vertical four-part matrix.

## 2. Improvements in Lesson Planning Skills

Broadly speaking, all three students' lesson planning skills improved in two ways.

First, they became able to envision objectives and learning activities backed by the theory of teaching that their instructor taught.

Their first lesson plan (Mongol) comprised standard objectives and instruction methods as well as a possibly excessive reliance on textbook passages. While there were some differences in the historical phenomena they covered and the way in which their lessons' learning unfolded, they all saw the historical event of the Mongol invasions of Japan as a factor in Kamakura Shogunate's downfall, trying to help children understand it from the perspective of the change in the relationship between the Shogunate and gokenin. Furthermore, they also all created and used fill-in-the-blank worksheets. These

followed the content of the textbook-spread copies that had been handed out in class, a reflection of their approach that sought to construct lessons so that the facts and interpretations written in them would be transmitted to children as-is. While not covered in this paper, amongst the students who received an A-level evaluation, there was one who, focusing on how these invasions (collectively referred to as the "Genkou") were depicted on the one-yen bill during the Meiji period (1868–1912), conceived of a bold and fresh lesson plan, trying to use a metahistorical approach that would help children realize that historical phenomena are given diverse meanings from the perspectives of later generations. Compared with this plan, those of the three students were of the sort that is seen relatively frequently, in that they refrained from deviating from the textbook's framework.

Their second lesson plans (United States) differed both in goals and content. While the themes focused on varied (race, language, agriculture, etc.), they all presented some sort of point of discussion or debate and were able to conceive of a lesson development that required that children construct judgment standards through participation in discussions and decision making. This shows that they deeply understood the essence of the social participation theory of teaching presented by Kusahara and that they were able to use it in their lesson planning. Furthermore, they all engaged in considerable teaching materials study that made full use of specialized works, the Internet, and so on, not being limited by textbooks and independently choosing educational content. This led them to select stimulating themes that would bring children's

attention to norms that cut to the core of lives and culture in the US as well as to related debates.

Second, in creating their second lesson plans, they tried to structure and elaborate upon worksheets and blackboard plans.

For the first worksheet, all three students only thought to have children enumerate terms and fill in blanks, despite them having been instructed to use a scientific-explanation theory of teaching. Worksheets that aimed to organize knowledge in this way are, as is well known, frequently used in high school classes that aim to instruct students in university entrance examination preparation. In the second assignment, worksheets' compositions were changed in a purposefully rational fashion while taking into account the aim of the social participation-based theory of teaching so that they could support children in engaging in discussions and making judgments.

This three-person improved group grew over the course of one month. Students went from a level at which they were only able to envision a lesson plan that was restricted by textbook content (in a sense, "safe") and not grounded in a theory of teaching to a level at which they were able to conceive of a lesson plan backed up by one.

#### **IV. Discussion of Results (2) : Why Were Students Able to Improve Their Lesson Planning Skills?**

Why were these students able to so dramatically improve their lesson planning skills in a short period of time? We will discuss this while referring to the results of our interview survey (Reference Material B) .

#### **1. Imitating Others, Self-Reflection, and Ignorance**

In our interview survey, we identified three factors governing the improvement of lesson planning skills.

First, students were stimulated by the lesson plans of others and found hints in them for making their own.<sup>9)</sup> For example, Takayama both realized that she had designed a safe lesson plan and tried to absorb another person's lesson planning idea to which she was sympathetic: "In the eleventh class, I saw the 'Mongol' presentations, which really drew me in. Conversely, I thought that my own was boring. I particularly liked K's approach (of exploring the meaning of the Mongol invasions of Japan in terms of intellectual history) and decided to be a little more inventive."

Second, students reflected upon the low assessments they received for the first assignment. They prepared themselves to try to create a lesson that overcame issues in their first presentation by coolly examining them: "For the 'Mongol' lesson, I wrote down everything that I wanted to say; there was no flexibility. Consequently, I didn't know what I wanted to explain and wasn't able to bring everything together" (Takayama) , "(Basically) it was just reading the boldface text in the textbook. I felt that if I was being taught this lesson it would probably be boring; so, I thought that I would change (my approach) ," (Kagawa) etc.

Third, students saw the second assignment lesson as easier and more worthwhile to create. They were of the opinion that a geography-related field was easier because, although they had not studied it in high school, there was more room to choose content: "As for learning about history

(Mongol) , there are various interpretations, and I didn't know which one was correct to teach. For geography (United States) , there were various kinds of data and facts; so, it was easier to teach" (Masuda) .

An opinion was also expressed that teaching materials study with children's learning in mind is enjoyable: "There are many points at which I imagined the actual (lesson) flow, that is, the kinds of opinions that would come from (students) . The process of choosing things from teaching materials that I could use was interesting. I thought that if I were a teacher, creating teaching materials would really be rewarding work." (Kagawa) It can be seen that these factors made flexible lesson planning possible.

In this way, by (1) finding out about others' novel lesson plans, the three students in this improved group (2) realized the poor nature of their own lesson plans, thereby making the problems therein clear. Furthermore, (3) while they were not certain as to what should be taught in geography lessons, since all were considerably flexible, they were able to actively engage in creating their second lesson plans. We can surmise that this was the process and logic of their improvement.

## 2. Reconsidering the K-12 Experience

From our interview surveys, we saw that students reflected upon and reconstructed, throughout each of their post-university enrollment learning experiences, views of social studies that had been established in their K-12 experiences.

Masuda, who majors in Elementary Education, was considerably influenced by his extra-curricular activity experience in a child

support project run by the Faculty of Education as well as by subject-specific teaching method courses. The image of blackboard-centric social studies lessons that Masuda had absorbed from classes in the past were changed by courses on math and social studies teaching methods. It can be surmised that this led him to seek a deep understanding of the educational content that forms the background to lessons and aspire to have children's learning develop in a way that follows their thinking and interests: "While things like the logic behind problems are not taught to children, it is necessary for teachers to understand them." Masuda also stated, "Teachers (should) not say the answers but draw answers out of children; children ( should ) be able to think by themselves based on discussions." This was a case of involvement with children and knowledge acquisition supporting the deepening of lesson planning abilities.

Takayama, whose major is Educational Studies, was greatly influenced by a course on instructional methods for a specific subject as well as one-on-one instructional methods common to all subjects: "In Professor F's Study of Educational Methods seminar ... (I learned) about the importance of establishing goals in a lesson." Takayama also stated, "By having taken Professor T's Assessment of Geography & History Education, I found out that social studies takes various forms besides explaining the content of the textbook." Furthermore, in her statement that "by trying two different types of lesson planning in the Social Studies Education class, my originally vague image of social studies lessons" took a clearer form. We can see here the background to Takayama having become able to connect the universal way of thinking about lesson

creation based on goals with a methodology for creating lessons in accordance with social studies. One of the characteristics of the growth of Takayama's views of social studies was that she became able to reflect and articulate by herself at a meta-level, albeit in an inexperienced way. We could say that her construction and awareness of philosophical rationales of education, emerging through courses, as well as a simultaneous deepening of an understanding of the subject of social studies, supported the heightening of her lesson planning abilities.

Kagawa, who majors in Secondary Social Studies Education, was considerably influenced by social studies education courses, including "Social Studies Curriculum Design Theory." Kagawa's attitude in favor of actively absorbing specialized knowledge regarding subject-specific education is shown in his statement, "While my first year was primarily liberal arts education, this year there are more opportunities to think about subject-specific education." The reference works Kagawa used in his teaching materials study were the ones introduced in such courses. Furthermore, in other courses, Kagawa had already looked over articles on social studies curriculum and instructional methods, and he assimilated theories from all of these sources. Consequently, while originally, Kagawa "had only known the way my teachers at my old school did things, and thought that these ( teachers' lessons ) equal social studies lessons," through his studies following enrolment at university ( particularly the specialized education he received in his sophomore year ) , he came to learn various methodologies. This is so to the extent that he thought, "I didn't know there were so many

various ways of making lessons." Kagawa also stated that his "image of social studies changed." Kagawa is strongly aware of social studies' unique characteristics. It appears that his integration and use of the various theories learned in other social studies education courses and the lesson creation theories from this course, led to the heightening of his planning abilities.

## V. Conclusion

**Why were the lesson planning skills of students who came to be able to create appropriate lesson plans able to be improved?** This was this study's research question.

Here, based on our discussion in section IV, we will present, by logical reconstruction, the factors and structures common to the students who were the subject of our study. These are presented below.

( 1 ) The lesson plans presented by fellow students. Students tried to reflect upon and refine their own lesson plans as a result of being enlightened by others' purpose-rational class plans. ( 2 ) Theories presented by the teacher. Students' own views of social studies and theories of teaching were relativized by learning about multiple theories of teaching with different goals as to what social studies should represent. ( 3 ) Knowledge "I" lacked regarding subjects' content. Students had little formality with regards to what they should teach for subjects and fields that they had not taken during high school; thus, they were able to independently choose and compose content in a purpose-rational fashion.

In closing, we will summarize the lessons these findings can offer to improvements in social studies teacher education.

This study once again confirmed that, as is pointed out in Lortie (1975) , Kawakami (2012) , and Slekar (1998) , that lesson planning beliefs backed by students' learning experiences through high school are firm, and it is difficult to loosen them. To overcome this, it is not enough to just awaken students from the outside to the views of social studies and good lesson standards that they first learn at university and find uncomfortable. As has been attempted in Tanahashi et al. (2014) and Kusahara (2015) , the views of social studies and good lesson standards (as well as conflicts surrounding them) latent within students must be drawn out. The parallel process of having students reveal, adjust, and overcome that which is within them through the experience of evaluating others' lessons and creating their own is especially necessary.

It was also clarified that, in social studies teacher education, students not having studied certain subjects in high school is not necessarily a negative. Rather, it can be perceived as a positive, providing a suitable opportunity for instructing them on a fundamental level about the process of lesson planning. In other words, teachers can help students understand the importance of engaging in teaching materials study and content creation that is in accordance with subject aims. An effective method for doing so is having students plan lessons that can justify the study of subjects and fields that few of them have taken (such as geography and ethics) and have not yet grasped for themselves.

This study suggests that to educate social studies teachers-in-training, it is important to consider whether they have studied certain subjects in high school, incorporate the "aim talk" proposed by Stephen J. Thornton (2004) ,

and guide them in developing lesson planning skills.

### Notes

- 1) For example, the Benesse Educational Research and Development Institute (2014) survey of approximately 4,800 middle-school social studies teachers across Japan shows that many teachers on the ground have still not freed themselves from traditional lesson styles. Almost all of them only spend a few hours per year on "theme-exploration style" learning such as research, report creation, and fieldwork; over half of them do not use ICT instruments such as electronic blackboards and electronic teaching materials.
- 2) The concept of "lesson planning skills" used in this paper incorporates that of "lesson construction" as defined in Moriwake (1988). Moriwake defines " (social studies) lesson construction" as the process of independently establishing the educational aims ( the understandings and capacities) that one wants to be formed in a lesson, choosing appropriate educational content and methods for this formation, and creating a lesson (plan) . For this reason, Moriwake holds that this ability is, to an extent, objectively measurable based on the composition of a student-created lesson and that it is appropriate to adopt as an aim and ensure its formation when educating teachers.
- 3) The course is held yearly by Kusahara (one of this paper's authors ) and Professor Tomoyuki Kobara ( Graduate School of Education, Hiroshima University's) . Osaka and Watanabe were involved as TAs in the latter eight classes that Kusahara is in charge of. They developed teaching materials for class and provided guidance and suggestions



to students. Kim was involved as an observer. For details regarding the course, see Tanahashi et al. (2014) .

4) Terms used in this paper such as “scientific explanation” and “social participation” were defined by Kusahara in the “Social Studies Education Course” while taking into account the findings of research in the field of social studies education. For details regarding each of these theories of teaching, see Shakai Ninshiki Kyouiku Gakkai (2012) .

5) The survey interviews with the three students were as follows.

<Time>

Masuda: 08/21/2014. 10:00~/approx. 35 min.

Takayama: 09/01/2014. 13:00~/approx. 30 min.

Kagawa: 08/24/2014. 18:00~/approx. 35 min.

<Format/Place>

All interviews were carried out in room A401 of the Hiroshima University Faculty of Education. Two interviewers (Osaka and Watanabe) met with each student.

6) The assessment indicators and assessment point-based evaluations used in the two class assignments were implemented by Kusahara, who was in charge of the classes. For this study, the aims of the class were described in advance for the students, to acquire their approval, and then, Osaka and Watanabe analyzed anonymized data and decided who to use as the participants of this survey.

7) Osaka analyzed changes in scores based on the results of Kusahara’s evaluations and decided upon the three students that would be the participants of the survey.

8) A “genetic explanation” is, according to Moriwake (1978) , “An explanation in which phenomena that are factors and conditions precede concluding phenomena; it is an

something that explains circumstances by describing the factors that made phenomena exist, that is, their process by which they came into being” (p. 97) .

9) For class 11, Kusahara chose four high-quality model lesson plans from the “Mongol Invasions of Japan” ones handed in by students, and had their creators present an overview of them.

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Reference Material A: Parts of the Lesson Plans Created by Survey Subject Students

1st Assignment (Mongol Invasions)		2nd Assignment (Lives and Culture in the United States)																			
Masuda	<p>月 日 ( ) 年 組 番 名前 ( )                      社会科歴史ワークシート 「モンゴルの襲来と日本」</p> <p><b>蒙古襲来絵詞を見てみよう</b></p> <p>1. 日本と戦っているのはどこの国の軍隊か? ( )                      御家人は鎌倉で何を要求しているのか? ( )</p> <p>2. 「蒙古襲来絵詞」に描かれた戦いの後、鎌倉幕府と御家人の御恩と奉公の関係はどのように変化していくのだろうか。予想してみよう。</p> <hr/> <p><b>モンゴルの2度の襲来</b></p> <p>1274年 ( ) 元・高麗軍 集団戦法、毒矢や火薬を使った武器一暴風雨により敗退</p> <p>1281年 ( ) モンゴル軍の人数は前回の約5倍一暴風雨により敗退</p> <p><b>鎌倉幕府の対応</b></p> <p>( ) →御家人の土地の売買や買入れの禁止、売った土地を無償で取り戻させるなど</p> <p>◎なぜ幕府は徳政令を出したか?</p> <hr/> <p><b>まとめ</b></p> <ul style="list-style-type: none"> <li>・( ) の繰り返しやモンゴルの襲来による( ) の増大で落ちぶれる御家人が増えた。</li> <li>・御家人救済のために幕府は( ) を出したが、あまり効果は上がらなかった。</li> </ul> <p>↓</p> <p>御家人の幕府への反感が強まる中、倒幕への動きが強まり→幕府滅亡へ</p>	2	<p>月 日 ( ) 年 組 番 名前 ( )                      社会科歴史ワークシート 「アメリカの生活と文化」</p> <p>1. アメリカについて知っていることを自由に書いてみよう。</p> <hr/> <p>2. 地図帳を見て、円グラフの空いているところに書き込んでみよう。また、下の白地図のうち、黒人人口の割合が20%以上の地域に色を塗ってみよう。</p> <p>3. 黒人差別を緩和させるために、どのような政策を行うことが考えられるだろうか。班で話し合ってみよう。</p>																		
Takayama	<p><b>ワークシート例</b></p> <p>元々の二度の襲来</p> <table border="1"> <tr> <td>日本名</td> <td>文永の役</td> <td>弘安の役</td> </tr> <tr> <td>年代</td> <td>1274(文永11)年</td> <td>1281(弘安4)年</td> </tr> <tr> <td>軍</td> <td>高麗軍</td> <td>高麗・南宋軍</td> </tr> <tr> <td>共通点</td> <td colspan="2">                     ・元軍が博多湾に襲来したこと                      ・元軍が暴風雨の被害を受けたこと                 </td> </tr> <tr> <td>相違点</td> <td>                     ・元軍の集団戦法・火器→日本軍を苦しめる                 </td> <td>                     ・海岸に石塁を築くなどの防備→元軍は上陸できず                 </td> </tr> </table> <p>この二つの戦い→合わせて「元寇」とよぶ                      ☆「寇」には敵が攻めてくるという意味がある</p>	日本名	文永の役	弘安の役	年代	1274(文永11)年	1281(弘安4)年	軍	高麗軍	高麗・南宋軍	共通点	・元軍が博多湾に襲来したこと ・元軍が暴風雨の被害を受けたこと		相違点	・元軍の集団戦法・火器→日本軍を苦しめる	・海岸に石塁を築くなどの防備→元軍は上陸できず	3	<p><b>ワークシート</b></p> <p>ヒスパニックへのバイリンガル教育</p> <p>氏名( ) ( )班 立場( )</p> <p>班の意見</p> <table border="1"> <tr> <td>①</td> <td>②</td> </tr> </table> <p>クラスの見解</p> <p>自分の意見 ( )</p>	①	②	4
日本名	文永の役	弘安の役																			
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相違点	・元軍の集団戦法・火器→日本軍を苦しめる	・海岸に石塁を築くなどの防備→元軍は上陸できず																			
①	②																				
Kagawa	<p><b>ワークシート例</b></p> <p>1. ☆(モンゴル帝国)の成立</p> <ul style="list-style-type: none"> <li>○1206 (チンギス=ハン) が建国</li> <li>○1268 (フバイ=ハン) が首都を大都【今の北京】に移す ⇒ ☆(元)を建国</li> </ul> <p>(3) 結果</p> <ul style="list-style-type: none"> <li>①元軍が撤退。</li> <li>②幕府軍、多額の出費、恩賞不足</li> </ul> <p>→御家人、勝っても恩賞もらえず、生活苦に。 ⇒幕府への不満高まる。</p> <p>2. ☆(元寇)</p> <p>(1) 原因</p> <ul style="list-style-type: none"> <li>○フバイ、日本支配のため特使派遣</li> <li>→執権(北条時宗)が拒否</li> </ul> <p>(2) 経過</p> <ul style="list-style-type: none"> <li>○1274 (文永の役) 幕府、元軍の集団戦法や「つはう」に苦戦する。</li> <li>○1281 (弘安の役) 幕府、日本海岸に(石塁)をつくり防戦する。</li> </ul> <p>3. 鎌倉幕府の滅亡</p> <ul style="list-style-type: none"> <li>○1297 ☆(永仁の徳政令) →失敗</li> <li>○倒幕勢力が結集... (足利尊氏)、新田義貞 + (後醍醐天皇)、(悪党(楠木正成))</li> <li>○1333 鎌倉幕府滅亡</li> </ul>	5	<p><b>◎日本の農業は今後どうしていくべきか</b></p> <p>～アメリカの農業の特徴～</p> <ul style="list-style-type: none"> <li>・効率を重視した大量生産型大規模農業</li> <li>・大企業が運営する企業的農業</li> <li>・多国籍企業が経営する海外市場向け農業</li> </ul> <p>&lt;特長&gt;</p> <ul style="list-style-type: none"> <li>・安く食品を購入できる</li> <li>・季節を問わず購入できる</li> </ul> <p>&lt;問題点&gt;</p> <ul style="list-style-type: none"> <li>・中小農家との低賃金契約</li> <li>・安全性の問題                     <ul style="list-style-type: none"> <li>家畜農場の衛生環境</li> <li>家畜動物への抗生物質やホルモンの投与</li> <li>遺伝子組み換え作物</li> <li>甘い食品安全審査</li> </ul> </li> </ul> <p>日本でも農業経営の大規模化がみられる ⇒今後の日本の農業はどうしていくべきか</p> <table border="1"> <tr> <td>A班 食の安全性が失われる危険性があるため、大規模農業は取り入れない</td> <td>B班 消費者にとっては安くおいしい食品が豊富であるため、大規模農業を推進すべき</td> </tr> <tr> <td>C班 大規模農業を取り入れたら、世界で一番おいしい日本の食文化が失われるのではないかと</td> <td>D班 食品の安全管理を徹底し、たうえて、安く食品が手に入る大規模農業を取り入れるべき</td> </tr> </table> <ul style="list-style-type: none"> <li>・大企業と契約した家族農家は生活が苦しくなる</li> <li>・食は安全が第一</li> <li>・日本でも農業を大規模化しても、アメリカなどの国には勝てない</li> </ul> <p>⇒日本の農業は大規模化すべきではない</p> <p>— 板書計画 —</p>	A班 食の安全性が失われる危険性があるため、大規模農業は取り入れない	B班 消費者にとっては安くおいしい食品が豊富であるため、大規模農業を推進すべき	C班 大規模農業を取り入れたら、世界で一番おいしい日本の食文化が失われるのではないかと	D班 食品の安全管理を徹底し、たうえて、安く食品が手に入る大規模農業を取り入れるべき	6													
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\* For both assignments, we have included slide number 7 of Masuda and Takayama, and slide number 8 of Kagawa (about the translation of their slides, refer the support documentation) . (To create this reference document, study authors processed some of the slides survey subject students handed in for the course.)

\*Support Documentation: Translation of the Slides Created by Survey Subject Students

1 Masuda Slide Mongol

Date: \_\_\_\_\_ Grade: \_\_\_\_\_ Homeroom Class: No.: \_\_\_\_\_ Name: \_\_\_\_\_  
Social Studies History Worksheet "The Mongol Invasion and Japan"

Mongol Invasion Handscrolls

1. Which country's army is fighting with Japan?→ ( )  
What are the vassals (gokenin) seeking in Kamakura?→ ( )
2. After the battles shown in the handscrolls, how do you think the relationship between the vassals' rewards (goon) and services (hoko) changed?

The Two Mongol Invasions

1274: ( ) The Yuan and Goryeo armies. Group battle tactics, poison arrows, and weapons that used gunpowder. Lost due to rainstorms.

1281: ( ) Mongolian Army: Five times as many soldiers as before. Beaten due to rainstorms.

• Response of the Kamakura Shogunate...

( ) Buying, leasing, and selling land of vassals were prohibited, and land they had sold was returned without compensation, etc.

◎ Why did the Shogunate issue the Debt Cancellation Order (tokuseirei) ?

Summary

- Due to repeated ( ) and an increase in ( ) resulting from the Mongol invasions, the number of vassals who fell on bad times increased.
- To save the vassals, the Shogunate issued the ( ) , but it was not very effective.



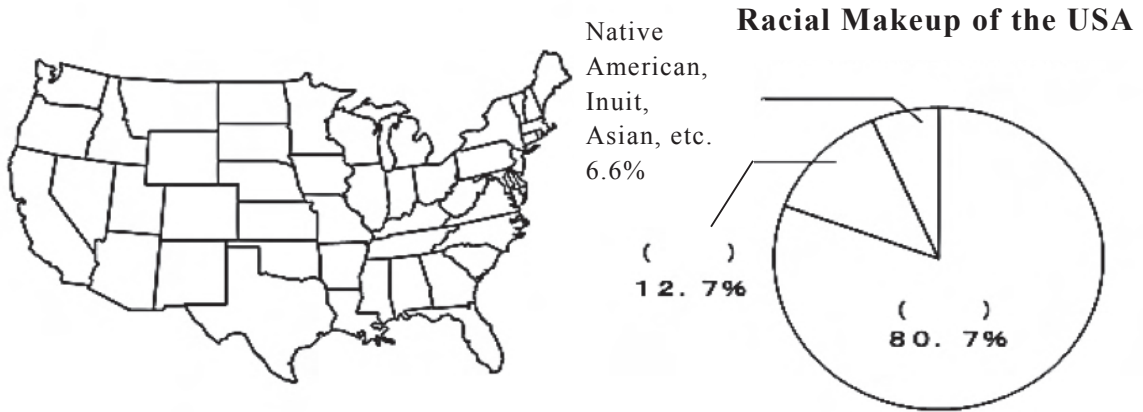
With vassals' bad feelings toward the Shogunate increasing, there was a growing movement to overthrow it, which led to its downfall.

**2 Masuda Slide USA**

Date: \_\_\_\_\_ Grade: \_\_\_\_\_ Homeroom Class: No.: \_\_\_\_\_ Name: \_\_\_\_\_  
Social Studies History Worksheet “Lives and Culture in the United States”

1. Write down some things you know about the United States.

2. Looking at the atlas, fill in the blank spaces in the pie chart. Then, color in the places in the map below where African American people make up over 20% of the population.



3. What kind of policies can be used to alleviate racism against African American people? Discuss this as a group.

**3 Takayama Slide Mongol**

Worksheet Example

The Two Mongol Invasions

Japanese Name	Battle of Bunei	Battle of Koan
Year	1274 (Bunei 11)	1281 (Koan 4)
Army	Goryeo Army	Goryeo and Southern Song armies
Similarities	<ul style="list-style-type: none"> <li>• Mongol Army invaded Hakata Bay.</li> <li>• Mongol Army was hurt by rainstorms.</li> </ul>	
Differences	<ul style="list-style-type: none"> <li>• The Mongolian Army's group tactics and firearms hurt the Japanese Army.</li> </ul>	<ul style="list-style-type: none"> <li>• Seashore defenses (building of stone walls, etc.) . The Mongolian Army was unable to land.</li> </ul>

These two battles are collectively called "Genko"

☆"Gen" means "Mongolian" and "ko" means an enemy attack.

**4 Takayama Slide USA**

Worksheet

Bilingual Education for Hispanics

Name ( ) ( ) Group Position ( )

Group Opinion
---------------

Class Opinion	①	②

My Opinion ( )

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5

## Kagawa Slide Mongol

Worksheet Example

<Left Side>

### 1. ☆ The Establishment of the (Mongolian Empire)

◎ 1206 (Ghenghis Khan) establishes Mongolia

◎ 1268 (Kublai Khan) moves capital to Khanbaliq (present-day Beijing)

⇒ ☆ Establishment of the (Yuan/Mongol) Dynasty

### 2. ☆ (The Mongolian Invasions/Genko)

(1) Cause

○ Kublai sent a special envoy to rule Japan

← Rejected by regent (Hojo Tokimune)

(2) Development

◎ 1274 (Battle of Bun'ei)

The Shogunate suffers due to the Mongolian Army's group tactics and firearms.

◎ 1281 (Battle of Kōan)

The Shogunate builds (stone walls) on the Japanese seashore for defense.

<Right Side>

(3) Results

① The Mongolian army withdrew.

② The Shogunate Army spent lots of money and was not able to adequately compensate for those who fought.

→ Even though they won battles, vassals or gokenin could not receive rewards for having fought.

Their lives became hard.

⇒ Dissatisfaction with the shogunate increased.

### 3. The Fall of the Kamakura Shogunate

◎ 1297 the ☆ (Einin Debt Cancellation Order/einin tokuseirei) → failure

○ Forces to topple the Shogunate came together ... (Ashikaga Takuji) , Nitta Yoshisada

+ (Emperor Go-Daigo) , the (Akuto (Kusunoki Masashige et al.) )

↓

◎ 1333 Fall of the Kamakura Shogunate

6 Kagawa Slide USA

◎ What should the path of Japan's agriculture be in the future?

<Left Side>

~Characteristics of US Agriculture~

- Mass production, large-scale agriculture emphasizing efficiency
- Business-like agriculture run by large corporations
- Agriculture for foreign markets managed by multinational corporations

<Merits>

- People can purchase cheap food products.
- People can purchase food products regardless of the season.

<Issues>

- Low-wage contracts with small- and mid-size farmers
- Safety issues
  - The hygienic environment at livestock farms
  - Giving antibiotics and hormones to livestock
  - Genetically modified crops
  - Weak food product safety inspections

<Right Side>

Farm management is becoming large-scale in Japan as well.

⇒ What should the path of Japan's agriculture be in the future?

Group A: Large-scale agriculture should not be adopted because there is a danger of food becoming unsafe.

Group B: Large-scale agriculture should be promoted because cheap and tasty food is the most important feature for consumers.

Group C: Large-scale agriculture should not be adopted because Japanese food culture, which is the most delicious in the world, will be lost.

Group D: Large-scale agriculture, which gives consumers access to cheap food products, should be adopted after thorough food product safety management has been put in place.

- The lives of family farmers who enter into contracts with large corporations will become difficult.
- Food safety is the most important feature to be considered.
- Even if Japan's agriculture becomes large-scale, it cannot beat that of other countries like the United States.

⇒ Japan's agriculture should not become large-scale.

-The Plan of Writing on Blackboard in the Class-



Reference Material B: Summary of Survey Subject Students' Statements

	Masuda	Takayama	Kagawa
1. Attributes	<ul style="list-style-type: none"> <li>Went to a general education high school. University entrance examination subjects were Japanese History B and Ethics.</li> <li>Every Saturday, I am involved with children as part of the Friendship Project ( various experiential activities for local elementary school students) .</li> <li>I chose social studies for my second license because I enjoyed my high school Japanese History class.</li> </ul>	<ul style="list-style-type: none"> <li>Went to a general education high school. Took Contemporary Society, Japanese History B, World History A, and Politics/Economics. In preparation for the university entrance exam, studied Ethics on my own. Particularly studied Japanese History.</li> <li>I am leaning toward becoming a high school teacher rather than a middle school teacher.</li> <li>Currently teaching study skills once a week at a children's self-reliance support facility ( <i>jidō jiritsu shien shisetsu</i> ) .</li> <li>Since I enjoy Social Studies the most, since high school I have thought of teaching the subject if I were to become a teacher.</li> </ul>	<ul style="list-style-type: none"> <li>Went to a general education high school.</li> <li>Took Japanese History B, World History A, Ethics, and Politics/Economics in high school.</li> <li>Since February 2014, I have been working as a personal instructor at a private-tutoring school (<i>juku</i>) for all elementary and middle school subjects, and high school English, math, and social studies.</li> </ul>
2. Background of and Intentions in Lesson Creation	<ul style="list-style-type: none"> <li>For the "United States" lesson, I wanted to help children understand differences between the United States and Japan, particularly in terms of ethnic makeup (multi-ethnic or not) .</li> <li>I had trouble deciding what kind of material to use because I had not studied geography in high school. I created worksheet shown on slide by myself.</li> <li>Consulted newspaper articles and literature from university library homepages and the Internet. Having decided to teach about racism with regard to the multi-ethnic US, I chose this book after looking at it in order to find out what kind of measures President Obama is adopting.</li> <li>The difference between creating the "United States" lesson and creating the "Mongol" lesson was with regard to gathering materials and making teaching materials. Having reflected upon the "Mongol" lesson (for which my material gathering and teaching materials analysis were not adequate), I was careful. The history lesson took the form of asking children questions. For the geography class, I decided to have children color in a map.</li> <li>When watching other students' "Mongol" lesson presentations in class 11, I realized the</li> </ul>	<ul style="list-style-type: none"> <li>Compared to the "Mongol" lesson, and in order to capture students' interests, I thought of picking up one thing derived from the textbook and creating the lesson, instead of just covering only the textbook.</li> <li>For the "Mongol" lesson, I didn't have the knack (of lesson creation) and my lesson developed in an orthodox way that followed the textbook. In the eleventh class, I saw the "Mongol" presentations, which really drew me in. Conversely, I thought that my own was boring. I particularly liked K's approach ( of exploring the meaning of the Mongol Invasions of Japan in terms of intellectual history) , and decided to be a little more inventive. I thought about what was interesting in high school and middle school and decided that it would be useful to explain aspects not in the textbook.</li> <li>I chose to cover race and ethnicity because they relate to society and students' lives in the future and are familiar content.</li> <li>For the "Mongol" lesson, I wrote down everything I wanted to say; there was no flexibility. Consequently, I didn't know what I wanted to explain and wasn't able to bring everything together. For the "United States" lesson,</li> </ul>	<ul style="list-style-type: none"> <li>For the "United States" lesson, when engaging in teaching materials study I particularly thought about what to use. While a textbook was included in the materials distributed (as part of the course packet), I was not able to envision an hour-long lesson solely based on that. Therefore, I bought a book ( <i>Hinkon daikoku amerika</i> or "The US, A Country of Great Poverty" ) and engaged in teaching materials study based on it.</li> <li>I chose this book because I had found out about it in an article assigned in the 2014 first semester class "Social Studies ( Geography and History ) Curriculum Design" (taught by Kusahara) . Kusahara's introduction to the book stayed with me.</li> <li>Since it (the "United States" lesson creation assignment) was "social participation"-style, I thought about how children could participate, and what means to participate in society. In addition to learning about lives and culture in the United States, it also took time to go beyond that and think about how to make the lesson become something that participates in society. As can be seen in slide 5 (which ask students to discuss the Americanization of agriculture and the issue of TPP participation) , I had students present opinions regarding the United States and</li> </ul>

## How Do Social Studies Pre-Service Teachers' Learn Lesson Planning Skills?

<p>inadequacy of my own lesson plan. These students engaged considerably in teaching materials study, and they were lessons that even we (university) students could find interesting. The way I engaged in teaching materials study was inadequate, and I thought I could do a little more in terms of how I ask questions. I felt that my level was different than those of the presenters.</p> <ul style="list-style-type: none"> <li>• For the geography lesson, I included map coloring because (geography) classes I had taken did so. I think that the reason I changed the learning method for the geography (“United States”) lesson was that I remember working with a map in classes in middle school. I had the image that geography classes have more in-class work than history classes.</li> <li>• The “United States” lesson was a bit easier to make. As for history learning, there are various interpretations, and I didn’t know which was right to teach. Geography was easier to teach because there are considerable data and facts.</li> <li>• The reason that I chose this (human rights and multi-ethnic country-focused) content in the “United States” lesson was because I thought it would be good to have children think about things that are issues at present. Recalling that the news covered issues of race and conflict around the world, I first thought of teaching about the problem of racism ( when creating the “United States” lesson plan) .</li> </ul>	<p>what to focus on had already been decided ( particularly Development II and the concluding portion) ; so, I thought of using this content for that, which could be easily done as learning activities.</p> <ul style="list-style-type: none"> <li>• For reference works, after having decided the theme in advance when I found a book on Hispanics when consulting the university library’s database, I decided to do that.</li> <li>• The “United States” lesson was easier to do than the “Mongol” lesson. Both took about the same amount of time to create. I thought that ( in terms of educational content) it would be fine to simply share with student the fact that this is a culture originating in the United States. With the remaining time, I was able to focus on what I wanted to communicate.</li> <li>• (The reason that I decided to cover race was that) in a social participation lesson, one has to make it ( lesson content) be something thought about by students together. The US culture itself cannot be thought about by students together. Since population composition is a distinguishing characteristic of the United States, I thought that it would be easy for students to think about it together.</li> </ul>	<p>based on them think about the form Japanese agriculture should take.</p> <ul style="list-style-type: none"> <li>• I adopted the aim of “asserting how Japanese agriculture should be and acting” because even if (children) learn about the United States, it is hard for them to participate in its society because they do not live there. I thought that they could participate in Japanese society which is familiar to them and decided to have students (think after having changed their perspective from) the United States to Japan.</li> <li>• I was unsure about the “Let’s Act” part of slide eight, which explained the lesson’s concluding teaching and learning activities. It was pretty hard to come up with an example I could give for how to “act.” In the end, I found out that on the Ministry of Agriculture, Forestry and Fisheries’ website, comments from the public were being sought (about the TPP issue) , and as an example, I proposed that students post there.</li> <li>• Seeing what was written in the textbook, I created the “Mongol” lesson be in a format in which I asked about that. I also made a worksheet. However, (basically) it was just reading the boldface text in the textbook. I felt that if I was being taught this lesson, it would probably be boring; so, I thought that I would change (my approach) .</li> <li>• Using the content of the textbook, I made the “Mongol” lesson an explanation of it. However, in the presentations of the people chosen for class 11, they did not just explain the textbook but proposed lessons using various methods and from various perspectives in a way that went beyond the textbook (content) , and I was stimulated. While until now, I had a fixed image that “a lesson is this kind of thing,” hearing various people’s presentations and being influenced by them, I aimed for my own lesson, a lesson I create.</li> <li>• Comparing the “Mongol” and “United States” lessons, the “Mongol” lesson didn’t take much time. I made it by putting that which was written in the textbook into a teaching plan format, but it was like assembly-line work and was boring. On the other hand, while it was difficult and took time, the “United States” lesson was rewarding. There are many points at which I imagined</li> </ul>
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			<p>the actual (lesson) flow, that is, the kinds of opinions that would come from (students) . The process of choosing things from teaching materials that I could use was interesting. I thought that if I were a teacher, creating teaching materials would really be rewarding work.</p> <ul style="list-style-type: none"> <li>• I changed from the “Mongol” lesson plan format to the “United States” lesson slides that use bullet points, figures, and tables because I heard the various presenters’ presentations in class 11 and found out that there is formality in terms of slide visibility. I thought that I would make (a lesson) my own way.</li> </ul>
<p>3. Learning after Enrolling in</p>	<ul style="list-style-type: none"> <li>• A course that left a particularly strong impression on me was Professor U’s math class, which I took in the second semester of my first year. It was not so much on subject-specific instruction methods but rather centered on the content of the subject. While things like the logic behind problems are not taught to children, it is necessary for teachers to understand them. I think this influenced my lesson creation for this occasion. I think I also had in my mind that for history, things that the teacher should know, besides that which they teach to children, are important.</li> </ul>	<ul style="list-style-type: none"> <li>• After entering university, basically the only class on lesson creation was the class on “Social Studies Education.” Professor Y’s “Sociology of Education” left a particular impression on me. In the class, we thought about the origins of education, its current state, the education system, and an educational-background conscious society. Professor Y is good at creating lessons, and used anime and movies, which are familiar (to students) . His use of movies and the like to teach about differences in education depending on class was particularly impressive.</li> <li>• Professor F’s Study of Educational Methods seminar, which I took at the same time as Social Studies Education, influenced my lesson creation plans. I think I had in my mind what we learnt about the importance of establishing aims in a lesson. Thinking that aims were important, it took a while for me to create aims for both the “Mongol” lesson and the “United States” lesson. However, since my “Mongol” lesson goals were vague, I thought that in the “United States” lesson I had to connect the aims and the lesson itself.</li> </ul>	<ul style="list-style-type: none"> <li>• Social Studies Education was a class at university that left a particular impression on me. I did not know there were so many various (ways of making) lessons.</li> <li>• I had only known the way teachers at my old school taught and thought that they (these teacher’s lessons) equaled social studies lessons. After entering university, various professors taught me different ways to create lessons, and I realized that there are various approaches (methods, styles) .</li> <li>• Social Studies ( Geography and History) Curriculum Design left a particular impression on me. Reading various articles on social studies education, I realized that there are a variety of (ways of implementing) lessons. Since I took the course at the same time as Social Studies Education, it was in my mind. My image of social studies changed. While my first year was primarily general education, this year I have been thinking more about subject-specific education.</li> </ul>
	<ul style="list-style-type: none"> <li>• My high school Japanese history class left an impression on me. While it was a blackboard-centric style that taught the textbook in a typical way, the teacher was knowledgeable about the imperial family, and it</li> </ul>	<ul style="list-style-type: none"> <li>• My middle school social studies teacher left quite an impression on me. For both history and geography, the teacher would draw maps so that we could easily visualize (the topic) , tell funny</li> </ul>	<ul style="list-style-type: none"> <li>• Throughout high school, basically all teachers used lessons that followed the textbook. History was probably diachronic history education: Learn the things in the textbook, as they appear on the test.</li> </ul>

## How Do Social Studies Pre-Service Teachers' Learn Lesson Planning Skills?

<p>4. Elementary, Middle, and High School Classes</p>	<p>was easy to take an interest in the class. In high school, there were many (other) unique teachers (in addition to that one). Since I was interested in topics related to Japanese history that were not written in the textbook, it was an enjoyable class.</p> <ul style="list-style-type: none"> <li>• My middle school teacher engaged (with us) very enthusiastically. The class was easy to understand, and it left an impression on me. I do not really remember elementary school.</li> <li>• I chose to become an elementary school teacher because one can contribute to the growth of children who are a wide range of ages. I also was attracted by being able to witness their process of growth.</li> <li>• I think that the classes I took up through high school and the manner of teachers somewhat influenced my lesson creation this time, but not directly.</li> <li>• I think that there are some differences between lesson creation in elementary school and middle school. While in elementary school, one teaches in a situation in which (the children) do not know anything, in middle school and high school one can create lessons that further deepen the students' thinking.</li> <li>• If I were to teach the "United States" lesson to elementary school students, since they feel that what the teacher says is absolute, I think that I would not push upon them my individual opinions as a teacher but rather plan a class in which students could think about a wide variety of opinions.</li> </ul>	<p>short stories, and so on. Everyone was focused in class and got high scores on tests. It was my most fun and memorable class.</p> <ul style="list-style-type: none"> <li>• For middle school students, it is important that lessons are fun. While there are many middle school students who do not listen to classes, I had the impression that everyone looked forward to that teacher's class. While I think that in high school it is everyone's own responsibility to listen to class, in middle school, not everyone aims to go on to high school. I think that since there are various kinds of students, classes that everyone listens to are important.</li> <li>• Part of my intention behind creating a situation in which (students) had to freely talk in group work was to have everyone pay attention. When talking over things, one's own opinion comes out. Therefore, by having children engage in a discussion with roles having been assigned in advance, in the end, their own true opinions come out. I thought that by doing so, they would be able to get to the (lesson's) substance, even if just a little bit. I think that there are also children who are swayed by the opinions of others, even if they form their own opinion in the beginning. I thought that by adopting a debate format at first and then in the end, having students write down (their own) opinions, it would be easy for them to hold their own opinions. I focused on how to help students engage in debates and make decisions.</li> </ul>	<ul style="list-style-type: none"> <li>• The social studies (civics) class in my third year of middle school left a particular impression on me. At the beginning of each class, one person who was appointed in advance would write on the blackboard news that had caught their attention and talk about it. They talked about a variety of things: society, politics, sports, entertainment, etc. I remember that since (the topics they picked up) occurred in Japan or the world just at that time, it was familiar news that was related to me and stimulated my interest.</li> <li>• With regard to the news that students picked up, the teacher would explain the international relations and politics in the background as well as various ways of thinking about the matter, and then ask us what we thought. The teacher answered everything off the cuff and had so much knowledge. Even if I recall other subjects, that teacher still stays with me. It did not feel like a class—it was not stiff.</li> <li>• My idea of connecting things to what surrounds the children might come from the influence of that teacher.</li> </ul>
	<ul style="list-style-type: none"> <li>• In high school, I liked reading and often read books. I did not dislike reading sources either.</li> <li>• An ideal social studies class is one that is not just an entrance examination subject that inculcates students with the information in the textbook, but one in which children understand that there are various ways of seeing history and geography and think about them for themselves. I do not want to do</li> </ul>	<ul style="list-style-type: none"> <li>• An ideal lesson is one that does not just end simply as a lesson, but one with content that children can be aware of in their daily lives. Also, I think it is important that children be interested in everyday lessons. While they cannot be made to engage in discussions every class, I think it is good if they hold their own opinions by doing so once per unit. With regard to history as well, I think that an understanding of history is important in Japan</li> </ul>	<ul style="list-style-type: none"> <li>• Rather than holding and pursuing a single ideal (that one already has), one aims to acquire a wide variety of knowledge and find a way of thinking therein that fits one's own opinion. After having done so, I want to find an ideal lesson and pursue it. At present, I do not have an ideal (social studies) lesson. If I were to give one, currently, my ideal lesson is one in which children think on their own and share their opinions and then, rethink their own</li> </ul>

5. Image of Social Studies Lessons	<p>fill-in-the-blank worksheets.</p> <ul style="list-style-type: none"> <li>• This image comes from having taking this course and learning that there are various styles for increasing children’s understanding of society, such as scientific explanation and so on. While I knew (the style of) the classes I had taken, I realized that other class (styles) exist.</li> <li>• In many of the classes that I had taken, lessons comprised the teacher talking. My image of social studies changed. Teachers (should) not say the answers but should rather draw answers out of children; children (should) be able to think by themselves based on discussions.</li> </ul>	<p>today. I want children to compare history to the current situation of Japan.</p> <ul style="list-style-type: none"> <li>• By taking Professor T’s Assessment of Geography &amp; History Education, I found out that social studies takes various forms besides explaining the content of the textbook. By trying two different types of lesson planning in the Social Studies Education class, my originally vague image of social studies lessons became clearer.</li> <li>• If I can, I would like to aim toward creating lessons like the “United States” one. Since I think that it is difficult to spend all (class time) in debate, I think it is good if such activities are inserted at key points.</li> <li>• I decided to try to become a social studies ( geography &amp; history, civics ) teacher because social studies was my favorite subject in middle school and high school. While I think that teaching is difficult, the parts of it that relate to the current state of Japan are interesting. Since this aspect touches upon culture and the like as well, it also has practical utility.</li> </ul>	<p>opinions and present them. Put in terms of the Social Educations Studies course, this is a social participation-style.</p> <ul style="list-style-type: none"> <li>• After entering (sophomore) year and seeing and hearing about various ways of doing lessons, (my) image of lessons has expanded. Amongst them, (social participation-style) best suits me. I was really stimulated when I found out that this was a way of doing a lesson, and thought that this is the one I want to try out the most.</li> <li>• The image of social studies I had originally held was one of ( the teacher ) reading the textbook and writing it on the board, and then, that content appearing on the test, and being answered... While it is, of course, important (for the teacher) to explain the textbook and (for the children) to understand its content, my image of social studies changed, when I found out that it is possible to carry out a lesson in which students think about the content, have strong opinions about society, engage in discussions, and act.</li> <li>• If I was to make a lesson using different materials, it would not only be the content of the textbook. I would engage in teaching materials study, deepen my knowledge and present to students familiar examples not found in the textbook. I would want to create an easily understandable lesson in which children could take interest.</li> </ul>
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Authors have added the supplementary information within parentheses. (Authors summarized the contents of the interview surveys of students and organized their answers for each question.)

## **The Process of Learning Japanese Kanji (Chinese character) Words in Chinese-Native Learners of the Japanese Language: Effects of Orthographical and Phonological Similarities between the Chinese and the Japanese Languages**

Fei Xiaodong

The current study examined the process of learning Chinese character words in Chinese and Japanese of Chinese-native learners of the Japanese language. We estimated the learner's learning process by examining the process of Chinese character words. We conducted 2 experiments while manipulating the degrees of orthographical and phonological similarities. Experiment 1 used a two by two factorial design with presentation language (first language, and second language) and orthographical similarity (high and low) , and Experiment 2 used a two by two factorial design with presentation language (First and second language) and phonological similarity (high and low) . These experiments suggested the following; (1) Words with high orthographical similarity have similar processing both in the first and the second language regardless of the learner's proficiency levels of the Japanese language, (2) learners with low proficiency had more active phonological representations of the native language that affected the processing of words, while learners with high proficiency had more active phonological representations of the second language that affected the processing of words. In learners of the Japanese language whose native language is Chinese, discrimination between the orthographical information of the Chinese and the Japanese languages was easy, while instant discrimination between the phonological information of the two languages was more difficult. The study elucidated that Chinese native speakers utilize both orthographical and phonological representations in their native Chinese language in learning Japanese kanji characters. The results indicate the importance of being keenly aware of the learning process where learners read Japanese kanji words using Chinese phonology.

Key Words: Kanji words of Chinese and Japanese, Orthographical Similarity, Phonological Similarity, Word Recognition, Learning Process

## 1. Introduction

How do native Chinese-speaking learners of the Japanese language learn kanji (Chinese) characters in the Japanese language? The current study aimed to elucidate the effects of their native language (L1), Chinese, on the learning process of Japanese kanji characters by estimating the Chinese L1 learner's learning process through an examination of the processing of Japanese kanji words by these learners.

Chinese characters (or, kanji characters in Japanese) are a common orthography shared between the Chinese and the Japanese languages. When a Chinese L1 speaker studies Japanese as a second language (L2), it is difficult to completely remove the effects of L1 Chinese (Fei & Matsumi, 2012). In recent years, many studies have been conducted to examine the processing of Japanese kanji words in Chinese L1 speakers (Cai & Matsumi, 2009; Cai, Fei, & Matsumi, 2011; Fei & Matsumi, 2012; Matsumi, Fei, & Cai, 2012; Fei, 2013). The effects of L1 Chinese on the processing of Japanese kanji words are being elucidated. Investigating the processing of a word would inform us of the acquisition status of a certain learning stage of a learner, and would allow us to understand the learning process that the learner used to achieve their current level of ability. The current study explored the learning process of kanji words of Chinese L1 speakers by examining their processing of those words.

Many previous studies examined the impact of the L1 on the processing of L2 words. In other words, these studies manipulated only one language and observed activity of the other language. Based on the past literature, the current study conducted experiments that manipulated the L1 and L2 simultaneously. By

presenting both languages as stimuli, learners distinguish Chinese characters and Japanese kanji words more clearly, which enabled the study to provide direct evidence to test the "mental lexicon" model that proposes the use of shared and unshared orthographical and phonological representations (Matsumi et al., 2012). In addition, the study was able to observe effects from the Chinese language when a learner studies Japanese kanji words, which allowed us to estimate their learning process of Japanese kanji words.

## 2. Overview of the Past Literature

Investigations of the processing of Japanese kanji words by Chinese L1 speakers started in 1990s. In the early stages of this line of research, most studies focused only on orthographical information of kanji words and studied the processing of cognates and non-cognates (Chiu, 2002, 2003; Chiu 2006, 2007; Cai & Matsumi, 2009). These studies demonstrated that different processes existed for cognates and non-cognates, the former being words whose orthographical forms are similar across Chinese and Japanese, and the latter being words whose orthographical forms are not similar between the two languages. More recently, researchers started focusing not only on orthographical information but also on phonological information of kanji words (Cai et al., 2011; Matsumi et al., 2012; Nagano & Matsumi, 2013). These studies showed that both orthographical and phonological similarities between the Chinese and the Japanese languages affect the processing of Japanese kanji words.

A lexical decision task and a naming task were administered while manipulating the orthographical and phonological similarities

between the Chinese and the Japanese languages in advanced learners of Japanese in China (Cai et al., 2011), intermediate Japanese learners in China (Matsumi et al., 2012), and advanced learners of Japanese who were studying abroad in Japan (Nagano & Matsumi, 2013). The results indicated that the effects of the L1 Chinese differed across these three studies.

In the lexical decision task in Cai et al. (2011), both orthographical and phonological similarities showed facilitation effects on making a correct lexical decision, and there was no interaction of orthographical and phonological similarities. On the other hand, in the naming task, in words with high phonological similarity orthographical similarity had a suppression effect, while phonological similarity showed a facilitation effect regardless of the degree of orthographical similarity. This study demonstrated that the connection between the L2 orthography and L1 phonology was strong in advanced learners of the Japanese language in China.

In Matsumi et al. (2012), phonological similarity facilitated accurate processing of words in both lexical decision and naming tasks. There was no main effect of orthographical similarity or the interaction of the orthographical and phonological similarities. This study indicated that the process that intermediate learners of Japanese in China used was driven by the use of Chinese language representation (both orthography and phonology). The authors pointed out that intermediate learners study Japanese kanji words by reading them using the Chinese phonology.

In the lexical decision task in Nagano &

Matsumi (2013), phonological similarity facilitated correct responses, while there was no main effect of orthographical similarity or the interaction of the orthographical and phonological similarities. However, in a naming task, a facilitation effect of orthographical similarity was seen only in words with low phonological similarity, and phonological similarity had a facilitation effect regardless of the degree of orthographical similarity. The results indicated that the formation of orthographical representations of words with low orthographic similarity became stronger, which resulted in quicker access to phonological representation in the L2 in advanced learners of Japanese who were residing in Japan.

The confluence of these studies indicates that the processing of Japanese kanji characters in Chinese L1 speakers differ depending on the learner's proficiency level of Japanese and the experience using Japanese. These studies elucidated the impact of knowledge of Chinese characters on the processing of Japanese kanji characters. These studies led to the proposal of mental lexicon model of Chinese L1 speakers (Figure 1). According to this model, an orthographical representation is shared between the two languages for words with high orthographical similarity (Figure 1-(a)), while independent orthographical representations exist for words with low orthographical similarity. In addition, separate and independent phonological representations are formed for the two languages for words with high phonological similarity (Figure 1-(b)). Then, what effects does Japanese (L2) have on the processing of Chinese (L1) words in Chinese native speakers?

Matsumi, Fei, & Cai (2014) investigated the effects of knowledge of Japanese kanji



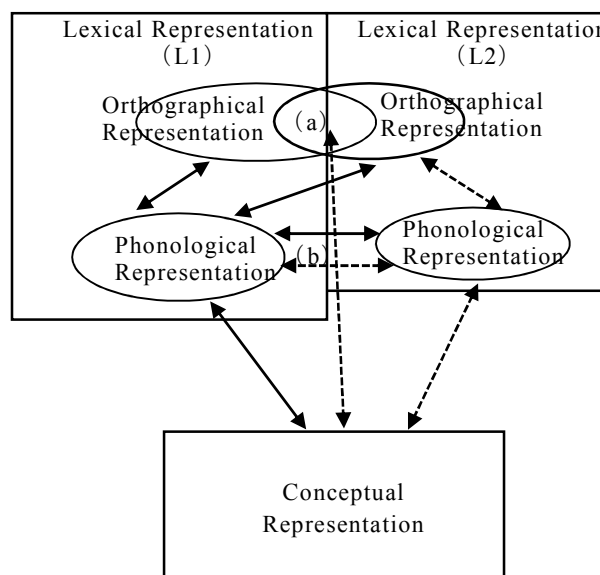
characters on the processing of Chinese words by using a naming task in advanced and intermediate learners of Japanese in China. The results demonstrated a facilitation effect of orthographical similarity in intermediate learners, and a facilitation effect of orthographical similarity and a suppression effect of phonological similarity in advanced learners. The study indicated that greater proficiency of L2 Japanese resulted in an increasing impact of the L2 on the processing of Chinese (L1) words. Furthermore, the study suggested that the impact of the knowledge of L1 (Chinese) words on the L2 kanji processing was greater than the impact of the knowledge of L2 kanji words on L1 Chinese words.

Few studies have investigated the impact of the knowledge of L2 kanji characters on the L1 Chinese word processing. This study by Matsumi et al. (2014) made an important contribution to understanding the orthographical and phonological relationships of Chinese words in Chinese and Japanese languages.

### 3. Research Questions and the Purpose of the Current Study

Previous literature investigated the effects of one language on the processing of the other. There are no studies to our knowledge that manipulated the L1 and L2 simultaneously. By presenting both languages as stimuli, learners distinguish Chinese characters and Japanese kanji more clearly, which enabled the study to provide direct evidence to test the “mental lexicon” model (Matsumi et al., 2012) that proposes the shared and unshared orthographical and phonological representations (Figure 1). In addition, the study was able to estimate the learning process

of Japanese kanji words by making a learner’s distinction between Chinese and Japanese characters clearer.



**Figure 1. The Mental Lexicon Model of Chinese Native Speakers who Study Japanese (taken from Matsumi et al., 2012)**

The following were the hypotheses of the current study:

**[Hypothesis 1]** Words with high orthographical similarity would result in shorter response times regardless of the presentation language, as their orthographical representations are shared between the Chinese and the Japanese languages (Matsumi, et al., 2012; Hypothesis 1-1). Furthermore, in words with high orthographical similarity, no significant difference would be found in response times between the L1 and L2, while shorter response times in response to L1 words would be observed in words with low orthographical similarity (Hypothesis 1-2).

**[Hypothesis 2]** Because of separate and independent phonological representations in

the Chinese and the Japanese languages (Matsumi et al., 2012), response times to L1 words would be shorter regardless of the degree of phonological similarity (Hypothesis 2-1). When the presentation language is the L2, response time would be shorter for words with high phonological similarity, and when the presentation language is the L1, response time would be longer for words with high phonological similarity (Hypothesis 2-2). This will be due to an increased suppression effect of the L2 on the phonological processing of the L1 in learners with greater Japanese (L2) proficiency (Matsumi et al., 2014), and the reported facilitation effect of the L1 on the phonological processing of the L2 (Nagano & Matsumi, 2013).

## 4. Experiment 1

### 4.1 Objectives

Experiment 1 aimed to elucidate the effects of orthographical similarity between the Chinese and Japanese languages on the processing of Japanese kanji words by testing hypothesis 1.

### 4.2 Methods

#### 4.2.1 Participants

Sixteen native speakers of Chinese who were advanced Japanese learners (13 women, 3 men) participated in this experiment. At the time of the participation in this study, all participants were studying at a Japanese university or graduate school, and had already passed the N1 (the most advanced) level of the Japanese Language Proficiency Test. Their duration of stay in Japan ranged from 6 months to 4 years.

#### 4.2.2 Experimental Design

A two-factorial design was used in analyzing the response times in the lexical

decision task, with the first factor consisting of two levels of the presentation language (Chinese or Japanese) and the second factor consisting of two levels of orthographical similarity (high or low). Both factors were within-subject factors.

#### 4.2.3 Materials

The Japanese words were chosen from the levels 3 and 4 word lists from Japan Foundation (2002), and the Chinese words were translation equivalents of these Japanese words. Only the words with low phonological similarity were used. Twelve words each were selected for “Chinese words with high orthographical similarity”, “Chinese words with low orthographical similarity,” “Japanese words with high orthographical similarity,” and “Japanese words with low orthographical similarity,” resulting in a total of 48 words. These words were controlled for the levels of frequencies based on Amano & Kondo (2000).

A one-way analysis of variance (ANOVA) on the frequency of words in each condition revealed no statistically significant difference in the frequency among the conditions ( $F(3, 44) = 0.05, p = .984, \eta^2 = .00$ ). All statistical tests were tested at an alpha of 5% in the current study. We considered the frequency to be equal among these 4 types of words.

A total of 48 non-word stimuli of the 4 different types were selected in a similar manner to the real word stimuli. Table 1 shows the examples of words and non-words used in Experiment 1.

#### 4.2.4 Apparatus

The experimental program was created with SuperLab Pro version 4 (Cedrus Corporation). A personal computer and peripheral devices were used in the experiment.

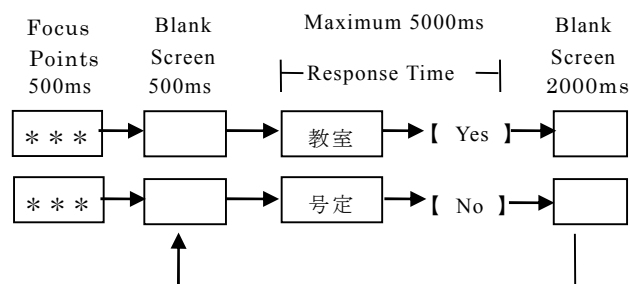
**Table 1 Examples of words and non-words used in Experiment 1**

Examples of Words ( For “Yes” Trials)			
Chinese words with high orthographical similarity	生活	Japanese words with high orthographical similarity	特別
	数学		食堂
	说明		正月
Chinese words with low orthographical similarity	小偷	Japanese words with low orthographical similarity	友達
	水果		息子
	词典		仕事
Examples of Non-Words ( For “No” Trials)			
兔产	比浅	安急	登存
锅消	百即	理記	茶立

**4.2.5 Procedures**

The experiment was performed individually. There were 8 practice trials prior to commencing the task. The experimental task was a lexical decision task using visually presented stimuli. Participants were required to judge as fast and as accurate as possible whether a word shown on the computer screen was a real word in Chinese (shown in red) or in Japanese (shown in black). In each language, the participant pressed a “Yes” key if the participant judged that it was a word in that language, and a “No” key otherwise. The Chinese language was shown in red, and the Japanese language was shown in black. The response time was automatically measured as the duration from the time a word was presented until the participant pressed the “Yes” or “No” key.

Figure 2 shows the flow of a single trial. Focus points were shown for 500 ms on the computer monitor, then, a word stimulus was



**Figure 2. The Flow of Yes/No Trials in the Current Study**

visually presented following a 500ms blank period. Each word stimulus was presented for a maximum of 5000 ms. There was a 2000 ms post-stimulus interval after the participant’s key press, or at the end of the 5000 ms if the participant failed to respond. The focus point was presented only before the first trial. All word stimuli were randomly presented by the SuperLab Pro program.

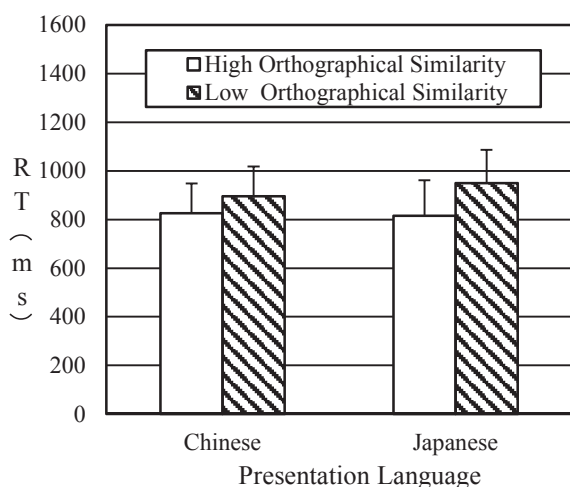
At the completion of the task, the participants were asked to indicate the words that they did not know, and to write down their learning history of the Japanese language.

**4.3 Results**

We analyzed the response times of the correctly answered “Yes” trials in the lexical decision task. Each participant’s response time in error trials, no-response trials, and trials of unknown words were excluded from the analysis. The percentage of excluded trials was 2.90%.

A two-way ANOVA (see Figure 3) demonstrated that the main effect of orthographic similarity was significant, ( $F(1, 15) = 37.16, p < .001, \eta^2 = .13$ ), with shorter response time in words with high relative to low orthographical similarity. The main effect of the presentation language was not significant, ( $F(1, 15) = 1.47, p = .244, \eta^2 = .01$ ). Given the

significant interaction of presentation language and orthographical similarity ( $F(1, 15) = 8.41, p = .011, \eta^2 = .01$ ), simple effects were tested. The results indicated that in words with low orthographical similarity, response time was shorter when the presentation language was Chinese relative to Japanese, ( $F(1, 30) = 6.57, p = .016, \eta^2 = .02$ ). In words with high orthographical similarity, there was no statistically significant difference between the presentation languages,  $F(1, 30) = 0.25, p = .620, \eta^2 = .00$ . Furthermore, words with high orthographic similarity resulted in shorter response time than those with low similarity, when they were Japanese ( $F(1, 30) = 44.58, p < .001, \eta^2 = .11$ ) or Chinese ( $F(1, 30) = 11.85, p = .002, \eta^2 = .03$ ).



**Figure 3. Average Response Times and Standard Deviations in Correctly Answered Trials in Each Condition of Experiment 1**

A two-way ANOVA was also performed on the inverse sine transformed error ratios of each condition. There was no significant main effect of presentation language, ( $F(1, 15) = 0.33, p = .577, \eta^2 = .01$ ) and orthographical similarity ( $F(1, 15) = 0.05, p = .826, \eta^2 = .00$ ),

or the interaction of the two ( $F(1, 15) = 0.05, p = .826, \eta^2 = .00$ ). This indicated that there was no speed-accuracy trade-off where shorter response time conditions produced higher error rate. Therefore, we judged that response times obtained in the current experiment were a valid reflection of time required for performing the lexical judgment task.

**Table 2 Error rates and standard deviations (SD) in each condition of Experiment 1**

	Chinese with High Orthographical Similarity	Chinese with Low Orthographical Similarity	Japanese with High Orthographical Similarity	Japanese with Low Orthographical Similarity
Error Rate (SD)	1.39 (5.38)	1.94 (5.13)	0.97 (3.75)	0.97 (3.75)

## 5. Experiment 2

### 5.1 Objective

In Experiment 2, we aimed to elucidate the effects of phonological similarity between the two languages on the processing of Japanese kanji words, by testing the hypothesis 2.

### 5.2 Methods

#### 5.2.1 Participants

Sixteen native speakers of Chinese who were advanced Japanese learners (14 women, 2 men) participated in the current experiment. These individuals did not participate in Experiment 1. At the time of the participation in this study, all participants were studying at a

Japanese university or graduate school, and had already passed the N1 level of the Japanese Language Proficiency Test. Their duration of stay in Japan ranged from 6 months to 4 years.

#### 5.2.2 Experimental Design

A two-factorial design was used with the

first factor consisting of two levels of the presentation language (Chinese or Japanese) and the second factor consisting of two levels (high or low) of phonological similarity. Both factors were within-subject factors.

**5.2.3 Materials**

Word materials were selected with criteria similar to Experiment 1. Only the words with high orthographical similarity were used. Twelve words each were selected for “Chinese words with high phonological similarity”, “Chinese words with low phonological similarity,” “Japanese words with high phonological similarity,” and “Japanese words with low phonological similarity,” resulting in a total of 48 words. These words were controlled for the levels of frequency based on Amano & Kondo (2000). A one-way ANOVA on the frequency of words in each condition revealed no statistically significant difference in the frequency among the conditions ( $F(3, 44) = 0.41, p = .748, \eta^2 = .03$ ). We considered the frequency to be equivalent among these 4 types of words.

**5.2.4 Apparatus**

The apparatus was the same as in Experiment 1.

**5.2.5 Procedures**

The procedures were the same as in Experiment 1 (See Figure 2).

**5.3 Results**

We analyzed response times of the correctly answered “Yes” trials. Each participant’s response time to error trials, trials with no response, and trials of unknown words were excluded from the analysis. The percentage of excluded trials was 3.68%.

A two-way ANOVA (see Figure 4) demonstrated that the main effect of presentation language was significant, ( $F(1,$

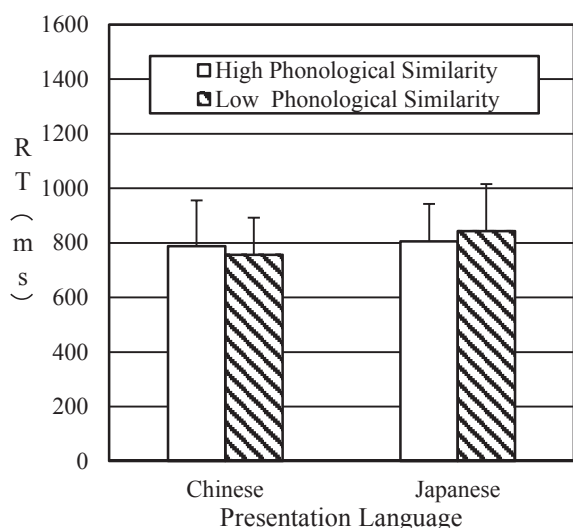
**Table 3 Examples of word and non-word stimuli used in Experiment 2**

Examples of Words ( For “Yes” Trials)			
Chinese words with high phonological similarity	教室	Japanese words with high phonological similarity	天気
	空气		散歩
	漫画		理由
Chinese words with low phonological similarity	作文	Japanese words with low phonological similarity	外国
	交通		学校
	生活		普通
Examples of Non-Words (For “No” Trials)			
们其	过叫	登陸	美凡
谭与	见耸	円役	号定

15) = 15.89,  $p = .001, \eta^2 = .03$ ), with shorter response time in the Chinese relative to Japanese language presentation condition. The main effect of the phonological similarity was not significant, ( $F(1, 15) = 0.03, p = .858, \eta^2 = .00$ ). Given the significant interaction of presentation language and phonological similarity ( $F(1, 15) = 8.33, p = .011, \eta^2 = .01$ ), simple effects were tested. The results indicated that in words with low phonological similarity, response time was shorter when the presentation language was Chinese than in Japanese, ( $F(1, 30) = 23.87, p < .001, \eta^2 = .05$ ). In words with high phonological similarity, there was no statistically significant difference between the presentation languages, ( $F(1, 30) = 0.93, p = .342, \eta^2 = .00$ ). Furthermore, words with high phonological similarity showed tendencies for longer response time than those with low similarity, both when they were Chinese ( $F(1, 30) = 3.01, p = .093, \eta^2 = .01$ ) and Japanese ( $F(1, 30) = 4.05, p = .053, \eta^2 = .01$ ).

A two-way ANOVA was also performed

on the inverse sine transformed error ratios of each condition (see Table 4). There was no significant main effect of presentation language, ( $F(1, 15) = 0.14, p = .718, \eta^2 = .00$ ) and phonological similarity ( $F(1, 15) = 1.31, p = .270, \eta^2 = .02$ ), or the interaction of the two ( $F(1, 15) = 0.32, p = .581, \eta^2 = .00$ ).



**Figure 4. Average Response Times and Standard Deviations in Each of the Conditions of Experiment 2**

**Table 4 Error rates and standard deviations (SD) in each condition of Experiment 2**

	Chinese with High Phonological Similarity	Chinese with Low Phonological Similarity	Japanese with High Phonological Similarity	Japanese with Low Phonological Similarity
Error rate (SD)	1.39 (5.38)	1.94 (5.13)	0.97 (3.75)	0.97 (3.75)

This indicated that there was no speed-accuracy trade-off where shorter response time conditions produced higher error rate.

Therefore, response times obtained in the current experiment were considered a valid reflection of time required for performing the

task.

## 6. General Discussion

### 6.1 The processing of kanji/Chinese words

The current study examined the processing of Chinese (kanji) words in the Chinese and Japanese languages in Chinese native speakers who study the Japanese language, using a lexical judgment task. Experiments 1 and 2 investigated the effects of orthographical and phonological similarities on response times, respectively. The results demonstrated the following two points; (a) Regardless of the presentation language, orthographical similarity showed a facilitation effect as indicated by shorter response time, and response time in the L1 was faster than the L2 in words with low orthographical similarity only, (b) A suppression effect (i.e., longer response times) of phonological similarity was seen when the presentation was in the L1, a facilitation effect of phonological similarity was seen when the presentation was in the L2, and response time was faster in the L1 than in the L2 in words with low phonological similarity. These results indicate that orthographical and phonological similarities have different effects on the lexical judgment processing of the Chinese and Japanese kanji characters in native Chinese speakers who learn Japanese as the L2.

In Experiment 1, we examined the impact of orthographical similarity on the processing of Chinese and kanji characters. The experiment demonstrated that response times were shorter for words with greater orthographical similarity regardless of the presentation language, supporting Hypothesis 1-1. Furthermore, in words with greater orthographical similarity, there was no

significant difference in response time between the L1 and L2, while in words with low orthographical similarity, response time was shorter for the L1 than for the L2, supporting hypothesis 1-2. These results support the proposition that orthographical representations are shared between the two languages in words with greater orthographical similarity (Matsumi et al., 2012). The lack of difference in response times between the L1 and L2 in response to words with greater orthographical similarity presents direct evidence supporting the common orthographical representations. The current study and previous literature (Cai et al., 2011, Matsumi et al., 2012, Nagano & Matsumi, 2013, Matsumi et al., 2014) demonstrate that similar processing exists for the Chinese and Japanese languages for words with high orthographical similarity, regardless of the learner's Japanese proficiency. That is, orthographical similarity facilitated the accurate lexical judgment of Chinese words (L1) and kanji words (L2).

In Experiment 2, we examined the effect of phonological similarity on the process of Chinese (kanji) words. The experiment demonstrated that faster response time in lexical judgment task was only observed in response to L1 relative to L2 words with low phonological similarity, which does not support hypothesis 2-1. In hypothesis 2-1, we predicted that response time would be shorter for the L1 relative to the L2 in words with high phonological similarity, but the experiment did not demonstrate a difference between the presentation languages. We speculate that in advanced learners of the Japanese language, the formation of phonological representations is greater for words with high phonological similarity relative to low phonological

similarity. We used words with high orthographical similarity in Experiment 2. It may be that the formation of phonological representation was similar between the L1 and L2 for words with high phonological similarity, resulting in similar response times. Furthermore, hypothesis 2-2 was supported because the high phonological similarity words resulted in shorter response times when presented in the L2, and longer response times when presented in the L1. The suppression effect of phonological similarity in response to L1 words also supports the greater formation of L2 phonological representations in advanced learners of the Japanese language. This effect of phonological similarity on L1 processing is not observed in intermediate learners (Matsumi et al., 2014) but only in advanced learners. These results seem to indicate that L1 phonological representations are more activated in learners with low Japanese (L2) proficiency while L2 phonological representations are more activated in individuals with higher Japanese proficiency.

Why did orthographical similarity show a similar processing effect of Chinese/kanji characters in both the L1 and L2 while the effect of phonological similarity differed between the two languages? This may be because the extent of phonological representations and the direction of their activation depended on the levels of Japanese proficiency. It appears that it is easy for native Chinese speakers to discriminate orthographical information between the Chinese and the Japanese languages, while discriminating phonological information in a prompt manner may be more difficult.

## 6.2 The learning process of Japanese kanji words

What kind of learning process do Chinese native learners of the Japanese language go through in learning Japanese kanji words? Here, we discuss the learning process of kanji in Chinese native speakers by incorporating the current results with the past relevant studies.

Matsumi et al. (2012) pointed out that it is highly likely that intermediate learners of the Japanese language whose native language is Chinese would first read visually presented Japanese kanji words using the Chinese phonology. The results from the current study support Matsumi et al.'s proposition. While being at low or intermediate Japanese proficiency levels, Chinese native speakers tend to rely on orthographical information of the kanji words and ignore the phonological information. It can be inferred that these learners would covertly pronounce these kanji words using the L1 Chinese phonology, by looking at the orthographical information. Familiarity with the Japanese phonological representations would be low, and as a result the learners encounter a phenomenon of "I understand when I see but I cannot understand when I listen," which is uniquely experienced by Chinese native speakers. This indicates that improving the familiarity with the Japanese phonology is essential in the learning process of kanji words in beginning and intermediate learners.

As the learner's Japanese proficiency improves, they may continue to rely on the orthographical information of kanji words, but Japanese orthographical representations may become more accessible for words with low orthogonal similarity. We speculate that the tendency to study kanji words using the

Chinese phonology would become weak as the learners progress from intermediate to advanced levels of Japanese proficiency and start to rely more on the Japanese phonological representations for kanji words. However, the learning process used during the beginning and intermediate levels of learning Japanese would continue to affect the processing of Japanese kanji words at advanced levels. This is also one of the phenomena uniquely experienced by learners of Japanese whose native language is Chinese.

The confluence of the current and the past studies demonstrate that Chinese native learners of the Japanese language utilize both Chinese orthographical and phonological information upon learning Japanese kanji words. This learning process may both positively and negatively affect Chinese native speakers in learning Japanese kanji words. In order to minimize the negative effect, attention needs to be given from the initial stage of learning the Japanese language.

## 7. Conclusion

The current study examined the processing of the Japanese kanji words by Chinese native learners of the Japanese language, as well as their learning process of kanji words. The study indicated that overt mastering of kanji words by Chinese native speakers may be accompanied by a cost. That is, at times, the previous learning process negatively impacts the processing of kanji words, which results in longer response times in processing those words. Studies examining the relationship between the word learning process and the processing of Japanese kanji words by Chinese native speakers are scarce, and more experimental studies are necessary.



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