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Effects of a Japanese Language Course Design for Foreign Students on Learning Performance Using the First Principle of Instruction Theory

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Abstract:

This study designed a Japanese foreign language learning (JFL) class using the first principle of instruction (FPI) and examined the effectiveness of the course and the improvement in the students' writing ability. The relationship between each element of the FPI and the learning outcomes was then examined to identify factors that should be considered when using the FPI in future JFL design. As a result, students' awareness of the effectiveness of an FPI-based class design saw significant statistical improvement. The results of the correlation analysis confirmed a significant positive correlation between FPI recognition and test and writing scores. The results indicate a need for improvement in JFL design in the future.

Keywords: instructional design, first principle of instruction, Japanese language learning

1. Introduction

With the development of internationalization, the connections between countries have constantly strengthened, and research on foreign language (FL) teaching and learning has also come to be constantly enriched (Şimşek, 2019; Winch, 2016). Some researchers have tried to study FL education from different perspectives, achieving fruitful results. Şimşek (2019) constructed a task-based language teaching (TBLT) model with Turkish as the target language, where students' mastery of professional terms and phrases was improved. Winch (2016) proposed that in today's diversified environment, communicative language teaching (CLT) is an optimal language teaching approach. At the same time, in the context of globalization, research on FL education will continue to develop.

In recent years, researchers have tried to improve the quality of FL education by changing teaching methods and class forms (e.g., Chong, & Lee, 2012; Chen, Shih, & Liu, 2015; Dimas, 2019). However, some problems with foreign language learning classes remain. Linh and Suppasetserereus (2016) point out that Thai university students lack the opportunity to exercise writing skills and lack professional

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theoretical knowledge of foreign language learning. The reason for the lack of practice opportunities is that Thai students follow a particularly traditional lecture teaching style.

The same problem also exists in Japanese foreign language (JFL) classes. Liu (2018) found that in a comprehensive Japanese university class, students' motivation to learn was low because the teaching format was only one. Students had fewer opportunities to practice; while they scored high in the final exam, the exam questions were multiple-choice, and the content of the exam focused on vocabulary and grammar; thus, students' language use ability—such as using Japanese to communicate or write articles—remained poor. Nakanishi (2015) points out that the learning of simple words and grammar makes university students fall into a vicious cycle: they cannot remember words and grammar, are unable to understand the course content, have low motivation to learn, are absent from classes, lack teachers to guide them in learning words and grammar and are unable to recite the course content. To solve these problems concerning JFL, instructional design (ID) constitutes a desirable solution. ID is the framework in which teachers follow planned teaching and learning steps (Richards & Lockart, 1994), and it includes a wide range of fields (Reiser, 2001). With a history dating back to the 1940s, ID has become an integral component in course design (Hernandez, 2016). Course design broadly refers to the processes and methods that can support student learning (McGee & Reis, 2012). Unlike course design, ID has numerous theories and models that all follow a system of assessing needs, designing a process, developing materials, and evaluating effectiveness.

To solve problems pertaining to the design of Japanese as foreign language learning, the first principle of instruction (FPI) theory, which falls under ID theories, can be useful for improving JFL. The FPI is an integrated ID theory; according to Merrill (2002), it is an effective solution and is necessary in principle to materialize a course. The proposed FPI is common to many ID models and theories, is influenced by constructivism and outlines the requirements necessary to achieve five effective learning environments. It has become a common theory in the area of teaching and syllabus design (Honebein, 2019). As mentioned before, the lack of opportunities to apply knowledge is a problem in the JFL classroom. For instance, Linh and Suppasetserueus (2016) point out that Thai university students lack the opportunity to exercise writing skills and the professional theoretical knowledge of foreign language learning. Liu (2018) found that students had fewer opportunities to practice. To solve these problems, ID theory is used to design JFL and increase the opportunities for students to use their knowledge and to exercise their writing skills. The FPI can be a valuable theory for improving the JFL class. In this study, the JFL was designed using the FPI and evaluated.

2. Literature Review

2.1 Reviewing the Application of Instructional Design in Foreign Language Learning

FL has a long history. Over time, scholars have conducted more in-depth and diversified studies on FL. Some researchers have studied foreign language learning from the perspective of linguistics, while many other studies have focused on teaching mode. Linh and Suppasetseereus (2016) point out that Thai students lack the opportunity to exercise their writing skills and the professional theoretical knowledge necessary for learning foreign languages. Further, researchers have used the ID model of analysis, design, development, implementation, and evaluation (ADDIE) to design a Facebook-based collaborative learning (FBCL) model for foreign language classes. The results show that the FBCL model offers teachers and teaching designers a valid and feasible teaching framework. Chen, Shih, and Liu (2015) used ID to design a foreign language class that uses blogs to write up the learning done in class. The results show that after training, students can learn to successfully use the internet to improve their foreign language writing and communication skills.

Few studies on class design have used ID theory for JFL. Goulah (2007) used digital video as a mediational tool to foster critical multiliteracies and transformative learning concerning geopolitics and the environment among Japanese learners. The results show that the students fully understood the teaching content and reflected on it. Kumagai, Konoeda, Nishimata, and Sato (2015) designed a video production project using the “pedagogy of multiliteracies” model (New London Group, 1996) with novice-level Japanese learners to provide an opportunity for them to communicate to a broader audience as learners drew a range of multimodal resources to tell a digital story. The research results showed that students’ oral Japanese abilities improved through learning. However, certain unresolved issues concerning foreign language learning classes remain. Regardless of which classroom mode is adopted, it should be based on the needs of students to obtain the best learning effect (Dos Santos, 2020). Dimas (2019) used ID theory to design and practice FL classes. The results show that while foreign language classes need the support of ID theory, at the same time, teachers face a challenge. For instance, some teachers are not instructional designers, and they may need to discuss how to adapt to such a course. It is thus necessary to support language teachers regarding their ID.

In addition, college students need to train their writing skills, but they may not be well trained in the actual course (Iriyama, 2019). Writing skills are essential because college students need to write reports and papers, but improving writing skills is always a challenge (Fallahi, Wood, & Austin, 2006). The methods for teaching writing commonly used in colleges are topic-centered approaches and mainly teach the application of vocabulary, grammar, and punctuation (Campbell, Smith, & Brooker, 1998). However, when college students write reports and papers, they must have the ability to contextualize basic knowledge. The problem-centered approach allows students to write in meaningful contexts. Researchers have

also conducted studies to verify the educational outcomes of the problem-centered approach (Weber, 2001). Since the FPI is an ID theory that emphasizes problem-centered approach, it is suitable for writing instruction to improve writing ability (Kim, Mendenhall, & Johnson, 2010).

2.2 First Principle of Instruction

The FPI, which was based on existing ID theories and models, was first advocated by Merrill (2002). As the FPI is an integrated ID theory, its use in practical courses was worth the wait. It was proposed under the influence of constructivism and organizes the five requirements necessary to realize an effective learning environment as follows:

(The) five principles are: (a) Problem-centered: Learning is promoted when learners are working to solve real-world problems; (b) Activation: Existing knowledge learning is promoted when activated as a basis for new knowledge; (c) Demonstration: Learning is promoted when new knowledge is presented to the learner; (d) Application: Learning is facilitated when new knowledge is applied by the learner; (e) Integration: Learning is promoted when new knowledge is integrated into the learner's world. (Merrill, 2002, pp. 43–44)

The FPI has been used in teaching. Gardner (2011) compared an experimental group using FPI with a control group and found that the experimental group's performance in the test had improved significantly. In addition, Lo (2015) developed a reversal lesson model by applying the FPI. Research has also shown that students' scholastic ability in mathematics, physics, and Chinese improves through practice. Tu and Snyder (2017) used the theory of the FPI to design a university statistical course, and the research results showed that the course helped develop students' statistical literacy, reasoning, and thinking skills through course learning. In terms of language education, Chong and Lee (2012) designed writing software for FL by applying the FPI, showing that students can improve their learning motivation and creative writing ability by using this software for writing and learning. Previous studies have shown that the FPI is a comprehensive ID theory that can be applied in course-level design, software design, and various other disciplines. This study designed JFL by the FPI, and the educational effects of this principle—such as the learning effect of vocabulary and grammar and the improvement of writing ability—were expected. The method of comparing the effect of JFL design implies verifying the results of the pre-test and post-test scores, including the basic (words and grammar) and writing.

Based on the literature review of FL and the FPI, the current FL class in ID theory is insufficient, especially in JFL. At the same time, the application of the FPI as a comprehensive ID theory in the JFL class may improve the insufficiency of ID theory. It is necessary to explore how JFL lessons can be made more effective from the perspective of the FPI to ensure that its use in JFL is desirable.

3. Purpose

In previous studies, it has been noted that students in their current JFL lacked opportunities to apply their knowledge (Nakanishi, 2015; Linh & Suppasetserueus, 2016; Liu, 2018). The problem-centered classroom approach facilitates students' application of knowledge. For instance, students who studied microevolution using problem-centered instruction were more confident in their ability to solve problems in the future (Gardner, 2011). The FPI is somewhat distinct from other active learning approaches, and it emphasizes the development of the course around practical problems in four elements (Merrill, 2002). Therefore, this study predicts that a JFL designed using problem-centered FPI theory will improve students' learning outcomes. In addition, Iriyama (2019) notes that college students studying Japanese must complete various reports and thus require more support in nurturing their writing abilities. The object of this study was college students, who also need to practice writing skills; thus, to help the students acquire basic knowledge of Japanese, this study also trained and evaluated their writing ability.

In this study, "students' scores" refer to the total score of the basic Japanese test score (choice questions included words, grammar, listening) and writing test scores. Therefore, this study proposes the following hypothesis regarding learning outcomes:

Hypothesis 1: Students' learning outcomes are improved through JFL designed by the FPI.

Prediction 1-1: Students' basic Japanese scores are improved through the JFL designed by the FPI.

Prediction 1-2: Students' writing scores are improved through the JFL designed by the FPI.

Moreover, previous studies have indicated that the elements of the FPI that students perceive in the course have a positive impact on their learning outcomes (Gardner, 2011; Lo, 2015), but they have not indicated how each element is related to and can affect learning outcomes. In this study, all the FPI elements were used in the design, and the time spent on each application element increased based on the lack of practice opportunities in JFL identified in the prior study. Therefore, Hypothesis 2 is proposed:

Hypothesis 2: There is a correlation between each FPI element and learning outcomes, and the strongest correlation is between the application element and learning outcomes.

4. Method

4.1 Course Design

Before the course was designed, teacher was interviewed about the school's course requirements and the students' learning needs. According to the interview, this teacher mainly teaches the basics language knowledge in class, such as vocabulary and grammar, and rarely give students a chance to make active practice. For example, when this teacher teaches 'masu-form' and 'dictionary form', this teacher explains the definition and tell students the difference. However, this teacher does not guide students to think

about what kind of scenarios should use ‘masu-form’ or ‘dictionary form’. In addition, there are few active learning practice in the classroom, such as, group discussion and presentation. Therefore, students also lacked opportunities to practice what they had learned in the classroom, which is consistent with the problems identified in previous studies (e.g., Linh & Suppasetsereus, 2016; Liu, 2018). The course was designed and improved based on the requirements of the school and the needs of the students. The sequence of the design first implied confirming the teaching content and learning objectives proposed by the school. The teaching content required by the school included lessons 20 and 21 of <New Standard Japanese Beginner>. To ensure the continuity of the course, the teacher used the words and grammar learned in Lesson 19 to explain the content of the 20 lessons. The school’s basic learning objective was for students to master vocabulary and grammar taught in textbooks. Based on the school’s basic learning objectives, this study also set up learning objectives to improve students’ writing ability. In addition, it was designed using the FPI after analyzing the students’ Japanese language skills and following the school’s requirements of basic knowledge being taught before group discussions, presentations, and other learning activities.

In previous studies, it was noted that using all elements of the FPI by phase resulted in desirable course outcomes (Gardner, 2011; Lo, 2015); therefore, they were all used in this practice. To improve the lack of active learning practice opportunities for students in JFL, the percentage of time spent on the application elements was increased (see Table 1).

Table 1 Course Design

Course elements	Previous Courses	This Course	The corresponding FPI elements in this course
Learning activities	The students read the text and make sentences with the words.	Complete the activities using the words and grammar according to the topic. The activity takes the form of a group discussion. The students then make a presentation to show works.	Problem-centered (5 Minutes) Activity 1. <Who pays for this?>Read a passage in Japanese and decide who should pay for the meal based on the conditions described in the passage. Activity 2. Situational presentation. If some Japanese students visit your school, you are required to give visitors a reception. You need to introduce yourself and the Chinese culture in Japanese. Activation (15 Minutes) Ask the students to recall experiences in the past to explain new knowledge. Application (30 Minutes) Using the words and grammar, students have learned to complete the activities. Integration (10 Minutes) At the end of the learning activity, give students the opportunity to show what students have learned.
Multimedia used in class	PowerPoint, photos	PowerPoint, photos, video	Demonstration (10 Minutes) For example, Lesson 21 is about Kabuki. Ask students to watch the video and explain what it is.
Support tool	None	Worksheet	Demonstration (10 Minutes) It helps students organize ideas for writing.
Form of learning	Personal activity	Group activity	Integration (10 Minutes) In group work, students can communicate with others and reflect on what students have learned.

4.2 Participants

The subjects of this experiment were third-year students majoring in English at a Chinese university. A total of 52 students attended the course; however, one student did not participate in the first course, and two were absent halfway. As a result, 49 students answered all questionnaire items. These students had started learning Japanese during the second year at university, and according to the Japanese proficiency handbook (Japan Foundation, 2010), students' Japanese proficiency was classified as N5-N4, meaning that they were elementary Japanese learners. The handbook states that N5 students can understand words that frequently occur in specific places, such as the classroom and everyday life, and can understand expressions spoken at a plodding pace in these particular places. N4 students can understand words and shorter texts from everyday life and phrases spoken at a slower pace. The course was optional, and according to the school's constitution and schedule, the content taught in this course was that of lessons 20 and 21 of <New Standard Japanese Beginner >. The course lasted for a month, with two classes of 90 minutes per week; the total time of this practice was 12 hours. The learning objective of the course was to master the vocabulary and grammar of lessons 20 and 21. Then, each lesson was designed using the FPI based on the needs of the students and the learning objectives. The teacher had 10 years of teaching experience. In addition to teaching basic Japanese knowledge, some group activities were conducted simultaneously. The teacher taught basic knowledge, conducted group discussions on the given problem theme and published the results of the discussion.

4.3 Data Collection

The pre- and post-questionnaires regarding the FPI were conducted at the beginning and end of the course. In addition, pre- and post-study tests were conducted to assess Japanese proficiency. The questionnaires were filled out online, and the exams were written on paper. The FPI questionnaire was based on the Academic Learning Time Question formulated (TALQ) by Frick, Chadha, Watson, Wang, and Green (2009). A total of 140 students from 89 undergraduate and graduate courses at multiple institutions answered the questionnaire. The study verified the reliability of the questionnaire using Cronbach's α coefficient. The confidence factors of Cronbach's α are all higher than 0.70 (see Appendix A for details); thus, this survey was considered reliable. TALQ is used when evaluating lesson design for versatility (e.g., Ritzmann, Hagemann, & Kluge, 2014; Xu, 2012). The FPI questionnaire used a 5-point Likert scale, with 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Not sure*, 4 = *Agree*, and 5 = *Strongly agree*. The questions and reliability are provided in Appendix A.

The test was divided into two parts—one about the Japanese language proficiency and the other one about the writing ability. The basic knowledge section of the test included knowledge learned in the textbook and comprised three choice questions, three reading questions, and two listening questions. Each question in all three types carried one point. The total score for the basic part was 11. When assessing

writing ability, <JF Japanese Education Standard> was taken as reference to evaluate the writing level of students from three items: “content,” “grammar/vocabulary,” and “composition.” Each item’s maximum score was 4, and the total score for writing was 12. Students’ writing scores were calculated by adding the scores of the three items. If the learner reached a certain standard, the learner received four points. Taking “content” as an example, the 4-point scoring standard referred to whether the reader could fully understand what was being written (see Appendix B).

5. Results

First, the data were verified by a normal distribution. Since the data were not normally distributed, the Wilcoxon signed-rank sum test and Spearman’s rank correlation coefficient method were used to analyze them. Because the median is used in the calculation, in addition to the mean, the result of the median is also stated in the result. The full score of the basic test was 11, and the full score for writing was 12. After calculation, there was no ceiling nor floor effect.

5.1 Students’ learning outcomes are improved through JFL designed by the FPI.

Consequently, the descriptive statistics and Wilcoxon signed-rank sum test analysis of the test data determined the distribution between the pre- and post-tests.

5.1.1 Students’ basic Japanese scores are improved through JFL designed by the FPI.

The analysis of the Japanese proficiency test score revealed that the post-basic test average (mean 7.22, median 7.00, SD 1.95, $n = 49$) was higher than the pre-basic test average (mean 5.10, median 5.00, SD 1.94, $n = 49$). Additionally, a significant difference ($p < 0.05$) was noted in the distribution of basic Japanese scores (see Table 2).

Table 2 Descriptive Statistics of Japanese Proficiency Test Score

	Mean	Median	SD	z	p
Pre-test	5.10	5.00	1.94	5.174	0.038
Post-test	7.22	7.00	1.95		

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

5.1.2 Students’ writing scores are improved through JFL designed by the FPI.

The analysis of the writing test score revealed that the post-writing test average (mean 6.88, median 7.00, SD 1.64, $n = 49$) was higher than the pre-test average (mean 4.61, median 5.00, SD 1.00, $n = 49$). Additionally, a significant difference ($p < 0.01$) was noted in the distribution of the questionnaire (see Table 3). The evaluation criterion of writing ability was based on the JF Japanese Language Education Standard, which measures the students’ level of proficiency in Japanese (see Appendix B).

Table 3 Descriptive Statistics of Writing Test Score

	Mean	Median	SD	z	p
Pre-Writing	4.61	5.00	1.00	5.617	0.000
Post-Writing	6.88	7.00	1.64		

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

5.2 There is a correlation between each FPI element and learning outcomes, and the strongest correlation is between the application element and learning outcomes.

To verify hypothesis 2, this study analyzed the correlation between the elements of the FPI and students' learning outcomes using Spearman's rank correlation coefficient method. The proportion of the FPI elements used in courses has not been specified in prior studies (Gardner, 2011; Lo, 2015). In this practice, the ratio of application elements was increased to address the lack of practice opportunities for students in the JFL course. Therefore, the effectiveness of this design is analyzed in terms of the correlation between students' awareness of FPI elements and their learning outcomes. Scores under each FPI element were added, the difference between the pre- and post-test scores was calculated, and the correlation between the Japanese proficiency test score and the writing test score was analyzed. Correlations among the variables are presented in Table 3.

A positive correlation was observed between the test scores and the total FPI (.614**, $p < 0.01$) and writing scores (.506**, $p < 0.01$). The basic test scores had a positive correlation between the activation element (.618**, $p < 0.01$) and the demonstration (.455**, $p < 0.01$) and integration elements (.456**, $p < 0.01$). There was no significant correlation between the test scores and the problem-centered element or application element, and there was a weak positive correlation between the writing score and total FPI (.387**, $p < 0.01$). Writing scores were positively correlated with the activation element (.489**, $p < 0.01$). There was a weak positive relationship between writing scores and application elements (.290*, $p < 0.05$), and there was no significant correlation between writing scores and problem-centered elements, demonstration elements, or integration elements. The results show that there is no correlation between all the elements and learning outcomes. The application element is not the element that has the strongest correlation with learning outcomes.

Table 4 Correlations between FPI, Writing Test and Basic Japanese Proficiency Test Score

	Test	FPI	Problem-Centered	Activation	Demonstration	Application	Integration
Basic		.614**	.189	.618**	.455**	.266	.456**
Writing	.506**	.387**	.218	.489**	.102	.290*	.264

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

6. Discussion

6.1 Discussion on students' learning outcomes

From the test results, both the basic Japanese and post-writing scores significantly improved compared to the pre-writing scores. This result verifies Hypothesis 1. Students' basic language scores and writing scores improved in the JFL class designed by the FPI. This result shows that the FPI elements added to this course are practical; further, there is an intentional significance between test and writing, which indicates that the basic knowledge taught in the course applies to writing. However, regarding the SD in Table 3, the post-writing score was significantly higher than before, but the post-SD was also higher. Through this lesson, students' writing skills were strengthened, but the disparity between students also widened. Although the design for writing is effective for the whole class, the degree of understanding of writing content may differ due to individual differences, and the difference between students may increase. Allison, Cooley, Lewkowicz, and Nunan (1998) point out that higher education students undertake limited writing exercises in the classroom and require one-to-one writing instruction. When designing a lesson to solve this problem, it is necessary to understand the learning situation of each student and provide support to the individual.

6.2 Discussion on the correlation between the elements of the FPI and students' learning outcomes.

In Hypothesis 2, the different correlations of FPI elements between the test scores and writing scores were observed. The total FPI had a positive correlation between writing and test scores; this indicates that the design of the FPI is correlated with students' scores and has a certain influence on them. This section discusses the relationship between each FPI element and learning outcomes and presents recommendations for future JFL design based on this discussion.

The problem-centered element shows no significant correlation between writing and test scores. Winch (2016) points out that classroom activities with clear themes would have a positive impact on learners' grades. According to the school's teaching requirements, the basic learning objectives required by the school need to be completed before the activity, and the time for learning activities in the classroom is limited. Thus, only problem-centered activities were conducted during the course. Honebein (2019) points out that problem-centered elements are easily ignored by teachers in classrooms that focus on teaching basic knowledge rather than supporting learning activities; this argument is supported by the practice and results of this study. As the problem-centered element was not significant, it might have been the cause of this result.

The activation element, test scores, and writing scores have an intentionally positive correlation. Through practical research, Ennis (2015) points out that explaining new words with words already learned

in a foreign language produces a better effect on students' learning. The design of this course also focuses on the connection between learned knowledge and new knowledge, and previously learned knowledge was fully reviewed before the start of the course. This course also proved that it is effective to emphasize the connection between previous and new knowledge in the design.

The demonstration element has a weak significant correlation with test scores but no significant correlation with writing scores. The use of multimedia is an important component of demonstration elements. As Huang, Teo, and Zhou (2017) point out, in language teaching, making full use of multimedia resources to show students how to use words has a positive effect on students' learning interest and promotion of learning. This study utilized multimedia elements such as PowerPoint, photos, and videos (see Table1); however, these multimedia elements were only used to show the contents of the textbook, such as the words in the textbook and the pictures related to the words, and no multimedia was used to show writing-related content. This may be the reason for the lack of correlation between demonstrations and writing.

The application element only has a weak correlation with writing scores. Writing activities were designed as part of the application of this study, and the group used worksheets to generate writing ideas and conduct writing exercises. Discussion about writing during the time of the application can be considered the reason for the correlation between writing scores and application. Although the application element was lengthened in this course, the expected effect did not occur, and only a weak correlation emerged between the application element and writing scores. This may be because, when conducting group discussions, students communicate in L1. Lo (2015) points out that excessive use of L1 may pose certain obstacles to reaching targeted language learning. In addition, there was no significant correlation between the application and basic test scores; this may be because, when designing the course, the time for the application was mostly allocated to learning activities such as group discussions or group presentations, and the basics were mainly covered through the activation and demonstration parts. As Kim, Jung, Siqueira, and Huber (2016) point out, the application element is influenced by the time, quantity, and quality of classroom activities. When designing the course and considering the length of the FPI elements, the focus should be on improving quality. For example, the teacher can provide support and guide students in using the target language in discussions.

The integration element had a significant correlation with the basic scores but no significant correlation with the writing scores. At the end of the course, students reviewed and reflected on their knowledge; at the same time, they were given the opportunity to demonstrate learning achievements after each activity. Most of the words used by the students in their presentations were words and grammar that they had learned in class that day, which explains the significant correlation between the integration element and basic scores. Students largely memorized example sentences in textbooks, which indicated a lack of creativity; for example, in the textbook, the original text recited "Mr. Mori can cook Chinese food," and in the

writing test, a student wrote “I can cook Chinese food.” The integration of the FPI comprises three small aspects: reflection, watch me, and creation (Merrill, 2002). For students, writing out obscure notes is not a creative act, and this may be the reason why there is no significant correlation between writing and integration in this practice.

7. Conclusions and future works

In this study, a JFL practiced using the FPI, the effect of which was verified. Students’ basic Japanese scores and writing scores improved significantly. The results of the correlation analysis confirmed a significant positive correlation between the recognition of the FPI, test scores, and writing scores.

To improve the lack of active learning practice opportunities for students in JFL, this practice was designed using problem-centered FPI theory, and the length of the application element was increased. However, the problem-centered element had no significant correlation between writing and test scores, and the application element only showed a weak correlation with the writing grade. The following suggestions are proposed to solve these problems in future JFL designs. Borg (2006) identifies 11 characteristics that distinguish language teachers from other teachers, one of which is that FL is the only subject requiring teachers to teach using a medium (language) that students have not yet understood. Therefore, effective language teaching requires diversity, and it is necessary to create a communicative context and improve student participation. Thus, the classroom form, which is mainly based on students’ learning activities and assisted by teachers’ explanations, can be adopted to solve the problem of learning outcomes and does not correlate with the problem-centered element.

When designing future JFL, it is important to improve the quality of the elements, in addition to focusing on the time they take. Student-centered classrooms can also solve the problem of insufficient application of the knowledge learned, and at the same time, teachers must consider the proportion of teaching and application times when designing the class. Hao and Yamada (2021) indicates a lack of systematic application of ICT in current language learning research. The application of ICT as a learning support tool may enhance the effectiveness of courses. Thus, teachers can use ICT tools such as writing software, digital worksheets, and chatrooms to support students’ learning activities. The effective use of ICT tools can also improve classroom quality.

Although this study found a correlation between the FPI and learning outcomes, the factors that contributed to it are still unknown. As this experiment was conducted in a broad JFL, there may be some inaccuracies in the setting of learning topics. Hao, Susono, and Yamada (2018) points out that the FPI can also be applied to content and language-integrated learning class designs with more specific learning goals. This study has several limitations. First, because of time limited, no preliminary investigation was conducted on the students. Second, because the post-SD value of the writing is greater than the pre-SD value,

it is necessary to interview the students and make a qualitative analysis to understand the reasons for this result with the aim to propose better options for future JFL designs.

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Appendix A

TALQ (Frick, Chadha, Watson, Wang, & Green, 2009)

1. Authentic Problems Scale (Merrill, Principle 1): Cronbach's $\alpha = 0.81$

• I performed a series of increasingly complex authentic tasks during this course. • I solved authentic problems or completed authentic tasks during this course. • I solved a variety of authentic problems that were organized from simple to complex in this course. • The assignments, tasks, or problems I did in this course are clearly relevant to my professional goals or fields of work.

2. Activation Scale (Merrill, Principle 2): Cronbach's $\alpha = 0.91$

• I engaged in experiences that subsequently helped me learn ideas or skills that were new and unfamiliar to me. • In this course, I was able to recall, describe, or apply my past experiences to help me connect to what I was expected to learn. • My instructor provided a learning structure that helped me mentally organize new knowledge. • I was able to connect my past experiences with the new ideas and skills that I learned in this course. • I was not able to draw upon my past experience, nor was it able to relate to the new things I was learning in this course. (-)

3. Demonstration Scale (Merrill, Principle 3): Cronbach's $\alpha = 0.88$

• My instructor demonstrated the skills I was expected to learn during this course. • My instructor gave examples and counter-examples of concepts that I was expected to learn. • My instructor did not demonstrate the skills I was expected to learn. (-) • My instructor provided alternative ways of understanding the same ideas or skills.

4. Application Scale (Merrill, Principle 4): Cronbach's $\alpha = 0.74$

• My instructor detected and corrected the errors I was making while solving problems, doing learning tasks, or completing assignments. • My instructor gradually reduced coaching or feedback as my learning or performance improved throughout this course. • I had opportunities to practice or try out what I learned during this course. • Course instructor gave me personal feedback or appropriate coaching on what I was trying to learn.

5. Integration Scale (Merrill, Principle 5): Cronbach's $\alpha = 0.81$

• I had opportunities to explore how I could personally use what I had learned in this course. • I see how I can apply what I have learned in this course to real-life situations. • I was able to publicly demonstrate what I learned in this course. • I was able to reflect, discuss, and defend what I learned in this course. • I don't expect to apply what I learned in this course to profession or field of work. (-)

Items with (-) are negatively worded, and the rating scores are reversed for the analysis of them.

Appendix B

Writing Evaluation Criteria (Japan Foundation, 2010)

Content: 4. The information necessary for the theme is explained to extent so that the reader can understand; 3. There is a lack of explanation; the reader cannot understand without checking; 2. The reader can vaguely understand the subject, but it is difficult to understand what convey overall; 1. It is difficult to understand because the information necessary for the theme is not accurate.

Vocabulary/grammar: 4. The writer accurately uses words, expressions, and syntax related to the topic; 3. There are some vocabulary and grammatical errors, but the sentence can be understood; 2. There are some parts where the message that the writer wants to convey cannot be conveyed; 1. Since the information is written in pieces, it is difficult to understand what they convey.

Constitution: 4. The reader can connect words and phrases using basic, parallel contact expressions; 3. There are some parts where the relationship between sentences is difficult to understand; 2. Only the points that the writer wants to convey are written side by side; 1. Writing sentences and words in pieces; no sentence composition.

ID の第一原理に基づく日本語授業の学習成果に対する有効性の検討

郝 皓

ID の第一原理 (FPI) を使用して日本語外国語学習 (JFL) 授業をデザインし、授業の有効性と生徒のライティング能力の向上を検討した。そして、今後の JFL 授業デザインに FPI を活用する際に考慮すべき要素を示唆するため、FPI の各要素と学習成果の関係性について検討した。その結果、FPI に基づく授業の有効性と学生の学習成果は、統計的に向上した。相関分析の結果は、FPI へ対する認知と基礎テストのスコアおよびライティングテストのスコアの間有意な正の相関関係があることを明らかにした。今後は本研究における実践の課題、ほかの研究知見も踏まえ、JFL コースのデザインに向けて貢献していきたい。