

EFFECTS OF CONTENT AND LANGUAGE INTEGRATED LEARNING CLASS DESIGN BASED ON THE FIRST PRINCIPLE OF INSTRUCTION THEORY: A CASE STUDY

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ABSTRACT

Content and Language Integrated Learning (CLIL) has emerged as a popular approach to language education in Europe and America in recent years. The main features of CLIL are learning foreign languages while gaining professional knowledge, enhancing student thinking, and improving the understanding of culture. However, CLIL has certain limitations, which a more effective course design may address. This paper aims to use the First Principle of Instruction (FPI) theory, one of the Instructional Design (ID) theories, to design CLIL in order to improve the course. This paper has selected the Japanese CLIL course in China as an example. The target learners are 16 students of the Japanese major at the university. The subject of the course is Intercultural Education. The results indicated that the FPI-based pre- and post- questionnaires revealed significant difference, as compared to those of the Japanese proficiency test. The analyses of the proficiency test, FPI, and CLIL indicated that there is a high correlation between the test and FPI whereas there is a moderate correlation between the test and CLIL and between FPI and CLIL.

KEYWORDS

CLIL, FPI, Foreign Language Learning

1. INTRODUCTION

Content and Language Integrated Learning (CLIL), which gained momentum in the 1990s, has spread in Europe in recent years, with significant advances in a relatively short period of time (Coyle, 2015). CLIL is a dual-focused educational approach wherein a student learns content while simultaneously learning a foreign language gain a certain level of mastery over both (Maljers et al., 2010). Through CLIL, students can enhance the sense of citizenship, increase awareness of the value of transferable skills and knowledge, and improve confidence and the ability to use language; CLIL may significantly increase the learner's thinking ability and offer an opportunity to the youngsters to be bilingual (Sabet et al., 2012). However, studies have also highlighted the shortcomings of CLIL, which more effective, integration of language and content, not only based on teaching experience may address. (e.g., Cenoz et al., 2014). Although CLIL-based courses are likely to be effective, a professional class design method can further improve its effectiveness (Meyer, 2010).

Using Instructional Design (ID) to create a model for CLIL is likely to solve some of the existing problems and expand CLIL's potential. This research focuses on the design and application of the First Principle of Instruction (FPI)-based CLIL program, which is a collection of fundamental principles of ID proposed by Merrill (2002). Statistical analysis, through testing and questionnaires, will be used to evaluate and improve the course design.

2. LITERATURE REVIEW

2.1 CLIL

CLIL is defined as a dual-focused educational approach wherein a foreign language is used to learn and teach content and language (Coyle et al. 2010). CLIL primarily has two features, a Conceptual Framework (4Cs), and five dimensions, displayed in Table 1. In 2005, the European Union (EU) formally recognized CLIL as a cross-curriculum class format (European Commission, 2005). Extensive research has proven that CLIL has improved the learning motivation, and professional performance, and language skills of the students. CLIL and non-CLIL students have different attitudes towards their mother tongue and second language, which may cause differences in their learning motivation (Sylvén, 2015). In a CLIL lesson, the use of foreign language learning strategies as well as geography-related content was facilitated and improved, at the same time, reading skills, lexicon, satisfaction and collaboration were enhanced (Dourda et al., 2014).

An effective integration and balance of content and language in a CLIL course will greatly influence learning. For example, if students are unable to comprehend what the teacher says, they cannot effectively grasp the content. Although CLIL has made significant progress in the last 20 years, it is also necessary to identify methods to continuously innovate CLIL (Dooley et al., 2015). In the current research, CLIL characteristics are employed to improve the quality and design of a class. (Meyer, 2010). So far, there seems to be no unified and effective way to design CLIL courses. In Thailand, researchers used design manuals to help teachers complete CLIL courses, as practice (Kewara, 2017). In this study, we expect to use ID to design CLIL courses, so as to stimulate more potential of CLIL and provide a possible way to design CLIL.

Table 1. The 2 Features (2F), 4Cs, and 5 Dimensions (5D) of CLIL (Coyle et al., 2010)

2 Features	2F-1.Integrating language and content and 2F-2.Flexibility to society and culture
4Cs	4C-1.Contents,4C- 2.Communication, 4C-3.Cognition, and 4C-4.Culture
5 Dimensions	5D-1.Progression in knowledge, 5D-2.Skills and understanding of content, 5D-3.Engagement in higher order cognitive processing, 5D-4.Interaction in the communicative context, and 5D-5.Development of appropriate communication skills, and acquisition of a deepening intercultural awareness

2.2 FPI

In 2002, Merrill advocated the First Principles of Instruction (FPI), which was based on existing ID theories and models. According to FPI, learning is promoted when: (a) learners are engaged in solving real-world problems, (b) existing knowledge becomes the foundation for new knowledge, (c) new knowledge is necessary to demonstrate to the learner, (d) new knowledge is applied by the learner and (e) new knowledge is incorporated into the learner's world (Merrill, 2002).

FPI was intended to identify universal principles of instruction that are common to various ID theories (Cropper et al., 2009). These include: (1) Star Legacy by the Vanderbilt Learning Technology Center, a software shell for instruction (Schwartz et al., 1999); (2) 4-Mat model used by teachers in K-12 education, which is divided into McCarthy (1996); (3) Instructional Episodes describing an instructional episode consisting of three major phases: (a) activation, (b) instructional, and (c) feedback, for supporting instruction rather than a theory (Andre, 1997); (4) Multiple Approaches to Understanding emphasizing the understanding of content rather than problem solving (Gardener, 1999); (5) Collaborative Problem Solving, which is just an extensive list of guidelines, organized under nine process activities: (a) Build readiness, (b) Form and normal groups, (c) Determine a preliminary definition, (d) Define and assign roles, (e) Engage in an iterative collaborative problem solving process, (f) Finalize the solution or project, (g) Synthesize and reflect, (h) Assess products and processes, and (i) Provide closure (Nelson, 1999). (6) Constructivist Learning Environments, which emphasizes problem solving and includes four phases; (a) Attention, (b) Demonstration, (c) Application, and (d) Integration (Jonassen, 1999); and (7) Learning by Doing, which is clearly problem- centered with a very strong emphasis on the application (Schank et al., 1999).

FPI uses cognitive strategy directly and indirectly through intrinsic goal orientation (Lee et al., 2016). In another study, the experimental group using FPI indicated a significant difference between pre- and post-tests at the remembering level and was more confident in solving future problems (Gardner, 2011). FPI is also

used to design learning software, which provides a teaching framework for software design (DeWitt et al., 2013). Other study has shown that students in biology courses designed with FPI as a framework have better remember level in final exams than students in traditional courses. (Gardner et al., 2017). It can be seen from the preliminary study that FPI has strong universality, using an FPI-based CLIL class is likely to improve the composition of the CLIL and address the issues in the current CLIL research.

3. METHOD

3.1 Course Design

Table 2. The relationship between the content of each class and the elements of FPI and CLIL

FPI Strategy level		Content of Lesson 1	Elements of CLIL (Table1)
Level 0	Information	Explain the definition of the Johari window and self-disclosure.	4C-1, 5D-1, 2F-1
1-a		Teach in Japanese.	
Level 1	Demonstration	Teacher to introduce herself first.	
1-a,1-b,	A. Consistent	Present the topic of the day. There are four learning activities	4C-2
2-1-c		from low to high throughout the lesson.	
3-b	B. Guidance	The teacher first introduces herself and provides real-life examples consistent with the subject. She then introduces the social and personal etiquettes that are followed by the Japanese society.	2F-2
3-c	C. Multimedia	Use PowerPoint and pictures to present information. The course materials were uploaded to the Moodle, and the students submitted their comments online at the end of the day.	4C-4
Level 2	Application	Students introduce themselves. Discuss self-disclosure and analyze their own type.	5D-2, 5D-5
4-a			
1-a	A. Consistent	Students use the principles of the Johari window and self-disclosure given to reintroduce themselves.	5D-2
2-b			
4-b	B. Feedback	Students were given feedback on discussion.	
4-b	C. Coaching	The students were given hints about problems they were unable to understand during the discussion.	
Level 3	Task-Centered	Give three different levels of self-introduction.	5D-3
4-c			
2-a	A. Activation	Utilize the learned knowledge to evaluate the teacher's self-introduction.	4C-3
2-b			
2-c	B. Structure	In addition to standing up and introducing themselves, there were other challenging activities. First, introducing themselves to the person next to them. Following which students stood in two columns and introduced themselves to the person opposite them.	
5-b	C. Integration	Rethink how to appropriately introduce themselves in diverse scenarios. Reflect on their self-disclosure and compatibility with others in the future.	4C-3
5-a	D. Peer-Collaboratio	Discuss in groups, exchange views, and then speak to the class.	4C-2, 4C-3, 5D-4
5-c	and Peer-Critique		

*The code "1-a" in the level column indicates the number of stages in the five stages of FPI. The five stages of FPI are as follows: 1.Task-Centered-a. Show task, b. Task level, and c. Problem progression; 2. Activation-a. Previous experience, b. New experience, and c. Structure; 3. Demonstration-a. Demonstration consistency, b. Learner guidance, and c. Relevant media; 4.Application—a. Practice consistency, b. Diminishing coaching, c. Varied problems; and 5. Integration-a. Watch me, b. Reflection, c. Creation

We first determined the content and learning objectives of the course depending on the elements of CLIL. Subsequently, we used FPI to design the content. The goals of this course are as follows, 1. Identify-personal communication styles, 2. Understand multicultural and 3. Improve language and communication skills.

The course covers the following along with cognitive exercise: 1. What is myself?, 2. Image and stereotype, 3. Meeting people, 4. Difference in values, and 5. Moving toward a multi-cultural symbiosis. In addition, the course content, taught only in Japan, covered Japanese etiquettes. We designed the FPI-based checklist to facilitate the design of and control the content, displayed in Table 2. The practice used Moodle at the end of every day to check and comment on the contents. In recent years, research is being conducted on the application of multimedia (as an essential FPI element) and information and communications technologies (ICT) in a class. In this study, we used the open-source solutions, Modular Object-Oriented Dynamic Learning Environment (Moodle), which is widely considered to be user-friendly in higher education (Paulsen, 2003).

3.2 Subjects

The participants were 16 junior Japanese language learners at the University in Republic of China. Among them, ten learners study at the N1 level of the Japanese-Language Proficiency Test (JLPT), five learners at the N2 level of JLPT, and one learner is without a determined level. The learners learned about intercultural education in five days for a total of 15 hours. The course, which was taught in Japanese, commenced with a pre-test and pre-questionnaire and ended with the post-test and post-questionnaire. The test comprised N1 and N2 of the JLPT, while the questionnaire was FPI based (see Appendix 1).

3.3 Data Collection and Analysis

The course lasted for 15 hours over five days. We conducted the pre- and pre-tests and FPI-based pre- and post-questionnaire in this course. Learners were required to answer the pre-questionnaire before taking this class, and post-one at the end of this course. The post-questionnaire comprised questions about FPI and CLIL. The test included N1 and N2 of the JLPT, including six reading and two listening questions. Each N1 question was scored at two points, while N2 was scored at one point, totaling twelve points. The FPI-based questionnaire included 21 questions. Application contained five questions, while the remaining Task-Centered, Activation, Demonstration, and Integration comprised four questions. CLIL based questionnaire included seven questions, three questions for Content, one for Communication, one for Cognition, and two for Culture, and one about the Moodle. At the end of the course, a questionnaire was conducted on CLIL with one question about the Moodle. The qualitative analysis data was conducted using IBM SPSS Statistics 24.0.

4. RESULTS

Consequently, descriptive statistics and Wilcoxon signed - rank sum test analysis on the test data determined the distribution between the pre- and post-tests, pre- and post-questionnaires. Analysis of the FPI-based questionnaire, revealed that the post-questionnaire (Mean 89.38, Median 90.00, Standard Deviation (SD) 8.53, N=16) average was higher than that of the pre-questionnaire (Mean 74.94, Median 74.50, SD 6.65, N=16). Additionally, a significant difference ($p=0.001$) was noted in the distribution of the questionnaire. Similarly, the post-test average score was higher than that of the pre-test, although the results did not reveal any significant difference (See Table3).

Table 3. The descriptive statistics of test (N=16)

	Mean	Median	SD
Pre-test	8.56	8.00	2.10
Post-test	9.00	9.50	3.12

Subsequently, we used Spearman's rank correlation coefficient method to detect the correlation between each element of FPI and CLIL and the test scores. We added the scores of the problems under each of the FPI and CLIL elements, and the correlation analysis was carried out with the difference of test scores. Correlations among variables are presented in Table 4. A strong correlation was noticed between test scores

and FPI, $\rho=.97^{**}$, $p < .01$; test scores and Activation, $\rho=.72^{**}$, $p < .01$; test scores and Demonstration, $\rho=.57^*$, $p < .05$; and test scores and Application, $\rho=.67^{**}$, $p < .01$. A strong correlation was observed between test scores and CLIL, $\rho=.69^{**}$, $p < .01$; test scores and Contents, $\rho=.68^{**}$, $p < .01$; and test scores and Culture, $\rho=.57^*$, $p < .05$. A correlation also existed between the FPI and CLIL, $\rho=.62^{**}$, $p < .01$; FPI and Contents, $\rho=.60^*$, $p < .05$; and FPI and Culture, $\rho=.56^*$, $p < .05$. Activation and CLIL were correlated, $\rho=.55^*$, $p < .05$; Activation and Culture, $\rho=.51^*$, $p < .05$; and Demonstration and Contents, $\rho=.50^*$, $p < .05$. Moodle and Task-Center displayed no correlation with any variables.

Table 4. Correlations among FPI, CLIL and test scores

	Test scores	All of FPI	Task-Centered	Activation	Demonstration	Application	Integration	Moodle
Test scores		.97**	.19	.72**	.57*	.67**	.27	
All of CLIL	.69**		.14	.55*	.30	.44	-.04	.12
Contents	.68**	.60*	.09	.48	.50*	.46	.04	.14
Communication	.12	.12	-.14	.07	-.17	.31	-.02	-.16
Cognition	.31	.31	-.32	.31	.45	.28	-.27	.36
Culture	.57*	.56*	.27	.51*	.28	.24	.04	.28
Moodle	-.20	-.24	-.04	.00	.09	-.18	-.23	

* $p < .05$. ** $p < .01$.

5. DISCUSSION

Data analysis of FPI-based questionnaire revealed that the average of post-questionnaire was not only higher than the pre-questionnaire but also significantly different. Further, a strong correlation was observed between FPI and CLIL. Thus, in addition to CLIL, FPI can be used as a tool for improving courses and the learning model of flipped classroom; the study indicates that the FPI provides teachers with a way to re-examine the existing teaching models (Hoffman, 2014).

In terms of language learning, although the average score of the post-test is higher than that of pre-test, there is no significant difference after statistical analysis. This could be because the test was based on JLPT, and it is difficult to improve a learner's language ability in a short time. However, Dourda et al. (2014) have indicated that in the geographical CLIL class of primary school, the students' geographical performance and the vocabulary and reading ability of foreign languages improved significantly.

Although the pre- and post-test scores did not indicate a significant performance, the test scores were strongly correlated with the FPI and CLIL. In the correlation analysis of the various elements of FPI, a strong correlation was observed between the test scores and Activation, Demonstration, and Application, respectively. Without these three elements, the test scores between the Integration presented no correlation. In the construction strategy of FPI, Integration is at a high strategic level, and it is challenging and relatively difficult to integrate these elements into the curriculum (Merrill, 2013). Test scores and Integration indicated no correlation. In the analysis of the elements of CLIL, test scores and Content and Culture revealed a strong correlation, while Cognition and Communication displayed no correlation. We speculate that such a conclusion could be a result of FPI-based curriculum design without emphasizing the elements of CLIL. However, as the course content involves cultural exchange, there is a correlation between the test scores and Content and Culture.

6. CONCLUSIONS AND FUTURE STUDIES

In this study, we designed FPI-based CLIL courses. Moreover, there was a significant difference in the questionnaire about FPI. Although the test scores were not significant, there was a strong correlation between FPI and CLIL. FPI-based CLIL courses are likely to address the problems raised by previous studies.

There are a few limitations to this study. Since there is no accurate measurement of FPI scale, the questionnaire used in this practice was designed by referring to the questionnaire of other ID theories; hence, it is necessary to improve the reliability of the questionnaire. In the descriptive statistics, the SD value of test scores is large, indicating that there is an obviously personal difference between students. In future research, it is necessary to study the reasons for the differences between students. In addition, this study considered the JLPT, and did not involve teaching content. In upcoming studies, teaching content should be added to the test. In terms of correlation, we can interview the students and use qualitative analysis to discuss the cause of the correlations. Although Moodle was used in practice, it was limited to uploading learning materials and submitting homework. Timely feedback was not given after submission. Other functions of the Moodle collaboration tools should be used in future studies. Collaboration tools such as teleconference seem to be effective on language proficiency (e.g., Yamada and Kitamura, 2011; Goda et al, 2014). There are only 16 samples in this study, and the analysis results are not widely applicable. In the following study, the number of samples will be continuously increased to enhance the credibility of the data.

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Appendix 1. The questions of FPI questionnaire

Task-Centered

1. Where you given a specific task in this class?
2. Are you interested in this lesson?
3. Did the teacher tell you about the role of the task in this course?
4. Did you feel that the composition of this course changed from simple to complicated?

Activation

1. Were you able to recall your past experience in this course?
2. Did you relate the past experience to the new knowledge?
3. Did you use the past experience in this class?
4. Through this lesson, did you structure the past experience and new knowledge?

Demonstration

1. Did the teacher give examples during the class?
2. Was the example given by the teacher consistent with the learning content?
3. Did the teacher give a proper explanation when giving examples?
4. Was there a proper use of multimedia in the course?

Application

1. Was the new knowledge applied in class?
2. Were group activities aligned with the learning objectives of the course?
3. Did the teacher give appropriate guidance and feedback?
4. Did you feel that as your abilities improve, your teacher's guidance diminishes?
5. Did you feel that the topic of group activities has gradually changed from a single problem to a complex one?

Integration

1. Do you think what you learn in this class can be applied to your life?
2. Is the knowledge you have learned visible to others?
3. Did you do any reflection in class?
4. Have you ever thought about how to apply what you have learned in a creative way?

Appendix 2. The questions of CLIL questionnaire

1. Do you think the learning objectives of this course are clear?
2. Do you understand the content of the course?
3. Have you built your own knowledge system through this course?
4. Does this course deepen your understanding of the Japanese culture?
5. Do you think the Japanese culture introduced in the course is closely related to the learning theme?
6. The teacher taught in Japanese. Do you think it is necessary to add Chinese language to assist?
7. Do you think the Moodle aids your learning?