

(English Immersion Education 〈Science〉)

# Studies of Implementing English Immersion Education — Using Experiential Learning and Task Activities in the Science Classrooms —

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## I Introduction

The Ministry of Education, Culture, Sports, Science and Technology released *Regarding the Establishment of an Action Plan to Cultivate “Japanese with English Abilities”* in 2003 and set a target of English ability for Japanese students. In 2005, the Okinawa Prefectural Board of Education announced their internationalized school education plan and designated one JHS and one SHS as English immersion education research schools. English immersion education is a learning program for teaching English as a second language. Students do not just study English; but also other subjects are taught in English. English immersion education creates an English environment in the class and immerses students in English. Teachers must teach the contents based on the course of study to students while aiming to foster talented people who have a global perspective.

The Curriculum Council stated in 2007 that in Japanese English education, there are more students who think English is important and useful than those that think other subjects are important and useful, but the number of students who enjoy English decreases as education progresses, and at the same time the number of students who can't understand classes is increasing. According to *Trend in International Mathematics and Science Study* (TIMSS) in 2003, in Japanese science education, students' scores are of a high level internationally, but the number of students who enjoy science classes is below the international mean. As a common problem of teaching both English and science, I think students' motivation to study isn't sufficient.

I think that students will approach this goal when teachers make use of a lot of communication and activities that “foster talented people who have a global perspective.” To achieve this goal, I think it is important that teachers make use of experiential learning, which is learning from direct experience, so that students can learn science in English and improve English skills at the same time. Moreover, as teachers make use of task activities to lower the affective filter, I think immersion education will become effective. Therefore, I decided to make this the theme of my research.

〈Hypothesis〉

After teachers make use of experiential learning and task activities in science classes, students will learn intently and their affective filter will be lowered. Therefore students' understanding will be raised.

## II Research Contents

When English immersion education is introduced, I think its strength will be raising the English ability of students, but its weakness will lower their understanding of science. But teachers must teach science properly and use effective methods. Therefore, students' interest in both English and science must remain at high levels. When students learn eagerly, their affective filter is lowered. I pay attention to the following two points to prove the hypothesis: First, I make use of experiential learning in the science classroom because it is easy for students to memorize. Second, I make use of task activities because they make it easier to learn English expressions.

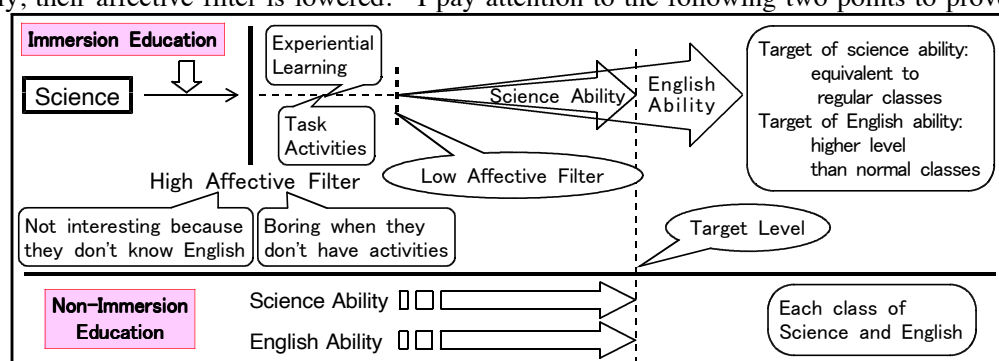


Figure 1: Comparison of Normal Education and Immersion Education

## 1 Experiential Learning

According to the *Experiential Learning Case Collection* from the Ministry of Education, Culture, Sports, Science and Technology: “Experiential Learning” is activity that uses the body to create a direct learning experience. Students experience phenomenon to learn about things from the outer world through the sensory organs: sight, hearing, taste, smell, and touch. The learning process of students is described as follows: “feelings create thought, and thought creates action.” First, students experience things from the outer world through sensory organs. Second, students think why, and form concepts and get knowledge. Finally, students adopt the knowledge to their life and act on it. Direct experience by the students is taken as an important process in “the practice of intelligence” and it is an important activity method.

## 2 Task Activity

Tasks are activities which have meaning as their primary focus (Nunan 1989; Skehan 1996a). Skehan (1996b: 20) defines tasks as activities that raise a learner’s language ability at language acquisition. The character of task activity is summarized in six conditions in Table 1 (Takashima, Moriyasu 1997; Takashima, Kiba, Maeda 1999). Concretely: ① Negotiation of messages by using target language is the focus. ② Learners use the target language through activities and achieve the goal. ③ When problems arise in negotiation of messages, learners negotiate meaning by asking again or checking what the partner said. ④ The teacher designs the activity so that learners can choose and use the most suitable forms. ⑤ The speaker and the listener will have different information according to the situation. ⑥ When learners do the task activities using their imagination, they will gain new information and achieve more. Furthermore, when learners do pair work with an assured result and solution, learners can enjoy communication in the target language.

Table 1: Six Conditions of Task Activity

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|---|
| ① Meaning and messages are the focus.   |
| ② It is most important that the activity target is achieved by using the target language. |
| ③ There is a negotiation of meaning.  |
| ④ There is a comparison of two or more structures.  |
| ⑤ There is an information gap between the speaker and the listener.                       |
| ⑥ The activity and the acquired information are interesting.                              |

## 3 Four Steps of English Immersion Education (Practical Plan)

First step: the teacher teaches students the basic grammar and frequently used directions at the introduction stage of English immersion education. At that time, the learning level of science is usually expected to be delayed in comparison with non-immersion education. Second step: after students understand basic grammar and directions, the teacher begins using laboratories and activities. The teacher ensures that students do not feel a linguistic gap through use of sensory organs. Third step: the teacher commences task activities to raise students’ English conversation ability. Through experiential learning and task activities, students will come to feel a sense of fulfillment that they could develop in English immersion education. Fourth step: when students get accustomed to the English immersion education teaching method, the teacher raises the science teaching level. Finally, students are expected to raise their science ability in immersion education to the same level as non-immersion education. At the same time, students will improve their English ability beyond that of non-immersion education.

### (1) First step (Beginning level)

Teach basic grammar and directions.

### (2) Second step (Semi-middle level)

Perform laboratory experiments and other activities, and ensure that students do not feel a linguistic gap.

### (3) Third step (Middle level)

Engage in task activities to raise students’ English conversation ability.

### (4) Fourth step (Advanced level)

Raise the science teaching level, and have students understand science as well as non-immersion students and English better than non-immersion students.

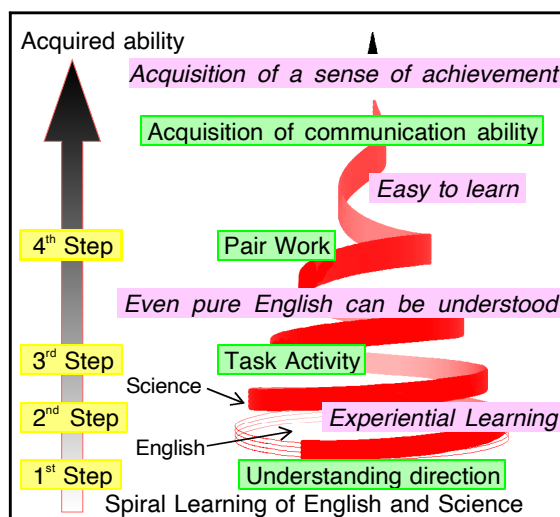


Figure 2: Four Steps of English Immersion Education

#### 4 Preparation for Class Practice

I will describe a methodology for teaching the “Balance of Nature” to Junior High School students, appropriate for students at the third step of the acquired English ability described above.

##### (1) The Concept for Experiential Learning

I have students perform the following experiential learning in a class.

<p><b>I What Am I?</b></p> <ol style="list-style-type: none"> <li>1. Introduce or review a number of different classification schemes with the students: -Producers, Consumers, Decomposers -Green plants, Herbivores, Omnivores, Carnivores</li> <li>2. The students are given one of the common ecosystem elements included in the <i>What Am I</i> cards (e.g. grass, crow, etc.) and must not show this card to anyone.</li> <li>3. Ask the students to hang their card on the back of one of their fellow students so that their fellow students don't know what card they have.</li> <li>4. When the teacher says “GO!,” the students attempt to find out what they are by asking the other students questions that use the key words on the board, such as “Am I a carnivore?” – All questions can only be answered by a yes or a no!</li> <li>5. If the students find they need more information, the teacher tells the students that they are allowed to ask more general yes/no questions (Ex. “Do I have four legs?”) to find out more.</li> <li>6. When the teacher say “STOP!” everyone gets into groups according to keywords.</li> <li>7. The students make a circle, and guess what they are.</li> </ol>	<p><b>II Food Chain</b></p> <ol style="list-style-type: none"> <li>1. Assign one of them the role of the tiger, and one of them the role of the zebra, and tell them the tiger must catch the zebra (and the zebra must try to avoid capture) despite the fact that both animals will be blindfolded.</li> <li>2. Tell the tiger that he/she will have three chances to find out where the zebra is. He/She will be allowed to clap his/her hands three times, and the zebra must immediately clap its hands in response.</li> <li>3. Let the game take place and after the activity, ask questions: How did it feel to be hunted?</li> </ol> <p><b>III Food Web</b></p> <ol style="list-style-type: none"> <li>1. The teacher gives the student who is the sun one end of a piece of string and continues to the next student who needs the sun to survive, and so on. The students should remain where they are and not move into a line.</li> <li>2. When every organism is connected, have the students pull gently to make the string taut. The teacher tell a student that he/she died and must drop the string.</li> <li>3. If students feel something, they drop the string. The teacher asks the students what they feel.</li> </ol>
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Figure 3: An Example of Experiential Learning

Students do the above experiential learning activities like games, and improve their learning motivation.

From these simulation activities, students will be able to grasp the functioning of the natural environment.

##### (2) An Example of a Task Activity

I use the following task activity in the experiential learning activity “What Am I?” of Figure 3.

<p><b>1st step</b></p> <p><b>Question</b></p> <p>Am I a [        ]?</p> <p>Ex. Am I a producer? Am I a carnivore?</p> <p><b>List</b></p> <p>Producer, Consumer, Decomposer, Green plant, Herbivore, Omnivore, Carnivore</p> <p><b>Answer</b></p> <p>Yes, you are. / No, you aren't.</p>	<p><b>2nd step</b></p> <p><b>Question</b></p> <p>Can I ~, Am I ~, Do I ~, Is my ~</p> <p>Ex. Can I fly in the sky? Am I bigger than a dog? Do I have four legs? Is my body color green?</p> <p><b>Answer</b></p> <p>Yes, you can. / No, you can't. Yes, you are. / No, you aren't. Yes, you do. / No, you don't. Yes, it is. / No, it isn't.</p>	<p><b>3rd step</b></p> <p><b>Question</b></p> <p>All questions are OK. But don't ask “What Am I?”</p> <p>Ex. How many legs do I have? What color is my body? How can I cry?</p> <p><b>Answer</b></p> <p>All answers are OK. But don't say the “name.”</p>
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Figure 4: An Example of a Task Activity

I have students hang their picture card on the back of one of their fellow students and make a pair. At the first step, I explain a form of question and answer so that all students can perform the activity. All students will deduce some information about their own picture cards. At the second step, I give some examples of yes-no questions. Students will ask questions by looking at examples and obtain more information. At the third step, I tell students all questions are OK, but don't ask “What Am I?” Thus, I get the students to do the task activity using sentence patterns separated into groups of ascending difficulty.

##### (3) Methods for Using Visual Aids

Students have a linguistic gap between English and Japanese, so I use relatively easy English words and employ gestures in order to clarify an expression difficult for students. Also I use presentation software and posters. As mentioned above, I make an effort to minimize problems that may occur due to the linguistic gap.

### III Teaching Practice

#### 1 Main Subject: Balance of Nature

#### 2 Class Hypothesis




After students get interested in the way organisms depend on each other for food and experience the way that organisms are closely tied in nature, they will be able to imagine and explain the relationship of organisms in nature.

#### 3 Goals for this class

The student demonstrates a conceptual understanding of the structure and function of ecosystems, that is, the student can:

- (1) State classification of organisms. [Review]
- (2) Describe the relationship of organisms depending on each other for food. [Review]
- (3) Communicate in experiential learning activities.
- (4) Describe the way that organisms are closely tied in nature.
- (5) Explain how the balance was restored in the numbers of organisms.
- (6) Imagine and describe the relationship of organisms in nature.

#### 4 Teaching Procedure

Stage (Time)	Teacher's Advice	Students' Activity	Remarks and Evaluation
Intro- duction (10min.)	<b>I Classify the Organism</b> Show the main subject. <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <b>Balance of Nature</b> </div> Handout worksheet. Use picture cards and have students classify them. <div style="border: 1px solid black; padding: 5px; margin: 5px auto; width: fit-content;">             Grass, Rabbit, Frog, Crow, Snake, Sunflower, Mouse, Wild boar, Mold, Mushroom, Grasshopper, Earthworm           </div>	Check "Producers," "Consumers" and "Decomposers." Fill in the worksheet. Classify the picture cards into three categories.	Students put cards on the whiteboard. Use presentation software. Goal (1)
Practice (30min.)	<b>II Food Chain</b> Explain the characteristics of a food chain. <b>III Food Web</b> Explain the food web. Explain the characteristics of a food web. Students do the activity, and pay attention to the teacher's remarks. <b>[Activities]</b> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <b>I What Am I?</b>   </div> <div style="text-align: center;"> <b>II Food Chain</b>   </div> <div style="text-align: center;"> <b>III Food Web</b>   </div> </div> <div style="text-align: center; margin-top: 5px;">           Refer to section 4 (1): The Idea of Experiential Learning         </div>	Consider the food chain. Imagine the food web. Recognize the difference between a food chain and a food web. Perform the activities while listening to the teacher's instruction. Realize that organisms are connected closely. Fill in the worksheet. Announce opinions. Listen to the explanation.	Use presentation software. Goal (2) Raise hands. Use presentation software. <b>I</b> Improvement in English communication ability. Goal (3) <b>II</b> Choose two students. <b>III</b> Everyone is connected. Goal (4) Choose some students.
Conclu- sion (10min.)	<b>IV Food Pyramid</b> Explain the balance of nature accompanying environmental change. Introduce their opinions. Reconfirm the food web. Turn in the worksheet.	Consider the number of organisms in ecosystem. Consider the balance of organisms in ecosystem. Fill in the worksheet. Announce opinions. Listen to the explanation.	Use presentation software. Goal (5) Check the worksheet. Goal (6)

## 5 School Lessons

### (1) Kadena Middle School (KMS)

In November 2007, I taught two lessons to each of five classes of grade 7 students and five classes of grade 8 students in KMS, an American DoDDS School. The first lesson comprised the content of the above teaching procedure, extending 90 minutes, and the second lesson covered experiential learning, biological accumulation and natural selection. After these lessons, I gave a questionnaire to the students.

### (2) Yamauchi Junior High School (YJHS)

In January 2008, I did the above teaching procedure to grade 9 students in YJHS, which is an English immersion education research school. After the lesson, I gave a questionnaire to the students.

## 6 Verification of the Hypothesis

After the lesson, I gave a questionnaire to 39 students in YJHS, the contents of which is shown in Table 2. And I gave a similar questionnaire to 100 students of grade 7 and 84 students of grade 8 in KMS after the first and second lessons. Table 3 shows the questionnaire responses.

In question ③, I compared the level of comprehension of the students of YJHS with the students of KMS. Although there is a difference between the students of the two schools, 75% of students in

Table 2: Questionnaire Contents

① Did you think that presentation was effective?
② Did you think that the activities were effective?
③ Did you understand the teacher's English?
④ Did you understand that organisms are closely tied in nature? [Goal (4)]
⑤ Did you understand how the balance was kept in the number of organisms? [Goal (5)]
⑥ Were you able to imagine the relationship of organisms in nature? [Goal (6)]
⑦ Were you able to understand today's lesson overall?
⑧ Do you think the science lesson activity was effective in immersion education?

YJHS answered that they understood the science lesson using English. This result reflects the answer to question ⑦. As for the other questions, both schools' students gave positive responses to more than 90%. Concretely, we can see from the response to questions ④, ⑤, and ⑥ that goals for learning science were mostly attained. Moreover, I found that experiential learning activities were effective in immersion education from the response to questions ② and ⑧. Furthermore, the response to question ① showed the visual aids were effective in raising understanding.

I gave the following questionnaires to YJHS, which is an English immersion education research school: before the lesson, "Are you looking forward to having a science lesson in English?" and after the lesson, "Were you interested in the science lesson in English?" The results are shown in Figure 5.

Although it was the first trial for YJHS students to have a science

Table 3: Questionnaire Responses

Yamauchi Junior High School (39 students)								
	①	②	③	④	⑤	⑥	⑦	⑧
Very good	69%	74%	21%	72%	74%	58%	Yes	Yes
Good	28%	26%	54%	26%	21%	39%	78%	92%
Bad	0%	0%	15%	0%	3%	0%	No	No
Require to effort	3%	0%	10%	3%	3%	3%	22%	8%

Kadena Middle School (184 students, 2 lesson)								
	①	②	③	④	⑤	⑥	⑦	⑧
Very good	83%	85%	59%	82%	81%	80%	Yes	87%
Good	17%	14%	38%	17%	19%	18%	100%	13%
Bad	0%	1%	3%	1%	1%	2%	No	0%
Require to effort	0%	0%	0%	0%	0%	0%	0%	0%

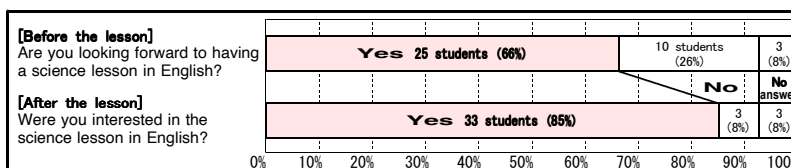


Figure 5: Interest Levels Before and After the Class in Yamauchi Junior High School

lesson in English, the ratio of students who were interested in the class increased from 66% to 85% after the lesson. From this result, we can see that students' anxiety concerning use of English decreased. Therefore, I think that experiential learning, the task activity, and the visual aids were effective.

From Table 4 on the following page, we can ascertain the following facts. From students' comments: "I enjoyed the class because I learned the lesson by using my body" and so on, it raised the students' motivation to have student-focused classes, in which the students themselves experience through the body and can imagine the relationship of the organisms, rather than teacher-focused classes. From students' comments: "It was good to learn though I don't know some English words" and "I mostly understood when I saw the PowerPoint" and so on, the image of English being difficult was mostly relieved by using easy English, the teacher's gestures, task activity, and presentation software and so on. Furthermore, some students of the YJHS saw the merit of also being able to learn English while learning science. After the lesson, we could see the effect: there were students who think positively about English immersion education.



Table 4: Students' Comments After the Lesson

Yamauchi Junior High School	Kadena Middle School
<b>About Presentation Software</b> ・It was easy to watch and very effective. ・When I saw the PowerPoint, I mostly understood though there was much English that I didn't know.	<b>About Presentation Software</b> ・The PowerPoint was very nice and it was on target. ・We had a visual on the pyramid. ・It made me think differently on food chains. ・The PowerPoint helped me understand a lot more.
<b>About Experiential Learning</b> ・It was a very nice idea. ・I had the actual feeling of being an animal. ・It was a new way. ・It was easy to understand because the class played games and so on. ・I think it was effective because we could really enjoy and learn.	<b>About Experiential Learning</b> ・The activities are fun while at the same time they are effective. ・I think the game was very effective because it showed that we could not hunt. ・The ribbon activity closely demonstrated that. ・It really showed us first hand that all animals are connected. ・It helped explain why things would die if another animal would die as well. ・It was good and helped me with the type of learning I use best.
<b>About English</b> ・I thought English was difficult, but surprisingly I understood the class. ・The class is difficult, but it doesn't mean that I can't understand anything. ・I did my best though I had been at a loss a little. ・It was good to learn though I don't know some English words. ・I thought it was good that we can understand daily English and our English ability was raised. ・I wanted Japanese translation because I am poor at English.	<b>About English</b> [Positive] ・You had very nice English. ・He did very good for a Japanese teacher! [Negative] ・Just need a little more practice but I could understand. ・Had some mistakes but did an excellent job of trying and trying to help us out.
<b>About English and Science</b> ・It was easy for me and I enjoyed the science class in English. ・The class was wonderful because we could get knowledge of English and science. ・I thought the class using English is good for us to understand English and science. ・I enjoyed the game. I was interested in English and science. ・The science class in English was the first time for me. I enjoyed the class though I was thinking about nothing. ・It was difficult for me to understand the science lesson because I take a lot of time to understand English.	<b>About Educational Method</b> ・You had a very good idea. ・I thought it was sweet and simple and it got to the point. ・I think the lesson was very on point on the topic.
<b>Overall</b> ・I couldn't understand a small part of the lesson. But it was good for me because it was my first experience. ・I couldn't understand some English words. But I enjoyed the class because I learned the lesson by using my body. ・I didn't understand the meaning too much. But I want to learn the lesson again. ・I enjoyed that the class was very nice and the teacher was good at teaching. ・I was happy though the class using English is a little difficult.	<b>Overall</b> ・You are a good teacher and you can teach and have fun at the same time. Your lesson was very effective for me. ・The lesson was very informative and fun. I think that the teacher did an excellent job in teaching these things. ・I loved the activity and hopefully you can teach us some other time.

As above, I think that making use of experiential learning and task activities in a science class raises students' learning motivation and lowers students' affective filter. Consequently, the students learned the lesson enjoyably and naturally. Therefore, the hypothesis is proved effective at raising the understanding of students.

#### IV Conclusion

Immersion education has been examined in many papers and books, and its validity is well established. "Using Experiential Learning and Task Activities in the Science Classroom," which has been the topic of my research, is only one method of education which helps students with their understanding. However, if Okinawa Prefecture introduces English immersion education, my research will be a contribution to achieving the aim in Okinawa: "fostering talented people who have a global perspective." Students don't end up acquiring just "knowledge" of English and science, it can be considered that they also gain "understanding" when they can do the following: make use of the knowledge which they acquired, and think freely, and find the next subject themselves, and act independently. I think that it is just the first step in achieving the aim in Okinawa: "fostering talented people who have a global perspective." As for the immersion school, I think that it is the first prerequisite that teachers aim to have students learn English naturally by using the "four steps of English immersion education" as described in this paper, and all teachers work according to a common plan when implementing English immersion education. I think the future tasks should be to: ① Outline the basis of the immersion educational curriculum, ② Prepare a support system for students who have learning difficulties, ③ Translate textbooks from the Japanese curriculum into English, ④ Discuss the method of evaluation, ⑤ Introduce students to "expressions" peculiar to Japan, and so on. Now, I will continue through self-study, and enhance my own skill.

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