

PROCESS-ORIENTED INSTRUCTION IN READING COMPREHENSION

THE ANALYSIS OF THE IMPLEMENTATION OF READER/LISTENER GENERATED QUESTIONS

TOMOKO TAKADA

I INTRODUCTION

Reader/listener generated questions is a teaching method which involves prereading activity to facilitate reading comprehension. This activity consists of six different stages.

- (i) The topic of the reading is introduced to the student.
- (ii) The student generates questions about the topic.
- (iii) The student responds to all or some of his/her questions.
- (iv) The text is presented.
- (v) The student checks the accuracy of his/her responses.

(vi) The student writes a summary or a chart. Or he/she does some other productive activities which will help him/her solidify the knowledge gained on the subject. (Brisk 1988) This paper presents empirical research on *Reader/listener generated questions*.

This method was implemented on a weekly basis for three months and its process was carefully observed. This paper will first describe the subject and the setting of the implementation, and second, it will focus on the analysis of the implementation.

II THE SETTING OF THE IMPLEMENTATION

(1) SUBJECT

The subject is a Japanese girl aged 15 who has been attending Greenwood High School in Massachusetts since April 9, 1987. The following is the detailed description of my subject from five points of view. Proper names have been anonymous.

(a) FAMILY BACKGROUND

The subject was brought up in a Japanese middle-class family. Her father, who has been dispatched by the Ministry of Education of Japan, is principal at the Japanese Language School of Easttown. They are to stay in Easttown from April 1987 to March 1990. They used to live in a small city in the northern part of Japan, where her father served as principal at a public school. Her mother used to be a teacher in Japan. The language used at home is Japanese.

(b) EDUCATIONAL BACKGROUND

The subject received elementary education and two years of secondary education in Japan before she transferred to Greenwood High School. Her teachers and classmates were all Japanese and the education was conducted in Japanese. She started to have the second language instruction at the age of 13 at school as all the other junior high students do in Japan. The language was English. The instruction was given by Japanese teachers 3 hours a week focusing on the practice for grammar construction. Although equal attention is supposed to be paid to the four skills of language performance according to the teaching guidelines, systematic instruction in reading and writing had not begun at her level. She completed the beginners' level before she left Japan. She belonged to the upper 40 percent in the achievement of English.

(c) LANGUAGE EDUCATION

The following is a general description of her linguistic status quo in terms of the second language acquisition and the language education she has been receiving after transferring to Greenwood High School. She has been exposed to the English environment at school. But positive interaction with her classmates and active participation in the classroom activities have still been beyond her language proficiency. She especially feels difficulty in comprehending both the lectures and the textbooks. Greenwood High School provides her with 3 hours of tutoring by a bilingual Japanese teacher every week. The assistance is given in reading textbooks and handouts of all subjects and in translating her Japanese drafts for assigned papers into English. She has 9 hours of ESL classes every week. The instruction is conducted by two native teachers. One of them uses a book containing relatively easy narratives, and a grammar book each section of which focuses on one grammatical item. The other teacher assigns his students dialogue journal writing once a week. He comments on her journal entries in terms of their content, and never corrects spelling mistakes or grammatical deficiencies. Although subject herself realizes her journals contain some unnatural expressions, the teacher's comments prove that meanings are negotiated. The teacher also pays attention to building vocabulary, and to introducing them to useful idiomatic expressions, synonyms, and antonyms. It should be noted that the subject is attached to him, that the dialogue journal writing is a pleasure for her, and that she feels it facilitates communication to some extent.

(d) THE LEVEL OF LITERARY PROFICIENCY IN THE FIRST LANGUAGE

While the subject was in Japan, she was required to write composi-

tions in the first language from time to time after school events or during vacations. Regular assignments in writing, however, were not requisite. Although she did not receive an intensive course in writing, the encounters with foreign people and customs in the U.S. urged her to write these experiences. She started to keep her diary in January, which she never did before. She writes three times a week on average. Besides, she has been enjoying writing letters to her friends and her grandparents in Japan every two weeks. As for reading, the instruction at school laid more emphasis on intensive reading than on extensive reading. At home, she reads novels and detective stories for enjoyment. The choice of books is random, based on her own interest. Her way of reading is quantitative rather than qualitative. Japanese is one of her favorite subjects and she belonged to the upper 20 percent in the achievement in her class.

(e) SPECIAL PROBLEMS

The following is a list of the subjects that the subject is taking at Greenwood High School. The numbers refer to the hours spent on each subject per week.

biology	6
music	5
algebra	5
art	5
ESL	9
gym	2
* bilingual	3

Among these subjects listed above, biology is the one which causes

* In this class, a bilingual teacher who speaks both English and Japanese provides the Japanese students with individual teaching in every subject not in terms of its content but in terms of language.

special problems to her in a sense that her language deficiency inhibits comprehension of the content. The following describes how the instruction is conducted.

The students are supposed to read the assigned part of the textbook before attending class. The teacher shows them transparencies which give them clearer ideas about the content of the textbook, adding detailed explanation. The subject has difficulty in reading the textbook and in understanding the teacher's explanation. Handouts containing questions are assigned from time to time. Each question requires them to write a few sentences as its answer. In addition, they are required to write short papers every two months. The last paper she wrote was a letter to a cell-biologist. A longer paper is also assigned once a term. One of the papers, for instance, is called a leaf report, which gives them ten requirements, such as sketching a leaf, calculating its area, and estimating the amount of leaves which one tree holds. The students are required to comment on their own job in one page. The subject spends a large amount of time in doing these jobs even with the assistance of her bilingual tutor.

(2) METHOD

The method applied to this subject is *Reader/listener generated questions*. This choice has been based on the following two hypotheses.

(i) Most of the lessons at her school require pre-reading of textbooks, which means she is supposed to gain new information from reading. New information is acquired and retained in association with the prior knowledge. In other words, reading comprehension of expository materials is interaction between old information and new information. A hypothesis presented by Ortiz (1977) goes that *Reader/listener generated questions* a dialogue promotes with the material.

(ii) This method has a considerable merit in stimulating motivation for reading. Not by being imposed questions by her teacher, but by generating questions for herself, the student exactly knows what information she is seeking in a given passage. That makes the student's attitude toward reading positive. Ortiz (1977) maintains: "Asking questions can be a valuable way to focus one's attention on a particular subject. It also serves to clarify meaning."

(3) MATERIAL

The teaching material for this series of instructions is the textbook that the subject has been using in the biology class. An expository material was selected based on the following hypotheses.

(i) As a freshman at high school, the student is expected to be proficient not so much in learning how to read as in learning from reading. This means that the student must depend on her own comprehension of informative material as the principal source of knowledge.

(ii) The schemas for narratives gained in the first language are helpful even when the narrative is presented in the students' second language. (Goldman, Reyes, and Varnhagen, 1984) The schemas for second language expository texts, however, are not parallel to those used in the first language. That makes the comprehension of expository materials more difficult than that of narratives. The biology textbook was selected among expository materials for the following three reasons.

(i) The subject feels the necessity of assistance especially in this area. This is an important element to enhance her motivation. At school, her bilingual teacher helps her mainly to work on the worksheets and spends less time in rereading the textbook.

(ii) Biology textbooks, in general, provide good expository pieces. The passages in a textbook are supposed to be well-structured to get

students equipped with useful information.

(iii) The content is cumulative, which means prior knowledge is crucial in comprehension. This provides her with good practice of combining her prior knowledge with new information.

One problem in using a biology textbook is that the teacher is required to deal with difficult content in which she is not specialized. The difficulty derived from the teacher's lack in biological information was overcome or was avoided through the devices described below.

(i) The passages given to the student were carefully selected from the viewpoint of teaching reading. Passages which require a high level of sophistication in a special area were avoided. What was chosen instead was a passage which illustrates the typical English prose structure, or a passage in which the student's observational experience in a real life would facilitate reading comprehension.

(ii) The teacher sought additional information about the content area she was supposed to teach. Other biology textbooks and encyclopedias were helpful.

(4) IMPLEMENTATION

The implementation was conducted on a weekly basis for three consecutive months. The texts used in each session are presented below.

- 1 Development in Higher Plants Begins in the Seed
- 2 Plant Embryos Develop Primary Growth Tissues
- 3 The Early Development Processes of Cleavage
- 4 Many Kinds of Taxes*
- 5 Plants and Animals Can Replace Lost Parts
- 6 Uncontrolled Cell Division May Produce Cancer

*No biology class was given at school in the fourth week. A passage from an American Civics testbook was used for variation.

- 7 Classifying Living Things
- 8 Early Classification Systems
- 9 Pedigrees
- 10 Environment Plays Key Role in Development

III ANALYSIS

(1) THE EFFECT OF GENERATED QUESTIONS ON READING COMPREHENSION

As mentioned previously, *Reader/listener generated questions* has two main purposes ; attention and clarification. Keeping asking questions enables the students to focus their attention on the subject matter. It also enables them to clarify the material they are reading. (Ortiz, 1977)

The analysis of the effect of generating questions on reading comprehension which will be presented below is based on two kinds of dichotomies. One is the dichotomy between factual and inference questions and the other is the dichotomy between general and specific questions. Each dichotomy will be described below in this order.

Although asking questions facilitates reading comprehension, it can create a negative effect on it. Moeser (1978) made an experiment on different effects obtained under different questioning conditions. She gave factual questions and a text to one group of subjects and inference questions to the other and investigated the subjects' memory retention. Her finding suggests that inference questions have a positive effect on the interrelating sentences. In order to answer inference questions, the subjects must retrieve any related information already stored and incorporate the new information into the existing pattern. Factual questions, on the other hand, can have a detrimental effect. They can

interfere with unitization process, encouraging them to process the segments of the narrative independently. (Mosesr 1978)

The other dichotomy used in this analysis is general/specific questions. According to schema theory (Adams and Collins 1979, Rumelhart 1980) the process of reading comprehension consists of two basic modes of information processing called bottom-up and top-down processing respectively. Schemata are hierarchically organized, from most general at the top to the most specific at the bottom. Bottom-up processing is, therefore, called data-driven. The top-down processing is called conceptually-driven. As the bottom-level schemata converge into higher level, these two become activated. (Carrell and Eisterhold 1983) A possible hypothesis is that general questions, which ask for broad information, contribute to the top-down processing and specific questions, to the bottom-up processing. The two dichotomies are possible to synthesize since they overlap in some respects. Let me put it this way : The process of factual and specific information (data) promotes comprehension when it works together with the processing of inferential and general information (concept). This modified theory is the rationale for the analysis given below. The following example shows that factual questions may interfere with the comprehension of the text as a whole.

Example 1

Text : "Environment Plays a Key Role in Development"

Stimuli : Three key sentences in the text.

Stimulus 1 ; When biologists became interested in problems of heredity, they began to make a list of characteristics or traits that appeared to be inherited.

Stimulus 2 ; The environment may affect the degree to which heredi-

tary traits develop.

Stimulus 3 ; Heredity determines what an organism may become, not what it will become.

Generated questions :

- (Q1) What traits are inherited?
- (Q2) What hereditary traits are affected by the environment ?
- (Q3) How long does it take to prove that a certain trait is determined only by heredity ?

Predicted answers :

- (Q1) The colors of hair, eyes, and skin are inherited.
- (Q2) Human characteristics are determined both by inheritance and environment.
- (Q3) It depends.

Her questions all ask for factual information. She easily found the answers to Q1 and Q2, and found that no reference was made to Q3. This is an indication that the questions attracted her attention to the material, which is itself an advantage in terms of urging her involvement in reading. But understanding factual statements as segments of the whole text does not contribute to the comprehension of general idea. This was proved by the results of a comprehension test which was given just after the student read the text once.

The test contained three factual questions (No. 1, 2, and 3) and three inferential questions (No. 4, 5, and 6). The following are the questions and the results.

1. Do all the curly-winged flies born from curly-winged parents have curly wings ?
2. Is polydactyly affected by the external environment ?

3. Is there any relationship between heredity and environment?
4. What relationship is there between them?
5. When geneticists work out the solution to each heredity mystery, they must try to keep environmental factors as constant as possible. Why?
6. Why is it important for everyone to become informed of these facts?

The student was correct in all factual questions while she was correct in only one question out of three inferential questions.

In the next example, the student asks both factual and inferential questions and it turns out to be successful in terms of helping her comprehend the text. The convergence of a data-driven process and a concept-driven process can be seen in this example.

Example 2

Text: "Plants and Animals Can Replace Lost Parts"

Stimuli: The title of this section and three key sentences

Stimulus 1: Plants and animals can replace lost parts. (the title of the text)

Stimulus 2: Many animals can replace lost parts in varying degrees.

Stimulus 3: Even some vertebrate animals have a remarkable capacity for regeneration.

Stimulus 4: Some internal organs of humans can also regenerate to a certain extent.

Generated questions:

(Q1) How do animals and plants replace lost parts?

(Q2) If an animal loses a large part of its body, it won't be able to renew it. What part of the body has the regenerative power?

(Q3) In what degree is the ability of regeneration different among animals?

(Q4) What animal has the largest capacity for regeneration?

(Q5) Is the process of regeneration of organs of a human body same as that of the other animals?

(Q6) What organ in a human body can regenerate?

Predictions :

(Q1) The answer was not predicted.

(Q2) If one of the claws is removed from a crab, it will regenerate a new claw. If a tail is removed from a lizard, it will regenerate a new tail.

(Q3) Crabs and lizards are able to regenerate lost parts.

[Assistance was given here to facilitate the prediction. The teacher said, "You want to know how different the regenerative power is among animals. So think of different kinds of animals." The student's response to this assistance was as follows :

Earthworms regenerate their lost bodies. Birds cannot regenerate their legs or wings. Fish cannot regenerate their fins. Frogs cannot regenerate their legs.]

(Q4) Vertebrates have the largest capacity for regeneration.

[The teacher urged her to note what kinds of animals have the regenerative power and what kinds of animals do not. The student's response to this assistance was as follows :

Simple animals have larger capacity for regeneration than complex animals.

(Q5) It is different.

(Q6) Intestines and a stomach can regenerate.

In Q4, the student asked for a specific animal or a group of animals which has the most remarkable capacity of regeneration. In Q3, she asked for a general statement of the variety in the degree of regenerative capacity. In predicting the answers to Q3 and Q4, the teacher had her think of various animals as examples and urged her to draw generalization from them. That showed the student a model of inference. It promoted her understanding. The summary which she wrote as a final activity indicated that her comprehension was perfect.

(2) THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT KINDS OF STIMULI

The advantages and disadvantages of four types of stimuli will be discussed here. They are :

- (a) summaries
- (b) figures
- (c) the combination of a figure, a table, and key sentences
- (d) the combination of a title and the initial sentence in each paragraph

The discussion will be focused on how each stimulus effects on generating meaningful questions.

- (a) Summaries

Example 3

Text : "Development in Higher Plants Begins in the Seed"

Stimulus (the summary of the passage) :

New cells rapidly push out from the primary growth layers. Thus, the plant gets taller and thicker and develops stems, leaves, and flowers. Most monocots can grow taller, but not much thicker. But dicots grow thicker, especially during the growing seasons. Dicots keep cambium layer which produces xylem and phloem. Even if inner cell walls are destroyed the tree can continue to grow.

Generated questions :

(Q1) What is cambium ?

(Q2) Why do dicots grow thicker ?

(Q3) Where are the primary growth layers ?

(Q4) What function do xylem and phloem have respectively ?

(Q5) Why does a tree grow even if the inner cell walls are dead ?

The question above can be classified into two groups in terms of the information the student is seeking.

1. Questions to ask for the concrete idea or visual image of a technical term. (Q1) (Q3)
2. Questions to ask for reasons or causes which trigger the phenomenon described in the summary (Q2) (Q4) (Q5)

In a summary, key words and key sentences are essential parts of the text. Consequently, the summary triggers unproductive questions which ask for the meanings of technical terms. On the other hand, it triggers inference questions which ask for the relationship between cause and effect since the summary includes only the superficial phenomena. Judging from this result, technical terms unfamiliar to the student should be explained before a stimulus is presented. With terminological questions cleared up, more active involvement in generating questions can be expected.

(b) Figures

Example 4

Text : "The Early Development Process of Cleavage"

Stimulus : A series of photos which shows stages of cleavage and later development in the frog.

Generated questions :

(Q1) What happens to the egg in the last picture ?

[The last picture shows a tailbud embryo.]

(Q2) How is the egg divided?

(Q3) How long does the process of development of embryos take to complete?

These questions can be classified into two types.

1. Questions which are triggered by visually salient changes in the pictures. (Q1) (Q2)
2. Questions which go beyond the content range of the text. (Q3)

Type 1 questions are the result of her observation whereas Type 2 question is that of her imagination. Observing the pictures and using imagination do not depend on her second language proficiency. Being free from the language barrier, the student can get more easily involved in the pre-reading activity. Using figures as stimuli has the advantage that it does not involve language intervention.

(C) The combination of a figure, a table, and key sentences

Example 5

Text: "Early Classification Systems"

Stimuli: The following stimuli were presented simultaneously.

Stimulus 1: Figure; A series of five pictures which shows some members of the cat family, such as a tiger, a leopard, a lion, and so on.

Stimulus 2: Table; A table which shows the classification of five different organisms; amoebae, white oaks, dogs, wolves, and human beings.

Stimulus 3: Key sentences in the text.

- (1) The Swedish naturalist Karl von Linne, usually known as Linnaeus, felt that the major aim of science is to find order in nature. Each organism seemed to have its place in the pattern of life. It was

Linnaeus' ambition to classify every species according to its proper place in this pattern.

- (2) The word species is used to mean animals or plants that are so much alike in structure that they can mate and produce fertile offspring.

Generated questions :

- (Q1) Does the lion belong to the same order, the same family, and the same genus as the cat ?
- (Q2) Do monkeys belong to the same genus as human beings ?
- (Q3) What is the difference between dogs and wolves ?

The quality of her questions indicates that this strategy did not work effectively in this case. The generated questions are sporadic, factual, and irrelevant to each other. Providing every stimulus simultaneously seemed to have distracted her attention. She paid attention to the segments of information and failed to utilize the stimuli as a whole. This result is something which proves the hypothesis presented by Moeser, that is: "factual questions, compared with inference questions, can have a detrimental effect on reading comprehension." (Moeser, 1978) The results of comprehension test given after the whole lesson indicated that the student did not benefit from these questions. Her answers were perfectly correct in every factual questions. But one mistake was made in inference questions.

- (d) The combination of a title and initial sentences in each paragraph
- Example 6

Text : "Plants and Animals Can Replace Lost Parts"

Stimulus 1 ; The following stimuli were presented one by one.

Stimulus 2 ; Many animals can replace lost parts in varying degrees.

Stimulus 3 ; Even some vertebrate animals have a remarkable capacity

for regeneration.

Stimulus 4 ; Some internal organs of humans can also regenerate to a certain extent.

Stimulus 1 is the title of the text. The other stimuli are the initial sentences of the paragraphs.

Generated questions :

The questions elicited from the first stimulus :

- (Q1) How do animal and plants replace lost part ?
- (Q2) If an animal loses a large part of its body, it won't be able to renew it. What part of the body has the regenerative power ?

The question elicited from the second stimulus :

- (Q3) In what degree is the ability of regeneration different among animals ?

The questions elicited from the third stimulus :

- (Q4) What animal has the largest capacity for regeneration ?

The questions elicited from the fourth stimulus :

- (Q5) Is the process of regeneration of organs of a human body same as that of the other animals ?
- (Q6) What organ in a human body can regenerate ?

The questions above can be categorized into three types.

1. Questions to ask for general information (Q1) (Q3) (Q5)
2. Questions to ask for specific information (Q2) (Q4) (Q6)

The result of this example indicates the relationship between the nature of a stimulus and that of generated questions. The title, which tells us a broad idea of what the text is going to say, elicited a question seeking general information. General question facilitate the top-down processing of a material. On the other hand, the initial sentences, which provide subdivisions of the content of each paragraph, elicited questions

seeking general information. They facilitate the bottom-up processing of a material. With these types of questions in mind, conceptually-driven processing and the data-driven processing take place simultaneously.

It should be added that this could be a disadvantage in some other cases. Presenting each stimulus one by one imposes restriction on her use of imagination which could help the student get involved in the content area. The teacher would be required to decide whether this type of stimulus would work or not depending on the text she intends to use. Another positive aspect of this stimulus is that it presents the formal schema of English. Carrell (1983) suggests that in understanding the role of background knowledge, a distinction between formal schema (background knowledge of the formal, rhetorical organizational structures of different types of texts) and content schema (background knowledge of the content area of a text) is useful. From the viewpoint of formal schema, this type of stimulus is worth using repeatedly for the second language learners whose culture holds a different formal schema.

In Japanese, a prose is supposed to consist of four divisions; introduction, development of the introduction, presentation of a different viewpoint for contrast, and a conclusion. On the other hand, in an English expository paragraph, a paragraph usually begins with a topic statement, and then, with a series of subdivisions of that topic statement, each supported by examples and illustrations. The students who have mastered the use of syntactic structures should become familiar with the rhetoric and a sequence of thought of the target language since successful reading comprehension is accomplished by grasping the whole idea in units larger than the sentence. (Kaplan, 1977) Presentation of a title and initial sentences of each paragraph could be a good practice for advanced students to become familiarized with the structure of an English

expository prose.

(3) TEACHER'S INTERVENTION IN GENERATING QUESTIONS

The subject was used to being asked comprehension questions after reading a material. Asking questions before reading was the opposite to her familiar situation in terms of who is the questioner and when the questions are asked. It was quite natural that she showed perplexity and uneasiness in the first few sessions. There was a session in which she could not ask any question, staring the stimulus for twenty minutes. The teacher's intervention was implemented in order to remove her anxiety.

An example excerpted from the 3rd session will be presented here. The teacher's intervention includes two aspects. One is warm-up conversation to let the student draw her prior knowledge. The other is showing models of questions.

The teacher made a warm-up conversation with the student in order to create an atmosphere in which the student felt free to ask questions. Then the teacher gave a model question.

Example 7

Text : "The Early Developmental Process of Cleavage"

Stimulus : A series of photos which show stages of cleavage and later development in the eggs of a frog.

The conversation between the teacher and the student is presented here.

The language used by the teacher and the student was English (L2) and Japanese (L1) respectively.

T : (Looking at the figure) Do you know what they are?

S : Yes. They are eggs of a frog.

T : Have you ever seen eggs of a frog?

S : Yes, I have.

T : Where did you find them ? Where do frogs lay eggs ?

S : They lay eggs in a pond or a stream.

T : How do they look like ?

S : They are like jelly.

T : This is a magnified photo that shows the cleavage of eggs. The first five pictures show its process.

A cell is divided into smaller and smaller cells. But in the sixth picture, we find no divided cells. The surface of the egg is smooth. Something must have happened in this stage. (Q1) What is it ? What happens to the egg after the division ?

S : The egg in the last picture is quite different from those in the former pictures, too. What is inside the egg is different in shape from those we find in the other pictures. (Q2) What does the change mean ? What happens to the egg in this stage ?

T : That's a good point.

S : (Tried to ask other questions.)

T : It's miraculous that each egg grows to be a tadpole, and then to be a frog. It seems that each cell has its own function in the development of an embryo.

S : Some cells may develop to be a head, and some may develop to a tail. (After another few minutes' looking at the photos) Look. The egg is first divided into two, and next into eight, and then into thirty-two. There is no regularity. (Q3) How do eggs multiply ?

T : There may be regularity numerically in the process of division, and there may be not. We'd like to know about it.

S : (Tried to ask other questions.)

T : you have seen a frog's eggs, haven't you ? When did you find them ? Did you find them in winter, or in spring ?

S : I found them in spring.

T : I'm sure you've seen tadpoles swimming in a stream. When did you see them swimming ?

S : In spring, too.

T : You saw eggs in spring and tadpoles in spring, too. The process of the development of embryos seem to take place rather rapidly.

S : (Q4) How long does the process take to complete ?

The question generated by the teacher was :

(Q1) What happens to the egg after division ?

The questions generated by the student were :

(Q2) What happened to the egg in the last picture ?

(Q3) How is the egg divided ?

(Q4) How long does it take for an embryo to be a tadpole ?

What relation can be found between the student-generated questions and the teacher's intervention ?

Q2 was probably caused by analogy with Q1. The presentation of Q1 had her notice the difference between the 5th picture and the 6th picture. That induced her to notice the difference between the 6th and the 7th picture.

Q3 may have been elicited from the prior conversation, or it may not. It is impossible to judge from this data only whether Q3 was the result of the teacher's intervention. However, it is possible that some relationship between them existed. Talking about small cells in the egg may have called attention to the way of its division.

Q4 is the product from the previous conversation. The teacher reminded her of her own experience of observing a frog's eggs and tadpoles. The teacher's intention to activate her background knowledge helped her generate questions. Teacher's intervention is thus helpful in terms of having the student ask more questions. However, it should be omitted if the student is accustomed to this teaching method and finds no problem in asking questions. It could also be omitted in a classroom where there are more than one student. Students might encourage each other by presenting questions.

(4) THE EFFECT OF PREDICTION

Predicting answers enhances the student's involvement in a material.

Prediction often requires logical reasoning and it also requires active use of imagination. As a result, it exercises a facilitative effect on reading comprehension.

Example 8

Text : “Development in Higher Plants Begins in the Seed”

Stimulus (summary) :

New cells rapidly push out from the primary growth layers. Thus, the plant gets taller and thicker and develops stems, leaves, and flowers. Most monocots can grow taller, but not much thicker. But dicots grow thicker, especially during the growing seasons. Only dicots keep cambium layer which produces zylem and phloem. Even if inner cell walls are destroyed the tree can continue to grow.

Generated questions :

- (Q1) What is combium ?
- (Q2) Why do dicots grow thicker ?
- (Q3) Where are the primary growth layers ?
- (Q4) What function do zylem and phloem have respectively ?
- (Q5) Why does a tree grow even if the inner cell walls are dead ?

Predicted answers :

- (A1) Cambium makes the tree thicker.
- (A2) Because it has cambium.
- (A3) I have no idea.
- (A4) It has something to do with the growth of plants.
- (A5) The substance crucial for the growth is contained not in the inner cell walls but in the outer walls.

The prediction was totally dependent on inference. (A1) and (A2) is inferred from three facts presented in the stimulus.

1. Dicots grow thicker.
2. Monocots do not grow thicker.

3. Only dicots keep cambium layer.

From these facts, the relation between cambium and the growth of dicots can be inferred. (A4) is also inferred from the fact that cambium layer, which makes the dicots grow thicker, produces xylem and phloem. (A5) is the inference from the last sentence in the stimulus.

The process of prediction includes two aspects. First, it is made by unitization of interrelating sentences in the summary. Second, she incorporated her background knowledge with information. The student had learned in the previous session what the structures of monocots and dicots are and what plants belong to each category.

The positive effect of prediction on reading comprehension was proved by the student's perfect achievement in the final activity. The student was required to fill in the blanks and to complete two charts. The charts will be shown here.

CHART 1

(Function)

Cambium produces (1) xylem...
(2) phloem...

CHART 2

	monocots	dicots
meristem		
cambium		

(Meristem or cambium) remains throughout the life time.

(Meristem or cambium) does not remain.

(5) THE EFFECT OF PRIOR KNOWLEDGE

The effect of prior knowledge on reading comprehension has been

emphasized by a number of linguists. Anderson, Reynold, Schaller, and Goetz claim that every act of comprehension involves one's knowledge of the world as well (1977). As mentioned previously, the distinction between a formal schema and a content schema is useful in understanding the role of background knowledge (Carrell 1983). We have discussed a formal schema above. An example in which a content schema was effectively employed will be presented here.

Example 9

Text : A short passage. The following is the whole passage.

Seed companies are always searching for varieties of plants that will grow in different abiotic conditions. New varieties are produced when two types of plants are crossed. Some plants such as wheat, are self-pollinates. Therefore, before a cross can be made, the stamens must be removed from one type of plant. Crop technicians remove the stamens. Later, the crop technicians transfer pollen from a second type of plant to the pistils of these plants. Crop technicians must be careful workers who enjoy working with plants. No special schooling is required. Training occurs on the job.

Stimulus : A title, "Crop Technician"

Generated questions :

- (Q1) What gives you difficulty in doing your job?
- (Q2) What plant do you deal with?
- (Q3) If we want to be a crop technician, what kind of certificate is required?
- (Q4) Do you work individually, or do you work in a group?

Predicred answers :

- (Q1) They must keep the plants from withering.
- (Q2) They deal with rice plants and orchis, for example.
- (Q3) Education is required.

(Q4) They work individually.

The student capitalized on her own experience and her background knowledge in the following three aspects.

In generating questions, she depended on her experience of writing a letter to a cell biologist. It was an assignment given by her biology teacher at school a few months prior to this instruction. In the letter, she asked him/her about his/her profession. That seemed to have enabled her to make a good guess what information the given passage would contain. Three generated questions out of four are answered in the passage.

In predicting answers, she depended on her knowledge that new types of rice plants which fruit quality rice have been produced in Japan. The answer given in the passage is wheat instead of rice. But this is a good guess because rice is the staple of Japanese diet just as wheat is essential for American diet, and because people seek for good quality in the staples.

In reading comprehension, she depended on her knowledge about self-pollinated. The most difficult part in this text was the second paragraph, which involves technical terms such as *self-pollinated*, *stamens*, *pollen*, and *pistils*. The student seemed to be overwhelmed by all these words which were totally new to her. But after the Japanese equivalent of *self-pollinates* was introduced, she began to figure out the rough idea of this paragraph since *self-pollination* was part of her knowledge. She even inferred the meanings of stamens and pollen.

VI THE EMERGENCE OF THE SECOND LANGUAGE

The subject received a series of instructions in a dual language environment described here.

(1) The language used by the student

The use of the second language was encouraged. But it was never imposed on the subject due to the consideration that language barrier should not impair her spontaneous reaction to the stimuli. It should not prevent her from displaying her comprehension, either. For these reasons, any restriction was avoided in terms of the use of the first language.

The student-generated questions in Japanese were translated into English on the spot. They were written down if necessary.

The student-generated questions in English were greatly welcomed regardless of its grammatical inappropriateness. A grammatically incorrect sentence was changed into a correct form and presented by the teacher without any comment on her mistake.

The English used in the summary or chart assigned as the final activity was checked and corrected in terms of its content rather than in terms of language use. The vocabulary which is crucial in the comprehension was expected to be remembered. The teacher explained the meanings of new words when reading aloud for the student. This was done either in English or in Japanese as the case might be. The words and phrases introduced to the student were technical terms and high-frequency phrases in expository prose such as *on the other hand*.

(2) The language used by the teacher

The teacher used Japanese

(i) in order to introduce the Japanese equivalents of technical terms

(ii) in order to supplement explanation for the student's better

understanding.

The teacher used English on every other occasion.

What induced her emergence of the second language? It was in the 6th session that the student first generated questions in the her second language. The following shows what happened in tutoring.

Example 10

Text : “Uncontrolled Cell Division May Produce Cancer”

Stimuli : Three stimuli were presented one by one. Each of them was the first sentence of each paragraph.

- (S1) As an organism approaches maturity, rate of development gradually diminishes.
- (S2) Even though the rate of cell division generally drops to a low level, some kinds of cells must still be manufactured at high rate.
- (S3) If the rate of cell division in an organ suddenly increases again, the chances are that somewhat different cells are produced more than are needed by the body. Such uncontrolled growth is called cancerous growth.

The question generated in her second language was : “What kind of cell is manufactured at a high rate?” This is a question which asks for specific information elicited from a general statement. It is quite probable that this type of question elicited speaking English since it was one of the most popular questions she has been asking. An example of this type of question generated before the 6th session is presented here.

Example 11 :

Stimulus : Many animals can replace lost parts in varying degree.

Question : What animal has the largest capacity for regeneration ?

The student had learned the ordinary structure of English expository prose by this session and she expected detailed information to follow a general statement. And it was then that she first asked a question in English. This finding suggests the correlation between the recognition of

the structure and the emergence of the second language. The more comfortable the student is with the structure of the text, the easier the language comes out.

V DISCUSSION

What benefit did the student gain from this three-month instruction? A questionnaire was sent to the student's father. According to its results the most innovative aspect which the student appreciated were (1) that *Reader/listener generated question* aims at the comprehension of the content instead of aiming at mastering grammatical and lexical items contained in the text, and (2) that this method is process-oriented instruction. The following discussion will be presented in this order.

First, she appreciated the lessons as content area reading. This requires some explanation of the learning environment which she had been exposed in Japan. The English textbooks she used provided passages as a vehicle of presentation of new grammatical structures and new vocabulary. The readings are well-structured in order of ascending difficulty from grammatical point of view. The focus of instruction was on language-related rather than on meaning-related problems. With this background, she began learning to read for information in the second language last February. It is no wonder that she was perplexed with this instruction. However, she now considers this experience as valuable since it enabled her to recognize the function of language in a real situation.

The student's appreciation of content area reading suggests two crucial issues. One is that the ability to read for information in the first language is not necessarily transferred to reading for information in the second language. The student, having taken Japanese classes for 8 years before she transferred to an American high school, has no problem in

cognitive development in the first language. And yet, she turned out to be a novice at content area reading in the second language. This seems to attribute to the heavily grammar-oriented reading instruction. It is true that mastering grammar is essential when they decode materials. But we should never neglect other sources of difficulty in reading, such as English thought patterns and paragraph structures.

The other issue which the comment in the questionnaire suggests is that the student understands the function of language through reading informational materials. The student recognizes that language conveys new information. Final activities such as summarizing the text or making a chart reinforced her the purpose of reading. She recognized that we read for gaining information, not for practice.

Secondly, the student appreciated this method as process-oriented instruction. In traditional ESL/EFL classrooms, questions were asked by a teacher after students read a text. The teacher serves as an evaluator in this situation. In the implementation of *Reader/Listener generated questions*, however, a teacher serves as a facilitator, or even as a co-worker. Traditionally, the cognitive aspect of reading activity has taken a back seat to its language aspect. But when we accept the hypothesis that reading is interactive endeavor between reader and text (Henry 1984), emphasis should be placed on the cognitive aspect of reading. And it will be accomplished when the teacher stops being an evaluator and shares the process of reading comprehension as a facilitator. *Reader/listener generated questions* is one of the effective methods for this purpose.

REFERENCES

Carrell, P. L. & Eisterhold, J. C. (1983). Schema theory and ESL reading pedagogy.

TESOL QUARTERL, 17, 553-572.

Kaplan, R. B. (1977). Cultural thought patterns in intercultural education. *Language Learning*, 16, 1-20.

Henry, R. (1984). Reader-generated questions: A tool for improving reading comprehension. *TESOL Newsletter June*.

Moeser, S. D. (1978). Effect of questions prose utilization. *Journal of Experimental Psychology: Human Learning and Memory* 4, 290-303.

Ortiz, R. K. (1977). Using questions as a tool in reading. *Journal of Reading*, 21, 2, 109-114.

Reyes, M. L. (1987). Comprehension of area passages: A study of Spanish/English Readers in Third and Fourth Grade. In S. R. Goldman & H. T. Truba (Eds.), *Becoming Literate In English as a Second Language* (pp.107-126). New Jersey: Ablex Publishing Corporation.

Rumelhart, D. E. (1980). Schmata: The building blocks of cognition. In R. L. Spiro, B. C. Nruce, & W. E. Brewer (Eds.), *Theoretical Issues in Reading Comprehension* (pp. 33-58). New Jersey: Hillsdale, Publishing Corporation.