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THESIS

Analysis of Classroom Discourse in a Tenth Grade Biology Class: A Case Study of English Program Curriculum at Matthayom Watnairong School

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A Thesis Submitted in Partial Fulfillment of
the Requirements for the Degree of
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Prhomput Thammarutjinda 2012: Analysis of Classroom Discourse in a Tenth Grade Biology Class: A Case Study of English Program Curriculum at Matthayom Watnairong School. Master of Arts (English for Specific Purposes), Major Field: English for Specific Purposes, Department of Foreign Languages. Thesis Advisor: Mrs. Issariya Thaveesilpa, Ph.D. 95 pages.

This research investigates the nature of classroom discourse in a Biology classroom at Matthayom Watnairong, a school which provides an English Program (EP) Curriculum and has won several awards from the Ministry of Education, Thailand, under the framework of the Initiation-Response-Evaluation (IRE) pattern (Mehan, 1978, P.32-64) and the structure of classroom lesson (Mehan, 1979, P.73-74). Moreover, the research aims to illustrate the teacher's strategies in classroom discourse as well as the students' attitudes towards the strategies employed.

This research entails two main mechanisms, observation and research instruments, to achieve the objectives. Thirty tenth-grade students in a science curriculum were observed and interviewed through the perspectives of the framework. The research instruments include a questionnaire, a classroom observation check-sheet, video camera recordings and a semi-structured interview. Each instrument was used to collect students' attitudes, verbal and non-verbal reactions of the interlocutors, transcripts, and the teacher's strategies, respectively.

The findings suggest that the nature of classroom discourse explored in the Biology class was constructed through the pattern of Initiation-Response-Evaluation and the structure of classroom discourse. The IRE model derived from the class was mainly in accordance with that of Mehan (1978) and Mehan (1979). However, there were some exchanges which were considered not to be full cycles of the IRE pattern due to some cultural factors which can be reflected by the students' answers in the questionnaire. The strategy, which is compatible with the pre-formulating method of Cazden (1988), was employed when the teacher encountered difficulties in explaining by formulating questions to convey the insight of the lesson to students.

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Student's signature Thesis Advisor's signature

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Prhomput Thammarutjinda

February 2012

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TABLE OF CONTENTS

Copyright by Kasetsart University All rights reserved

TABLE OF CONTENTS (CONTINUED)

Copyright by Kasetsart University All rights reserved

LIST OF TABLES

Copyright by Kasetsart University All rights reserved

LIST OF FIGURES

Copyright by Kasetsart University. All rights reserved

LIST OF FIGURES (CONTINUED)

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LIST OF ABBREVIATIONS

EP	=	English Program
I	=	Initiation
I*	=	Initiation that requires answer from student
R	=	Response
E	=	Evaluation
DA	=	Discourse Analysis
L2	=	Second Language
S	=	Sequence
EFL	=	English as a Foreign Language
ESL	=	English as a Second Language

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CHAPTER I

INTRODUCTION

This chapter introduces six main parts comprising the rationale, the objectives, the research questions, the scope, the significant of the study, and the components of the thesis.

Rationale of the Study

At present, several schools in Thailand provide an option for Thai students who are interested in following the standard Thai curriculum in the English language. This educational program is known as the English Program (EP) which requires students with academic strength and ability in English language communication: listening, speaking, reading, and writing. The English program commenced in Thailand in 2003. A short time later, a number of Thai schools have become interested in launching the program to serve this educational demand for Thai learners.

Matthayom Watnairong School, a Secondary School, is one of the forefront English Program schools, which began providing the EP course after Yothinburana School, the first EP school of the country, and has succeeded in its aims of educational operations. Matthayom Watnairong School is well known as a progressive organization and has received several awards from the Ministry of Education (Thailand). To date, the school has been visited by many educational organizations including upcountry schools where the purpose of visiting was to observe the general operation of the school.

At Matthayom Watnairong, teachers of many nationalities have been employed to teach specific fields. They are both native and non-native English speakers with outstanding teaching experience. The researcher has six years experience teaching Physics and other science subjects at this school.

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This research is conducted to explore the nature of classroom discourse in the English Program Biology class at Matthayom Watnairong School through a Discourse Analysis (DA) framework. Typically, the main curriculum of the English Program provides Biology and other science lessons by employing English (L2) as the main communication in classrooms. This could cause the interlocutors, a teacher and learners, communication difficulties as a result of dialogic exchanges when learning science with English as the main medium. In addition, little research has focused on this topic, especially with EP students in Thailand. This study, therefore, aims to explore the nature of discourse in a Biology classroom at this school.

From the empirical observation through the English for Specific Purposes (ESP) perspective of the researcher, this research aims to investigate the specific strategies, Initiation-Response-Evaluation patterns (IRE) and Scaffolding, employed by the science teacher to communicate with learners in science classes. The two discourse patterns are related and are congruous to apply in this study. Classroom discourse involves inter-individual communication while the goal of education is intra-individual change and student learning (Cazden, 1988). Normally, when focusing on classroom discourse, inter-individual communication is commonly known as a three-part sequence comprising teacher initiation, student responses, and teacher evaluations (IRE). Such a discourse pattern is the most common aspect of classroom discourse at all grade levels (Cazden, 1988).

Since it started, there have been difficulties in conducting comprehensive science classes successfully with Thai teachers, Thai students, and native and non-native English teachers. Nevertheless, it is interesting to find that the 6-year course of the school, providing educational levels from grade 7 to 12, has produced three generations of well-qualified students who are accepted by many science faculties in the most renowned universities in Thailand and abroad which is a satisfactory outcome demonstrating successful teaching and learning with English as the main medium in science classes. It is therefore interesting to investigate how the nature of spoken discourse encourages educational success.

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Objectives of the Study

There are two main objectives for the study:

1. To investigate the nature of classroom discourse in a Biology classroom at Matthayom Watnairong School under the framework of the Initiation-Response-Evaluation (IRE) pattern (Mehan, 1978), the structure of classroom lessons (Mehan, 1979) in conjunction with Scaffolding introduced by J. Campione, in Pearson and Gallagher (1983), and Preformulating and Reformulating Strategies (Cazden, 1988).

2. To explore a teacher's and students' attitudes towards strategies employed by the teacher.

Research Questions

There are two main research questions for the study:

1. What is the nature of classroom discourse in a Biology classroom at Matthayom Watnairong School with the perspectives of the IRE pattern (Mehan, 1978) under the framework of classroom lessons (Mehan, 1979), Scaffolding, introduced by J. Campione, in Pearson and Gallagher (1983), and Preformulating and Reformulating Strategies (Cazden, 1988)?

2. How do a teacher and students perceive the strategies employed during real teaching and learning situations?

Scope of the Study

This study analyzes science classroom discourse in a Biology class and focuses on the nature of classroom discourse which provides instructional purposes

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and teacher-student interactions. The scope of this study is divided into three areas: theoretical background, unit of analysis, and participants' interactions.

Theoretical Background

This research adapts four theories which are Initiation-Response-Evaluation or IRE pattern (Mehan, 1978), Structure of Classroom Lesson (Mehan, 1979), Discourse as Scaffold (Pearson and Gallagher 1983), and Pre-formulating and Re-formulating Strategies (Cazden, 1988) to explore the nature of Biology classroom discourse and strategies to observe whether or not the classroom discourse in this educational program matches the aforementioned theories.

Unit of Analysis

The data are collected and studied specifically in the areas where most exchanges occur. In other words, according to Pearson and Gallagher (1983), there are three main parts which show the basic structure of learning environments that fit the term scaffold by means of the proportion of responsibility for task completion: all-teacher, joint responsibility, and all-student. However, this study aims to observe only the second part of the scaffolding where linguistic utterances are produced mostly in the interactions between a teacher and students. The analysis focuses on the joint responsibility part of the IRE cycles but does not include the evaluation part. The in-field cycles of IRE in the joint responsibility part are to be transcribed and tabulated with respect to the structure of classroom lesson stated by Mehan (1979).

In addition, this study also observes teacher's and learners' interactions particularly when they encounter L2 communication failure in an interactional classroom. Thus, the observation in accordance with the communication failure is linked to the framework of Cazden (1988). Cazden (ibid) stated that the model of discourse as scaffold requires the consideration of three main issues: the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. Since the researcher observes the nature of Biology

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classroom conversation under the scope of getting the answer versus getting the understanding, the researcher focuses on two teacher strategies: Pre-formulating and Re-formulating.

Participants' Interactions

Two-way communication in a Biology classroom between a non-native English teacher (Filipino) who teaches Biology and students of Matthayom 4/1 (grade 10) at Matthayom Watnairong was observed and recorded through video camera. When the class ended, thirty students of Matthayom 4/1 were asked to complete a questionnaire and the teacher was interviewed concerning attitudes and feelings towards strategies used when the teacher encounters communication difficulties.

List of terms with Definitions

Classroom Discourse = Conversation between a teacher and students in a classroom

English Program = An educational program which provides Thai learners all subjects in Thai curriculum through the English language

Initiation = An opening conversation

Response = A feedback of the second interlocutor(s) whom is/are questioned by the first interlocutor

Evaluation = A closing message given by the first interlocutor to assess the quality of the second interlocutor's answer

Scaffold = A basic structure of learning environments (Pearson and Gallagher, 1983)

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All-Teacher = Nature of social interaction under the concept of proportion of responsibility for task completion (Pearson and Gallagher, 1983) that a teacher predominantly teaches a lesson

Joint Responsibility = Nature of social interaction under the concept of proportion of responsibility for task completion (Pearson and Gallagher, 1983) that a teacher shares conversation with students

All-Student = Nature of social interaction under the concept of proportion of responsibility for task completion (Pearson and Gallagher, 1983) that students predominantly participate in classroom activities

Preformulating Strategy = The process that a teacher preface the question he/she wants a student to answer with one or more utterances in which the student is familiarized with the relevant area of experience

Reformulating Strategy = The process when a teacher tries to simplify the same question after the question is incorrectly answered by the student.

Significance of the Study

The researcher anticipates that this study will benefit those who study the nature of classroom discourse in Biology and other science classes, and the findings are expected to improve the understanding of science classroom discourse in other EP schools in Thailand. It exhibits how the teacher and students interact in the form of dialogic patterns with English as the primary medium by means of verbal utterances. The results may be useful to those who teach or study classroom discourse in Biology and other science classes in an EP curriculum. It may shed some light on the strategies employed to solve problems when science teachers in EP encounter failure situations in conducting instructional conversations.

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Components of the Thesis

This thesis comprises five chapters. This chapter gives introductory information about the study. The second chapter provides a review of relevant theories which include the Initiation-Response-Evaluation sequence (IRE), the Structure of Classroom Lessons, discourse as Scaffolding, and Pre-formulating and Re-formulating Strategies. The third chapter deals with the research methodology employed in the study. The fourth chapter shows the results of the study. The last chapter discusses the research results, implications, recommendations, limitation of the study, and the conclusion of the thesis

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CHAPTER II

LITERATURE REVIEW

This section aims to review literature related to the main study. There are six main parts which link this study to previous studies and theories: 1. Discourse analysis (Brown and Yule, 1983), 2. Classroom discourse (Cazden, 1988), 3. IRE pattern in classroom discourse (Mehan, 1978), 4. Structure of classroom lessons (Mehan, 1979), 5. Classroom discourse as scaffolding (Pearson and Gallagher, 1983), and 6. Literature related to previous research.

Discourse Analysis

One of the principal theories that plays an important role in this study is discourse analysis. Even though this kind of analysis is broad, this research explores the nature of science classroom discourse. According to Brown and Yule (1983), the analysis of discourse is the analysis of language use which cannot be restricted to the description of linguistic forms independent of the purposes or functions which those forms are designed to serve. The nature of discourse analysis is to investigate the uses of language. Scollon and Scollon (1995) identified the purpose of discourse study as a way to understand how the language we use is based on the social environments in which we use that language. In addition, Brown and Yule (1983) claimed that a natural language utterance is likely to fulfill one main function at a time. That is to say, it deals with the expression of either *transactional* content or the expression of social relations and personal attitudes, called interactional content.

In a classroom, there is both transactional and interactional content. When a teacher is lecturing or explaining something to students, where students have a passive role, the discourse is transactional. When students participate in a dialogue with one another or with a teacher, the content is interactional. The focus of attention in this research is to explore the nature of discourse in science classrooms as well as

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the interactional language needed when teachers in science classes encounter difficulty in explaining learning context.

Classroom Discourse

Classroom discourse is the oral interaction between teachers and students and among students in classrooms (Edwards and Westgate, 1994). The conversation between the interlocutors is made to construct a common body of knowledge, an understanding of roles and relationships, and the norms and expectations for involvement in classrooms. Cazden (1988) focuses on how the words spoken in classrooms affect the outcomes of education. The author claimed that the most common method used in the past to analyze classroom discourse, mostly teacher-led speech events, was in cognitive terms which categorize teacher questions on a cognitive scale. The conclusion of Cazden's research stated that the studies of classroom discourse by means of application effort on cognitive difficulty to individual questions may be useful for teachers, but it is imprecise for research. However, the author suggested considering discourse in longer sequences in which the sequences may present the potential cognitive value of classroom discourse as scaffolding and as re-conceptualization.

Initiation-Response-Evaluation Sequence (IRE)

The IRE sequence is commonly employed in classroom discourse as a teacher-led lesson or recitation. This means the teacher is the person who controls the development of a topic, assesses the relevance of utterances, and manages turn-taking in class. Most analyses of classroom discourse are analyses of this speech event (Cazden, 1988). Moreover, the sequence typifies the discourse of Western schooling from the kindergarten to the university (Barnes, 1992; Cazden, 1988; Mehan, 1979; Nystrand, 1997). Cazden (1988) stated that the three-part sequence of teacher initiation, student response, teacher evaluation (IRE) is the most common pattern of classroom discourse at all grade levels.

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With respect to Cazden (1988), the individual components of discourse in turn-taking in a dialogic pattern known as the IRE sequence have been defined: Initiation (I) is the question form employed to begin the investigating process which may determine whether or not the students can show their cognition through answers. Response (R) is the answer form to express corresponding verbal utterances which are related to the question of initiation. Evaluation (E) is the feedback form given by the teacher to show the interlocutor (the student) that his or her response is correct or not.

The IRE pattern usually begins with the teacher asking a question. The aim of asking a question is to elicit information from the answer produced by the student so that the teacher can be sure that they are focusing on the lesson, following the pattern of the conversation, and can understand the information being imparted. After the teacher's initiation, learners are expected to provide a concise but correct response to the question, which is to be evaluated with phrases such as "Good," "That's correct," "That is not right." In addition, when a round of IRE pattern is completed, the teacher might begin another cycle of IRE by asking the same question or a follow-up question but asking a different student.

The pattern is exemplified as follows:

Excerpt 1:

Teacher: Who can tell me the answer to the first question?
Student number one? **(I)**

S1: Mass. **(R)**

Teacher: Yes, that's correct. Who can identify another factor?
Student number two, what do you have? **(E) and (I)**

S2: I think…weight. **(R)**

Teacher: Weight? Student number three, what do you think?
(E) and (I)

As can be seen from the excerpt above, the teacher initiated the IRE cycle with a question after finishing a statement about the concept of force formation in Physics.

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Student number 1 provided a response with a correct answer, so the teacher gave the evaluation corresponding to the answer with the phrase “That’s correct.” However, the teacher started another round of IRE by repeating the same question with a different student. The second student couldn’t give a right answer to the question, so the teacher expressed the evaluation by repeating his answer with a rising intonation and initiated a new cycle of IRE with student number three.

Mehan (1978) observed classroom conversations in Cazden’s classes in San Diego to analyze classroom discourse. The topic of birthplace had been raised. It was a part of a social studies unit that had two objectives. The first was to assign students to understand and use maps as well as to give students a chance to locate where individual children and their parents were born. The second purpose was to lessen the distance between the visiting teacher, Cazden, by displaying a map showing the present location of the students and the country where the teacher was from. The teacher’s introduction of the lesson when the class had started is shown below:

“Some people did some good homework last night in finding out where they were born or where your family, your parents came from. And Miguel has a little box of colored paper here, and what we’re going to do is – if you know where you were born, we are going to put your name up with orange paper. If you know where your parents came from, we’re going to put their names up with green paper and pin them right on the map (demonstrating). Now some people were already telling me as soon as they came into school this morning that they had some, that they had some, they knew some things to put on the, to put on the map.”

Student A was the first child called to do as instructed. The lesson was recorded through video camera, and it was transcribed and analyzed with respect to the IRE pattern concerning only the segment of Student A’s family. The transcript and analysis are presented in Table 1.

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Table 1 Transcript of Segment of Lesson Concerning the Observed Student's Family by Mehan (1978)

Initiation	Response	Evaluation	Comments
1.*Teacher:*Uh, Student A, ah, let's see if we can find, here's your name. Where were you born, Student A?	***StudentA:***San Diego.	***Teacher:*** You were born in San Diego, all right	1.Individual nomination of Student A
2. *Teacher:* Um, can you come up and find San Diego on the map?	***Student A***: (goes to the board and points)	***Teacher****:* Right there okay.	2.Teacher acknowledges answer, even to questions for which only Student A knows the answer.
3. *Teacher:* So, we will put you right there (pins paper on map).			

From the conversation shown above, the discussion of Student A's birthplace (1-3) illustrates the basic sequence of IRE. It shows the complete cycle of initiation, response, and evaluation, and the teacher then moved to a new cycle to commence a new loop of IRE. However, this is only a part of the whole conversation. There are more exchanges which are not shown in this table.

The structure of many human events has two dimensions (Cazden, 1988). The two dimensions are known as a hierarchical organization and a sequential organization. The author points out that, according to Mehan's analysis, there is a structure of classroom lesson covering the IRE pattern in accord with the two

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dimensions to formally explain how the classroom lesson is formed systematically. Mehan exemplifies this structure in Table 2 shown below:

Table 2 The Structure of Classroom Lessons Mehan (1979)

Event	Lesson	Lesson	Lesson	Lesson	Lesson	Lesson
Phase	Opening	Opening	Instructional Topical sets	Instructional Topical sets	Closing	Closing
Type of sequence	Directive	Informative	Elicit Elicit	Elicit Elicit	Informative	Directive
Organization of sequences	I-R-E	I-R(E_0)	I-R-E	I-R-E	I-R(E_0)	I-R-E
Participants	T-S-T	T-S-T	T-S-T	T-S-T	T-S-T	T-S-T

Key: T= teacher; S= student; I-R-E = initiation-reply-evaluation sequence;
(E_0) = evaluation; Vertical arrow = Hierarchical organization;
Horizontal arrow = Sequential organization

The IRE pattern and the structure of classroom lessons are considered to be compatible with the objectives of this thesis. That is to say, the two aspects can capture the nature of spoken discourse in a classroom which can help to establish whether the science classroom discourse conducted in the English Program at Matthayom Watnairong has a nature similar to the theories. The pattern of IRE can be used to serve as a tool to describe both a conversational sequence and the structure of classroom lessons (Mehan, 1979).

Cazden (1988) defined scaffolding as "a temporary framework for construction in progress"**.** The concept was based on the works of cognitive psychologists Jerome Bruner and Vygotsky who regarded scaffolding as the helpful interactions between a teacher and a learner that enabled the learner to do something beyond his or her independent efforts. Within the classroom, the teacher provides new information as a modeler of correct performance and as a selective reinforce of learners' endeavor (Resnick, 1985). Pearson and Gallagher (1983) suggested that scaffolding can be applied generally to education, and there seems no reason why

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teaching skills in other areas could not be considered in the same terms. The basic structure of learning environments that suit scaffolding is shown below.

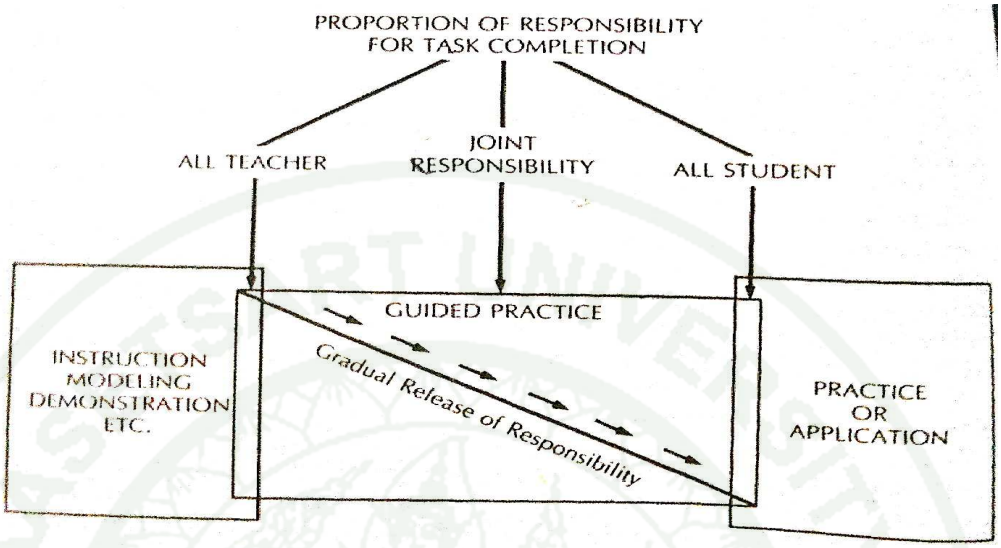

Figure 1 Basic Structure of Learning Environments as Scaffold (Pearson and Gallagher, 1983)

The term scaffolding emphasizes the proportion of responsibility for task completion where its components resemble the types of conversational sequence of Mehan (1979). However, the components' names are categorized differently depending upon the nature of social interaction: teacher only, teacher and student, and student only. This means if the conversation depends predominantly on the teacher as the teacher initiates a lesson with no questions for students to respond to (i.e. an opening phase only), the component is termed instruction modeling or demonstration. Where there is a part that requires conversational exchange with a full cycle of IRE, which is important to reinforce students' cognition, this process is called the gradual release of responsibility (joint responsibility). However, this systematic process of discourse as scaffolding will not be employed as a whole model to explore the understanding of the student, but some strategies, considered as an internal component in the part of joint responsibility, are chosen to achieve the second research objective.

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Cazden (1988) suggested that the model of discourse as scaffolding requires the consideration of three main issues: the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. Nevertheless, while the three issues will not be addressed to approach the research objective, the second issue, getting the answer versus getting the understanding, is commonly found from the in-class observations in EP science classes at Matthayom Watnairong School. With respect to French and MacLure (1980), the strategies are pedagogical routines which are the interactive mechanisms that allow teachers to control classroom interaction.

The first strategy, pre-formulating, is the process that the teachers preface the question they want the student to answer with one or more utterances in which the student is familiarized with the relevant area of experience. An example is illustrated below.

Pre-formulator T: Can you see what the elephant's got at the end of his trunk?
Nuclear Utterance What is it?

The second strategy, re-formulating, is the process when the teacher gets an initial answer which is wrong. The teacher then tries to simplify the question to encourage cognition. In other words, this strategy helps to repair the breakdown. The strategies are thus considered beneficial to students in learning in a science classroom discourse. French and MacLure (1981) categorized five examples of re-formulations according to the degree to which they make the original question more specific.

Table 3 Examples of Original and Reformulation Questions

Original Question	Reformulation
What are those people doing?	1. What are they planting?
How does the elephant feel?	2. Was he a very SAD elephant?
What else did you see?	3. Did you see a chest of drawers?
How did they go, Tom?	4. Did they go by bus or car?
What color have you used?	5. It's brown, isn't it?

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However, the present study does not focus on the degree of the re-formulation but investigates the frequency of use. All in all, the pattern of IRE (Mehan, 1978), the structure of classroom lessons (Mehan, 1979), and the two strategies, pre-formulating and re-formulating, are considered as important considerations which can serve the purposes in conducting this research.

A Review of Previous Research

Although there is a limited number of researches that involve classroom discourse in an English Program curriculum in Thailand, this research investigates the characteristics of previous research that may be applicable.

A Review of IRE Pattern in Science Classrooms and Other Subjects

Sinclair & Coulthard (1975) also analyzed the nature of the IRE pattern of classroom discourse. After their observation and analysis, the authors expressed the view of the pattern that the teachers usually ask a question the students can answer and have the power to select and evaluate individual students.

Mehan (1978) analyzed the basic sequence within classroom discourse in a geography class. In his research, he observed the IRE pattern used in the classroom in which the students were assigned to do their homework a night before the class. He wanted each student to be able to determine their birthplace on the map given. Mehan concluded that the IRE pattern sometimes is not a whole cycle, or it may be more than a single IRE. Therefore, if some sequences were not full IRE, Mehan fills in Topically Related Sets (TRS) to solve this problem.

Mehan (1979) represents the pattern of classroom lessons in a form of table which depicts how the IRE sequence is employed. The study combines the IRE sequence into a table categorized into four event types: phase, type of sequence, organization of sequences, and participants. Thus, the convergence of two linguistic patterns brings about simplicity to investigate the nature of classroom discourse.

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Pearson and Gallagher (1983) suggested that scaffolding can be applied generally to education, and there seems no reason why teaching skills in other areas couldn't be considered in the same terms.

Rowe (1986) analyzed the pattern of IRE in classroom discourse and the importance of wait time. The researcher found a positive trend of the way wait time was employed within a dialogue. This work concluded that the engagement of wait time in IRE enhances students' thoughtfulness. This was further supported by Tobin (1987) who concurred and added that wait time can increase the careful reasoned thinking of the students.

Cazden (1988) analyzed scaffolding in classroom discourse and suggested that the model of discourse as scaffolding requires the consideration of three main issues: the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. Regarding the second issue, Cazden (1988) focused on the ways a teacher formulates questions that can allow insight for the student. Cazden (ibid) claimed that Pre-formulation and Re-formulation are the two crucial strategies possibly bringing about understanding to the learners.

Guruprasad (1988) concluded that the use of day to day language is effective in order to explain scientific terms, which are sometimes difficult to be understood. This means she established a conversation in the classroom to explain some scientific terms using easy vocabulary. She used a video clip showing a man being rushed to the ICU of a hospital after a severe road accident to achieve a successful explanation of the phrase 'critical angle'. The result came out that the video clip shows relationships between a hard-to-understand concept, the critical angle and the video clip. In this sense, her practice in bringing media in visual form to be presented to learners is considered as a part of discourse.

Lemke (1990) analyzed the pattern of IRE in classroom discourse to assess how the teacher's role in teaching is related to the pattern, as well as what happens when the last sequence, evaluation, is not in the cycle. The author concluded that even

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when the teacher's discourse contributions do not have an evaluation function, the teacher can still maintain the pattern.

Graesser and Natalie Person (2002) described the significance of science classroom discourse which has a conversational nature in classrooms similar to general classrooms, and at all grade levels, in English-speaking countries. This means a teacher asks a question, and then one or two students answer. The teacher possibly comments on the students' answers and sometimes summarizes what has been said. The teacher will begin to ask a new question to achieve greater cognitive depth. This cyclical pattern repeats itself throughout the class.

Hall and Walsh (2002) analyzed classroom discourse in terms of the patterns of interaction in L2 classrooms in which the authors emphasized one common pattern, IRE, stating that the IRE pattern typifies the discourse of western schooling, from kindergarten to university. However, the authors claimed that the IRE discourse pattern limits student interaction and does not assist complex interactions and meaningful exchange.

Mortimer and Scott (2003) analyzed and expanded the IRE or IRF (initiation/response/feedback) structure by identifying IRFRF which is a structure with elaborative feedback from the teacher that is followed by a response from a student. He concluded that this pattern is typical of discourse found to support a dialogic interaction. This pattern of discourse enables teachers to explore student ideas.

Chin (2006) analyzed how teachers use questions in classroom discourse to scaffold student thinking to help students to construct scientific knowledge. In his research, he expressed that the IRE model was predominant in science classrooms. He concluded that questioning fosters productive student responses.

Sherris and Harris (2006) analyzed the pattern of IRE in classroom discourse to assess whether each student can name three items from the classroom, using the

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plural morpheme /s/. The teacher spoke with each student one-on-one. The authors concluded that there is a versatility of sequence which is sometimes not compatible with the IRE pattern. However, even though the IRE sequence might not be an ideal model for all classroom interaction, the pattern is a quick and adaptable framework to employ.

Long (2007) analyzed the pattern of IRE in classroom discourse. The author concluded that in accordance with the traditional IRE sequence, a sequence where the final utterance is a positive evaluation or a repair shows a low regard in second language pedagogy.

In accordance with the aforementioned studies, the researcher aims to employ the framework of Mehan (1978 and 1979) and Cazden (1988) because the studies are appropriate to investigate the nature of classroom discourse as well as the relations between Pre-formulation – Re-formulation and students' understanding where the framework can serve the research objectives. The two frameworks can capture the nature of spoken discourse in a classroom which can help to determine whether the science classroom discourse conducted in the English Program at Matthayom Watnairong is similar to previous studies.

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CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the methodology which explains how this study was conducted. Within this chapter, there are eight main sections which are objectives, research questions, participants, instruments, data collection, data analysis, reliability and validity, and verification of the research method and findings.

Objectives of the Study and Research Questions

There are two main objectives for the study:

1. To investigate the nature of classroom discourse in science classrooms at Matthayom Watnairong School under the framework of the Initiation-Response-Evaluation (IRE) pattern (Mehan, 1978), the structure of classroom lessons (Mehan, 1979) in conjunction with scaffolding introduced by J. Campione, (cited in Pearson and Gallagher 1983), and Preformulating and Reformulating Strategies (Cazden, 1988).

2. To explore teacher and student attitudes toward strategies employed by the teachers in the discourse. These two objectives are to find answers to two research questions in this study.

2.1 What is the nature of spoken discourse in science classroom at MatthayomWatnairong School with perspectives of the IRE pattern (Mehan, 1978), under the framework of the structure of classroom lessons (Mehan, 1979), scaffolding introduced by J. Campione, (cited in Pearson and Gallagher 1983), and Preformulating and Reformulating Strategies (Cazden, 1988)?

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2.2 How do teachers and students perceive strategies which have an impact on the cognition gained in the discourse?

Participants

In order to clarify the details of participants in this study, the participants, the interlocutors, are divided into two sides in classroom discourse: students and a teacher.

The English Program (EP) students observed in science classroom discourse are all Thais who have been familiar with western culture from native English teachers. Sakui and Gaies (1999) stated that Asian students are usually considered as resilient constructs, self-perpetuating in nature. However, the observed group studied an English program for three years before this research was conducted. The students are, in the main, different from Thai program students in terms of self confidence, individuality, and public expression. Individually, the EP student's behavior is somewhat similar to western students as opposed to regular Asian students whose self expression seems to be suppressed by oriental culture. Therefore, the nature of the EP students is likely to have an impact on science classroom discourse.

The research population, all EP students in Thailand, is estimated at ten thousand students, all of which are studying in an EP program. Nevertheless, the number of chosen EP students of Matthayom Watnairong was 30 with an age range between 15 – 16 years old. To exemplify this, the participants, 18 males and 12 females, were from one level, Matthayom 4/1 (Grade 10). All of the students were studying a science curriculum.

The other group of participants is a non-native English teacher. The teacher, 38 years of age, is from the Philippines and speaks English as a second language. He graduated in science-related fields in his country and is responsible for one science subject, Biology. The teacher has experience in teaching science through English for several years before teaching at Matthayom Watnairong School.

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Research Instruments

To study and analyze a classroom discourse, this research will employ a framework of the Initiation-Response-Initiation (IRE) pattern (Mehan, 1978), the structure of classroom lessons (Mehan, 1979) in conjunction with scaffolding introduced by J. Campione, (cited in Pearson and Gallagher 1983) and Cazden (1988), all of which clarify the basic structure of the learning environment, and a framework of IRE pattern, a conversational pattern that depicts how conversation is established, continued, evaluated, and ended. However, so that this study can be accomplished with respects to the objectives, it is essential to categorize tools that serve the particular function of utterances. There are four main instruments: video camera, classroom observation sheet, questionnaire, and interview.

Video Camera

The first instrument considered crucial to this study is the video camera. Using this gadget to record spoken discourse is prevalent in many discourse studies. This electronic device is planned to record motion pictures and sound which can help the researcher to analyze verbal and non-verbal utterances conveniently. The advantage of this electronic equipment is that the system can play the recorded situation forward and backward in order for the observer to watch details relevant to the study. The record of utterances is also able to show the countenances and gestures of students. These expressions can be used to consider, together with the component of IRE pattern, whether the students understand the concept taught. Therefore, the video camera is useful equipment to collect data in the field so that the observer can record, analyze, interpret, and report results based on factual situations.

Classroom Observation Sheet

Another instrument which the researcher used in the classroom is the classroom observation sheet. This sheet contains a table which provides gaps to fill in information related to verbal and non-verbal utterances. In fact, the practitioner

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adapted data recording structure of Mehan (1979) to tabulate information by means of IRE pattern and non-verbal utterances.

According to Pearson and Gallagher (1983), the authors divide the basic structure of learning environments, fitting the term scaffolding by means of the proportion of responsibility for task completion into three main parts: all-teacher, joint responsibility, and all-student. Within this section, the study aims to record only the part of joint responsibility in dialogic exchanges. What is defined as a unit of analysis in this study is a cycle of IRE pattern used in the area where exchanges start and end covering only the extent of joint responsibility. In addition, besides the IRE pattern, there is another feature to consider within the same section. It is the observation of failing situations within the conversation between the teacher and the students when the teacher seems not to explain scientific information. The observation captures the technique employed by the teacher to complete the goal of lecture. Thus, there are four main segments of organization of sequences in Appendix A: Initiation, Response, Evaluation, and Comments/Non-verbal utterances.

Questionnaire

Questionnaires are effective instruments that can be used to gather information that can serve the objectives of a particular research. O'Brien (1997) stated that a questionnaire should be viewed as a multi-stage process beginning with the definition of the aspects to be examined and ending with interpretation of results. Academically, a questionnaire needs to be designed prudently; the final results are processed through carefully designed steps: 1. Defining the Objectives of the Survey, 2. Determining the Participant Group, 3. Writing the Questionnaire, 4. Administering the Questionnaire, and 5. Interpretation of the Results.

The questionnaire designed to use in this study was constructed to find relevant information that can answer the second objective which is to explore teachers and students' attitudes toward the strategies employed by teachers in science classroom discourse. Normally, questionnaires are designed to gather either

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qualitative or quantitative data. However, this study approach is based on a qualitative paradigm to interpret the nature of spoken discourse, there is an instrument part requiring data expressed in terms of percentage of in-class utterances naturally made by the participants. The data are used to analyze in conjunction with the second instrument, classroom observation, to identify different points of view about the conversational pattern in science classroom discourse. The questionnaire represents the data provided by the second party (student) who participated in an in-class dialogic pattern while the classroom observation, as the third party (observer), provides details to give both verbal and non-verbal utterances.

Regarding O'Brien (1997), there are, in general, two types of questions in a questionnaire: open format and closed format. An open format question has no predetermined set of responses and the participant is independent. Nevertheless, this study observes the exchanges of utterances while the science classroom discourse is being conducted, so this means that the questions in the questionnaire are not compatible with this type. On the other hand, the closed format question establishes a predetermined set of responses in order to narrow down the information that is particularly related to the strategies used by the students and teachers. That is to say, the closed format questions enable the practitioner of this study to eliminate useless answers, to gain relevant information, and to spend optimum time with the questionnaire answering process. O'Brien (1997) claimed that closed format questions make it easier to track opinion over time by administering the same questionnaire to different but similar participant groups at regular intervals. The sample of questionnaire is shown in Appendix C.

Interview

The last instrument of this research is the semi-structured interview. The fourth instrument plays an important role in recording the attitudes of the teacher specifically about the strategies used to achieve the goal of teaching. The final process is aimed to obtain information with a complete dimension of classroom discourse by recording the attitudes of only the teacher. This means that the interview reveals the

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teacher's feelings, thoughts, and methods when he is confronting difficulties in explaining a scientific lesson to students or is in unexpected failure situations. In addition, the semi-structured interview provides an interviewee flexibility and opportunity to develop answer so that the information can be used to confirm or supplement the information collected (Muckay and Mauntford, 1978). The interview is shown in chapter 4.

In accordance with the science classroom observation protocol produced by RMC, the Research Corporation in collaboration with the LASER leadership, Regional Alliance directors and staff, and the Washington State Science Coordinators (2010), this study discovered how students learn science in Washington State. However, there are several areas of interest that are not suitable for this study, so there is merely a part of a teacher interview which is to be adapted to derive target information. For example, the authors divided the teacher interview into two sections: pre and post teaching interview questions. As for the former, the questions may be asked "What is the name of the instructional module in use?", or "What do you anticipate doing with the class today?" As for the latter, the questions probably are "How did this lesson turn out compared to what you planned?", or "What do you think the students learned from this lesson?" However, there is no pre-teaching question because this study does not aim to gain information about the quality of teaching and is aware of deviating real situation to cause unnatural spoken discourse. This study asks the teachers questions merely after class about their attitudes when confronting failing situation in teaching

Data Collection

This study employs four types of data collection methods: recording motion pictures through a video camera, remarking non-verbal utterances on a classroom observation sheet, exploring students' in-class behaviors and attitudes from a questionnaire, and observing teacher's strategies from an interview.

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All discourse events are recorded through video camera while the participant of this research is observing the discourse. This electronic device is commonly employed in many classroom discourse studies as it can collect motion pictures and sound. The technology of the device can be used to repeat the clips, so it is very convenient for this study. The video camera provides main information about the exchanges in discourse including minor supportive evidence such as non-verbal utterances, gestures, etc. Chin (2007) analyzed verbal data from the transcripts interpretively and stated that the video clips provided additional information about the physical actions, gestures, body language of participants, and the nature of individual language expression. Therefore, the device capability suits this study because it can record the whole discourse of each lesson.

The classroom observation sheet is employed to remark non-verbal utterances and gestures when the two interlocutors, a teacher and students, are exchanging questions and answers within the observed spoken discourse. This form of data is capable of clarifying transcript when it is analyzed.

In accordance with the methods used in previous studies of classroom discourse analysis, a questionnaire is designed to gain information from the students reflecting their attitudes upon classroom discourse and the strategies used by the teacher, and the after-class interview is for the teacher who is expected to provide information regarding the teachers' strategies and opinions when he confronts failure situations. Moreover, the video clips show the observer details of all the classroom discourse which is convenient to be transcribed and analyzed under the framework of the IRE pattern. Therefore, this study adopts all of the aforementioned methods in combination to derive the data needed for further analysis and interpretation.

The questionnaires were administered to thirty students after class in order to investigate their attitudes toward the discourse between them and the teachers. This instrument is considered as a source of information which corresponds to the second objective. Petkova (2009) stated in research about classroom discourse and how teacher talk influences English language learners that questionnaires are important to

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gain essential information from students to find supporting evidence to consider the discourse. This study collected information by means of a qualitative approach that reflects the interactions of the students when they are encountering difficulties in understanding the lecture to support the evidence recorded through video camera that was transcribed and formed into the IRE pattern. This procedure can be considered as an approach to double check the nature of spoken discourse through questionnaire.

With respect to the Washington State Science Coordinators (2010), the study shows a similar approach to this research to gain information from the teacher's attitude after class. However, the data in previous research were interpreted to further development in teaching science, whereas this study derives information qualitatively and concerns the teacher's attitude and strategies when he confronts difficulties in lecturing science lessons. When the lessons finished, the teacher who taught Biology was asked to write his answers in the interview form regarding the aforementioned issues. This information employed a qualitative approach that can meet the second objective because the teacher expressed true feelings about the discourse. Thus, these sources are necessary by means of supporting evidence that show attitudes whether or not they coincide with the recorded video clips.

In short, the data from four research instruments, video camera, classroom observation sheet, questionnaire, and interview, were collected during the first semester of the year. The researcher was permitted to observe one class with thirty students in each. The participants of this study were studying at the level of Matthayom 4/1 which can be compared to Grade 10 in the western education system. Therefore, there are thirty-one participants in this research: thirty English program students and a non-native English teacher. The Biology class was observed from the first to the thirtieth minute of the class. In addition, questionnaires and interviews were expected to provide qualitative interpretation to reveal the nature of spoken discourse by both students and teachers while the video source provides vivid raw data which recorded the Biology classroom discourse.

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Data Analysis

This study depends mainly on a qualitative approach which employs the theory of Mehan (1978) which focuses the pattern of IRE in the dialogic sequence of Mehan (1979) which emphasizes the structure of classroom lessons, and the study also evaluates discourse as scaffolding (Pearson and Gallagher, 1983) in conjunction with Cazden's (1988) strategies for enhancing cognition when a teacher confronts failure situations in science classroom discourse. Therefore, the four aforementioned theories, Mehan (1978), Mehan (1979), Pearson and Gallagher (1983), and Cazden's (1988) play an important role to this study.

Within a common classroom, classroom discourse can be studied in many ways. Regarding discourse as scaffolding (Pearson and Gallagher, 1983), the authors divide the discourse by means of the proportion of responsibility for task completion into three stages: all-teacher, joint responsibility (exchanges between teacher and students), and all-student. However, this study focuses merely on a part of joint responsibility where many dialogic exchanges are observed. The study of discourse as scaffolding (Pearson and Gallagher, 1983) is compatible with Cazden (1988) who suggested the use of strategies to help students to understand better when the teacher encounters failure situations. The author explained that the model of discourse as scaffolding requires consideration in three main issues: the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. Nevertheless, all three issues will not be used to approach the objective, as the second issue, getting the answer versus getting the understanding, is regarded by Cazden (1988) as the issue that brings about understanding for students in the classroom discourse. The author stated and categorized that this issue, getting the answer versus getting the understanding, comprised of Pre-formulating and Re-formulating methods. Therefore, these two strategies are regarded as approaches by which the teacher formulates questions that can easily convey the insight of the lesson to the students. Thus, the second feature of the framework, scaffolding, is more likely to be a suitable instrument to find the answer for the second objective.

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The IRE pattern exploration can be grouped into two issues and analyzed separately. In part of the Initiation, Response, and Evaluation sequence (IRE), this study analyzes the exchanges in part of joint possibility made by a teacher and students in which the unit of analysis of this study is predetermined to focus on a complete or incomplete cycle of IRE between a teacher and a student. This can reflect the nature of spoken discourse in a science classroom. In addition, when the video clips were transcribed and analyzed, the IRE pattern was compared with Mehan (1979) and the author found that the structure of classroom lessons in western schools share a common structure. The scheme found in the science classroom at Matthayom Watnairong is to adopt the structure of classroom lessons (Mehan, 1979) by means of five common hierarchical features: event, phase, type of sequence, organization of sequences, and participants. The information collected is allocated in a form of table produced by Mehan (1979), and the results are depicted qualitatively.

Not only is the IRE pattern investigated to provide qualitative explanations about the nature of science classroom discourse, but also the pattern is to be analyzed quantitatively through the Excel Program. A number of IREs are processed using this program because this study seeks to present the findings numerically reflecting the nature of verbal utterances by means of IRE pattern in the form of percentage. Therefore, different frequencies of pattern use are a part of the outcome of this study.

Reliability and Validity

Interpreting or determining the findings or impact of the results depends upon two concepts: validity and reliability. Construct validity means whether a study's measurement process or assessment actually measures or explores what the research intended to measure. Reliability plays an essential role in addressing whether repeated measurements or assessments provide consistent results when compared to the results of previous studies. One method for repeated measurements is inter-rater reliability. *Inter-rater reliability* means more than one judge or rater employs the same measurement to obtain the result. In cases where the ratings of all raters concur, the measurement is reliable (Muijs, 2004).

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Another part of this study uses a fact-finding process based on an interpretive paradigm established on the information and samples to convey the study to approach facts in a particular area. Finding the facts analyzed through the participants means the study covers an analysis of a specific group of students in which the science classroom discourse occurs. Patton states that "qualitative research uses a naturalistic approach that seeks to understand phenomena in context-specific settings, such as a real world setting where the researcher does not attempt to manipulate the phenomenon of interest" (Patton, 2001).

In general, there is a broad range of data or types of phenomenon brought to conduct a research, so the data derived from the observation and analyzing method are made to result in a qualified verification. Following Golafshani's (2003) interpretation on the approach to establish the credibility of qualitative research, the researcher quotes from Patton: "The researcher is the instrument" (Patton, 2001, P.14). This means the credibility of the qualitative research primarily depends on the ability and effort of the researcher. However, the ability and effort are dependent upon a tool to establish the credibility of the research. According to Mathison (1988), a good researcher should use multiple methods, data resources, and researchers to increase the validity of research findings. That is to say, the researcher who conducts qualitative research is obliged to triangulate the data from different relevant methods bringing about equilibrium of results. Mathison (1988) suggested that triangulation is a good strategy to improve the validity of research or evaluation findings and quotes from Miles & Huberman: "Triangulation is supposed to support a finding by showing that independent measures of it agree with it or, at least, don't contradict it" (Miles & Huberman, 1984, P.235). Moreover, Mathison stated that "triangulation has arisen as an important methodological issue in the evaluation literature as well. In particular, naturalistic and qualitative approaches to evaluation have demanded attention to controlling bias and establishing valid propositions because traditional scientific techniques are incompatible with these alternate epistemologies" (Mathison, 1988, P.13).

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Verification in Research Methods and Findings in the Present Study

Reliability

The term *reliability* is "the degree of accuracy in the measurements made by a research instrument" (McBurney and White, 2007, P.156). The type of reliability in this study is *inter-rater reliability*. The reliability test is employed to apply three types of interpretation of results using Mehan (1978), Mehan (1979), and Cazden (1988) which are the set of IRE pattern, the structure of classroom lesson and the strategies namely *Pre-formulating* and *Re-formulating*, respectively. Since the data analysis process deals with the application of theories relevant to verbal utterances in classroom discourse through English as the main medium, experts were required to verify the findings. Data were analyzed by the researcher, and three English native speakers were asked to check whether the interpretation of results matched the theories employed.

Validity

This research is a conversational analysis which employs a triangulation method in the validation process aimed to establish the credibility of the result. To construct the scheme of this method, the triangulation comprises three fundamental panels invited to examine the content of the conversation from different perspectives. However, the panel members work in the educational field in which they have a strong background of experience of using English language for teaching.

The first person which plays an important role in examining the research data includes an English native teacher who was invited to observe the Biology class. When the observation was finished, the teacher was asked to write a peer review to evaluate the classroom discourse from the teacher's angle. Peer review helps the study to maintain a standard, to develop performance, and to give credibility to the research. The peer review pattern varies according to the background of the teacher, so this can

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provide potential information to allow the writer to depict relevant ideas independently.

The second person invited to examine the result and to express academic reflection through a peer review is the in-field expert of the study. The invited instructor is an English native speaker and has direct experience in evaluating such data**.**

The last eligible person to examine the result is a native English speaking teacher who teaches English. Experience in teaching English among Thai students enables the validation and interpretation of results from a different perspective. A peer review was written by means of a report focusing on the learning strategies of the students. This means the perspectives on the results from the expert is primarily related to the way the students in a Biology class succeed in the goal of understanding.

Triangulation is important to this research in the validation process. Employing a qualitative paradigm to describe facts without bias needs a suitable approach, so-called triangulation, to maintain, develop, and provide a standard, and to lend credibility to the research. The chosen three qualified parties enhance validation and are capable of analyzing conversations appropriately.

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CHAPTER IV

RESULTS

This chapter presents the data findings which are derived from transcripts, questionnaires, and interviews, all of which are to be explored and analyzed with respect to the research objectives. The results of the Initiation-Response-Evaluation (IRE) pattern (Mehan, 1978) in conjunction with scaffolding introduced by J. Campione, in Pearson and Gallagher (1983) obtained from transcripts are illustrated in detail in tables, percentages, and descriptions. The results of the students' attitudes from questionnaires towards strategies employed by the teachers are shown in the form of percentages and descriptions while the results of teachers' attitudes about conversation used in class from interviews are explained by the teachers. This chapter comprises two main parts:

1. Pattern of Initiation – Response – Evaluation (IRE)

   a) The IRE pattern of the observed classroom conversations
   b) The IRE pattern by means of the structure of classroom lessons
   c) The IRE pattern considered as scaffolding

2. Teacher's and students' attitudes towards strategies employed by the teachers

   a) Exploring the results of attitude towards strategies used
   b) Exploring the strategies employed in class

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Part 1: Pattern of Initiation – Response – Evaluation

The findings of the observed conversation of Biology classes employing the IRE pattern based on Mehan (1978) and comments are transcribed and tabulated. In addition, the percentages of Initiation, Responses, and Evaluation as well as descriptions of the results follow the tables. The transcripts of the conversation in the involved part are shown in the appendix.

The transcript of the interactions between the teacher and the students is only a part of the entire conversation observed. The remaining conversational data tends to show a one-way communication. This means the time limit of lectures, as well as the amount of Biology content imparted by the teacher, did not allow the teacher to provide a significant turn to the learners to construct a conversational pattern upon which this study is focusing. In other words, the teacher controlled the conversation allowing students to have less chance to construct exchanges that allow a full cycle. Nevertheless, there are some parts of the classroom discourse that are appropriate and can be brought into this consideration. According to Pearson and Gallagher (1983), the dialogues are excerpted to illustrate the IRE pattern (Mehan, 1978) only in the part of scaffolding called joint responsibility. The results are shown and analyzed in two main parts:

1. Results of Pattern of Initiation-Response-Evaluation

a) Analysis through the Framework of Mehan (1978)

The nature of classroom discourse explored in a science classroom, Biology, of Matthayomsuksa 4 (Grade 10) at Matthayom Watnairong was constructed through the pattern of Initiation-Response-Evaluation. The IRE model derived from the class was predominant and coincided with that of Mehan (1978). This conversational pattern tended to drive the classroom dialogue to accomplish the teacher's objectives. The researcher recorded the conversation from the beginning of the lecture; however, it was not the first class of the chapter taught. The teacher began the lecture by

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reviewing the content learned from the previous class to build up the students' awareness, which was aimed to allow the students to activate their existing knowledge. The results of the IRE pattern are shown in Table 4 below.

Table 4 The Pattern of IRE Derived from Transcripts in Appendix A

Sequence	Type of Pattern	Type of Pattern	Type of Pattern
1.	I		
2.	I		
3.	I		
4.	I*		
5.	I*		
6.	I*	R	
7.	I		
8.	I*	R + R + R + R	E + E + E + E
9.	I*	R + R	E + E
10.	I*	R + R	E + E
11.	I*		
12.	I*	R	E
13.	I*	R	E
14.	I		
15.	I		
16.	I*		
17.	I*		
18.	I		
19.	I*		
20.	I		
21.	I*	R	E
22.	I*	R	E
23.	I*	R	E
24.	I		
25.	I*		

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Table 4 (Continued)

Sequence	Type of Pattern	Type of Pattern	Type of Pattern
26.	I		
27.	I		
28.	I		
29.	I		
30.	I		
31.	I		
32.	I*	R	E
33.	I*	R + R	E + E
34.	I*	R	
35.	I*		
36.	I		
37.	I*	R	E
38.	I*		
39.	I*		
40.	I		
41.	I*		
42.	I*	R	E
43.	I*		
44.	I*		
45.	I*		
46.	I*		
47.	I*		
48.	I*		
49.	I	R	E
50.	I		

Remark: I means the initiation of conversation but may not require an answer; I* means the initiation that requires answers from students R means response and E represents evaluation.

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The data in Table 4 demonstrate 50 dialogic patterns symbolized in the form of IRE pattern in which these cycles are derived from the transcripts. It can be seen that some patterns have a complete loop, Initiation-Response-Evaluation, whereas the other cycles are not. Some sequences have more than one response and one evaluation because the teacher was asking many students the same question so that this resulted in many responses and evaluations in a single sequence. For example, regarding Table 4, sequence # 8 has more than a single response and an evaluation in one cycle. The transcripts are exemplified as follows:

Sequence # 8

Teacher: Now for male, what are the important parts of the reproductive system? Can you just tell me in any order? (Initiation)

Student 1: Testes. (Response 1)

Teacher: Testes, right. (Evaluation 1)

Student 2: Erectile tissue. (Response 2)

Teacher: Erectile tissue, okay. (Evaluation 2)

Student 3: Penis. (Response 3)

Teacher: Penis, ok. That's important of course. (Evaluation 3)

Student 4: Epidermis. (Response 4)

Teacher: Epidermis, we also have it in scrotum. (Evaluation 4)

Table 5 The Frequencies of IRE Pattern Derived from Table 4

Types of Pattern	Frequency (times)	Percentage (%)
Total Initiation	50	
Initiation Requiring Answer.	31	
Response	19	61.3
Evaluation	19	100

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The data in Table 5 show that there are fifty sequences excerpted specifically in the part of joint responsibility. In the conversational pattern, there are complete and incomplete cycles of Initiation-Response-Evaluation. When taking a deeper observation, there are 31 initiations that require responses from the students. However, the data in Table 5 indicates that only 19 responses (61.3%) were produced to answer the initiations.

There are 15 IRE patterns in total which comprise both complete and incomplete cycles. Thirteen cycles out of fifteen are complete cycles while the incomplete loops are remained the same. The complete cycles or sequences of IRE pattern in the observation are 8, 9, 10, 12, 13, 21, 22, 23, 32, 33, 37, 41, and 48, and the incomplete cycles are 6 and 34.

In addition, the sequences 8, 9, 10, and 33 show more than a single response to a single initiation. This is caused by the type of question which can be answered with more than one answer. The students tended to respond when the first student began to reply. Thus, more students followed with additional responses. Sequence 8 has a single initiation, but there are 4 responses that followed. The initiation in such a sequence inspired more than a single answer. Sequence # 9, 10 and 33 have 2 responses to each question. Moreover, as shown in Table 5, the teacher evaluated all of the responses of the students. In fact, when the teacher finished the evaluation, he began a new initiation. According to Table Appendix A, the data show that there are two types of question employed by the teacher. The first kind asks the students about knowledge from the previous period and the content that has just been taught. This can be seen from Table 4 in Sequence # 8, 9, 10, 12, 21, 22, 23, 34, 37, 38, 43, 44, 45, 48, and 49. In addition, another question type is selecting the student randomly. In Sequence # 32 and 41 the teacher chose the students to respond.

According to Table 5, it suggests that there are 50 initiations in this excerpt. However, there are 31 initiations that the initiator, the teacher, required responses from the students. In the classroom discourse, the teacher initiated the conversation 31 times, but the students responded to the question 19 times, which is approximately

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61.3% of the entire initiations. In contrast, when the students responded to the initiation, the teacher always evaluated the responses.

b) Analysis through the Framework of Mehan (1979)

The nature of classroom discourse in a Matthayomsuksa 4 (Grade 10) Biology classroom, at Matthayom Watnairong was similar to the structure of classroom lessons by Mehan (1979). The data is summarized and tabulated below.

Table 6 The Structure of Classroom Lesson in the Biology Class

Event	Lesson	Lesson	Lesson	Lesson	Lesson	Lesson
Phase	Opening	Opening	Instructional (Topical Sets)	Instructional (Topical Sets)	Closing	Closing
Biology class	**(S#1-5)**	**(S#7)**	**(S#33, #34, #47, #4**	**(S#33, #34, #47, #48)**	**N/A**	**N/A**
Type of sequence	Directive	Informative	Elicit Elicit	Elicit Elicit	Informative	Directive
Biology class	**(S#2)**	**(S#1, #8, #9, #10, #12, #13, #20, #21, #22, #23)**	**(S#33, #34, #47, #48)**	**(S#33, #34, #47, #48)**	**N/A**	**N/A**
Organization of sequences	I-R-E	I-R(E_0)	I-R-E I-R-E	I-R-E I-R-E	I-R-E	I-R-E
Biology class	***No complete loop***	**(S#8, #9, #10, #12, #13)**	**(S#33, #34, #47, #48)**	**(S#33, #34, #47, #48)**	**N/A**	**N/A**

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Table 6 (Continued)

Event	Directive	Informative	Elicit	Elicit	Informative	Directive
Participants	T-S-T	T-S-T	T-S-T	T-S-T	T-S-T	T-S-T
Biology class		**(S#8, #9, #10, #12, #13)**	**(S#33, #34, #47, #48)**	**(S#33, #34, #47, #48)**	**N/A**	**N/A**
	T	**T-S-T**	**T-S-T**	**T-S-T**		

Key: S = Sequence T= teacher; S= student; I-R-E = initiation-reply-evaluation sequence; (E_0) = evaluation; N/A = No information obtained

Regarding the information from Table 6, the data are categorized into 4 events: Phase, Type of sequence, Organization of sequences, and participants. Each event is synchronized to the empirical data derived from Appendix A as follows:

Phase

The phases explored in the Biology class are of 3 types: Opening, Instructional Topical Sets, and Closing. As shown in Appendix A, sequences 1 – 5 illustrated that the teacher initiated the sequence by informing students what he was going to do and what he wanted the students to do in class. The teacher initiated the classroom conversation by introducing what he expected. Soon after the opening ended, the teacher instructed the students as planned through the PowerPoint program. The teacher provided one-way communication, meaning that the teacher spoke, and the students listened. This part involves the structure of classroom lesson of Mehan (1979) coinciding with the category named Instructional or Topical Sets. Such a pattern is found through Sequence # 33, 34, 37, and 48 and the omitted transcript between lines 24 and 25 as well as lines 39 and 40. The omitted part includes the Biological content which is not related to Joint Responsibility. Thus, even though there are some closings in the conversation transcript, there is no transcript of closing shown because the study does not aim to explore closing. The nature of the

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conversation observed is constructed with a phase composed of Opening, Instructional or Topical Sets, and Closing.

Type of Sequence

The type of sequence in the nature of classroom discourse explored in the science class resembles the 'structure of classroom lessons' theorized by Mehan (1979). In the opening, as claimed by Mehan (1979), the order of type of sequence is arranged by having a Directive Type first and followed by Informative part. However, the opening observed in the Biology class has a different position. That is to say, the result from Sequence # 1 and 2 indicate that the Informative Type comes first, and the Directive Type follows. As can be seen from Appendix A, Sequence # 1 shows the informative statement since the opening of conversation *("Now, I want you to study what I will uh....discuss for today, and then later on I will ask your group to present here ok?")*, yet Sequence # 2 illustrates the directive tone of the dialogue. The teacher was more likely to create attention in the class by commanding the students to be attentive. This can be shown from *"You have to be very attentive for today"*.

This research studies the turns between the two interlocutors when showing mutual interactions. There were exchanges that generate the IRE pattern. Before the lecture began, there were some sequences of the complete IRE pattern in an opening to enable the teacher to commence the conversation. These were done by asking the students questions about the content taught in the previous class, and the student replied. The example can be seen in Sequence # 8, 9, 10, 12, 13, 20, 21, 22, and 23.

Organization of Sequences

This section of the structure of classroom lesson (Mehan, 1979) establishes the pattern of initiation, response, and evaluation as a component of each event. From Table 4, there are incomplete and complete IRE sequences created naturally. Some sequences are similar to the structure of classroom lesson. However, some parts of the opening in the observed class have no complete cycle. For example, the opening in

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the directive part shows no response and evaluation. The teacher is the only interlocutor who began the conversation, but the students did not give any response.

Participants

Each observed class comprises one teacher and thirty students. The turn taking of the two interlocutors in science classroom discourse is mostly arranged with respect to the pattern of IRE. That is to say, the teacher is regarded as the person who initiates the conversation, and the students give responses to the questions. The teacher then evaluates the answer of the student. This can be exemplified as T-S-T. Therefore, the pattern of the conversation in a part of joint responsibility resembles the model of Mehan (1979). However, there is only one part that the classroom discourse in the Biology class differs from Mehan (1979). It is a first part of the opening, directive, because only the teacher spoke and students showed no response to the opening of the teacher.

c) The IRE pattern considered as scaffolding

The nature of classroom discourse found in the observed science classroom has an IRE pattern that does not differ from the model named scaffolding. Regarding the scaffolding model by J. Campione, in Pearson and Gallagher (1983), the author defined the in-class interactions between teacher and student as ‘the Proportion of Responsibility for Task Completion’. This model is categorized into three main parts: All Teacher, Joint Responsibility, and All Student. However, as indicated previously, this research focuses upon the conservation only in a part called Joint Responsibility. The transcript shown in this chapter, therefore, is of only a part of joint responsibility. Nevertheless, all of the transcripts involved in this section can be observed in Appendix 1.

The transcripts show that the teacher usually begins the classroom conversation with the opening that gives instruction, modeling or demonstration. The exchanges between the teacher and the student were rare unless the teacher initiated

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and emphasized the questions to encourage answers from the students. The difference found between the model and the empirical data is that the teacher started the lecture in a way that was not all-teacher responsibility. This means the teacher started with the exchanges by asking about the previous content taught before teaching new knowledge. The teacher reviewed the students prior to access into the boundary of all-teacher responsibility. Therefore, the model of Proportion of Responsibility for Task Completion was not *All-Teacher – Joint Responsibility – All-Student*, but the pattern of the responsibility for task completion of the observed class is *Joint Responsibility – All-Teacher – Joint Responsibility – All-Student*. However, this pattern did not occur in every class, only where the observed class was not the introduction of a new chapter. The comparison is exemplified in the diagram below.

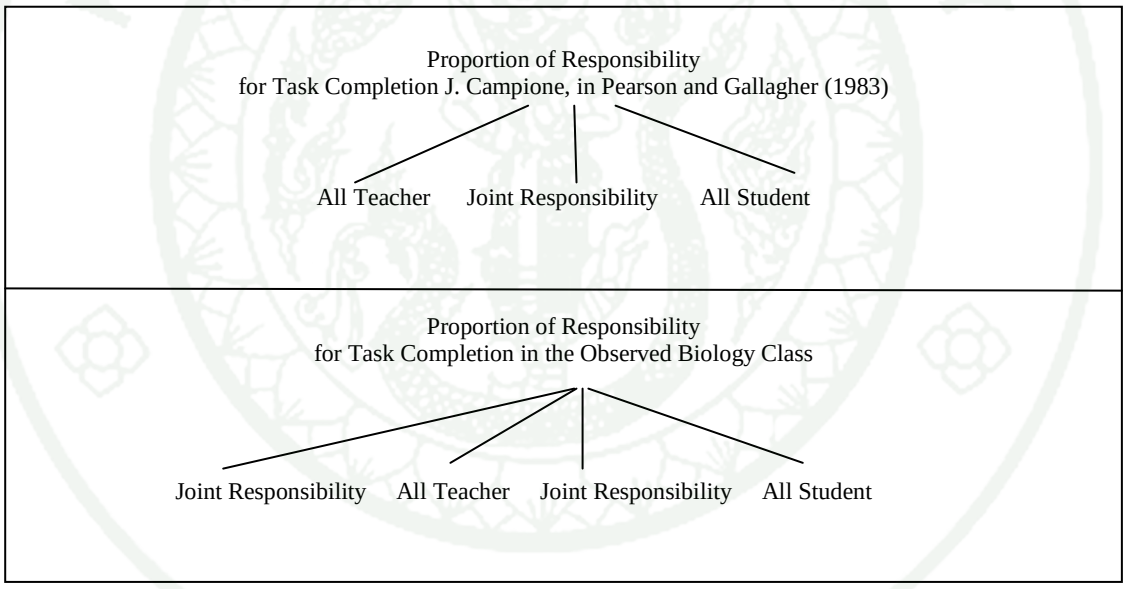

Figure 2 Comparison between Basic Structure of Learning Environments as Scaffolding (Pearson and Gallagher, 1983) and Basic Structure of Learning Environments in the Observed Biology Classroom.

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Part 2: Teacher's and Students' Attitudes towards Strategies Employed by the Teacher

The findings of Part 2 can be divided into two main sections: exploring the students' attitudes towards conversational practices in class and exploring the teacher's attitude on the strategies employed in class. The results of each section are described as follows:

a) Exploring the students' attitudes towards conversational practices

This section is mainly involved with the attitudes of students towards the interactions between the students and the teacher. Thirty students gave opinions through questionnaires distributed after class. The results are evaluated by means of percentage shown in Figures 3 - 12.

Questionnaire answer 1: The students expressed different attitudes when asked about the reactions if they could not understand the Biology lesson.

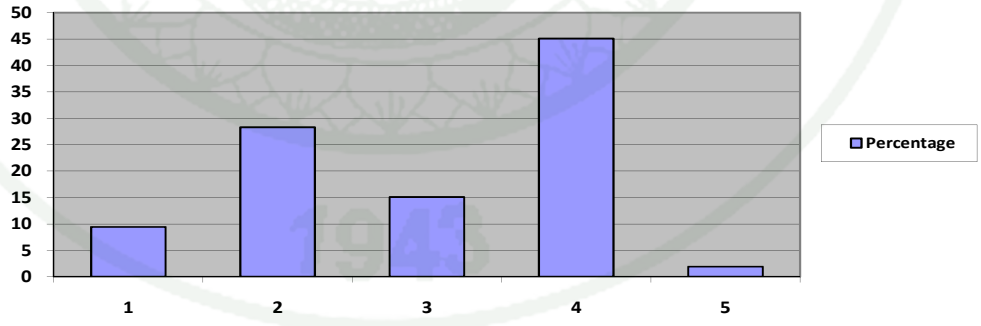

Figure 3 **Percentage of students' reaction when they do not understand the Biology lesson**

Number 1, (9.43%), represents the students' response to the teacher immediately.

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Number 2, (28.30%), represents the student's response to the teacher when a chance was given.

Number 3, (15.09%), represents the students' response to the teacher after class.

Number 4, (45.28%), represents no students' response to the teacher, but they ask friends about what they have not understood.

Number 5, (1.9%), represents no students' response to the teacher, but they will do self-study at home.

Questionnaire answer 2: The students expressed different attitudes when asked about the most difficult part in the Biology lesson.

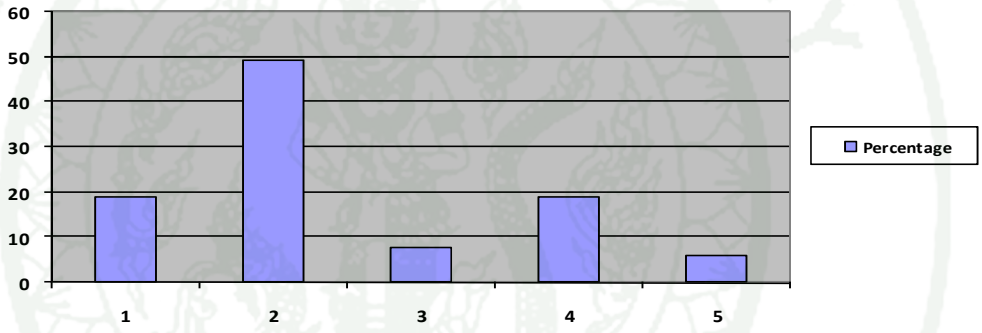

Figure 4 **Percentage of students' attitudes about the most difficult part in the Biology lesson**

Number 1, (18.87%), represents a lecture that is full of scientific terms.

Number 2, (49.06%), represents a lecture that is full of complicated processes.

Number 3, (7.55%), represents comments about a lecture made as a result of the teacher's unclear accent.

Number 4, (18.87%), represents the inability of the students in translation.

Number 5, (5.65%), represents the inability of the students to memorize the lesson.

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Questionnaire answer 3: The students expressed different attitudes when asked about the students' reactions when they were still confused after the first explanation.

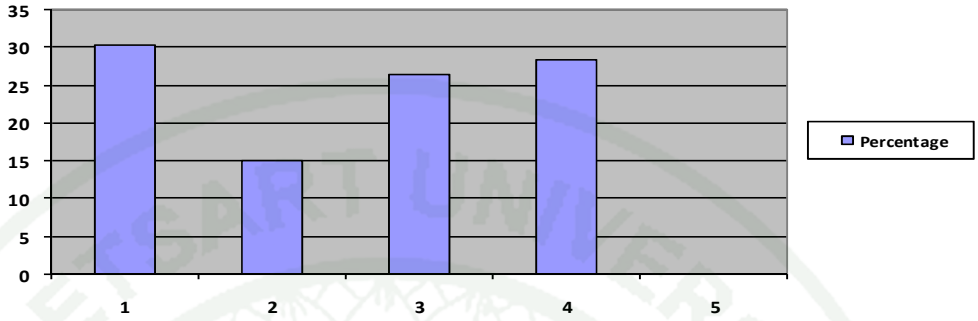

Figure 5 **Percentage of students' reaction when they were still confused after the first explanation**

Number 1, (30.2%), represents the immediate response to the teacher.

Number 2, (15.09%), represents the response to the teacher when a chance was given.

Number 3, (26.42%), represents no response to the teacher but where there was interaction with their friends.

Number 4, (28.29%), represents the response to the teacher after class, and the students doing self-study at home.

Number 5, (0%), is a gap for an open ended selection.

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Questionnaire answer 4: The students expressed different attitudes when asked about the students' reaction when the teacher tried to explain the lecture using fewer technical terms.

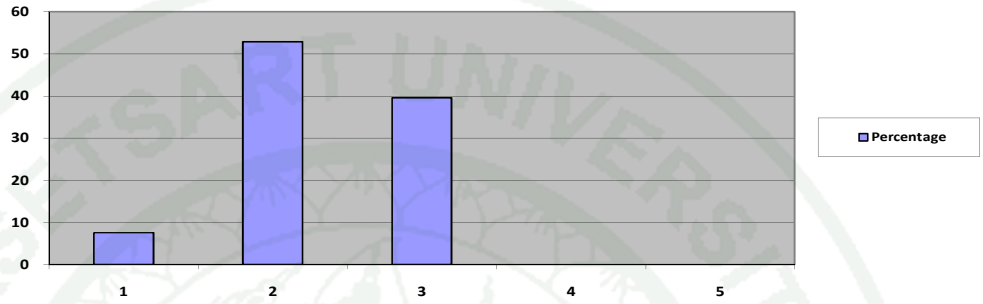

Figure 6 **Percentage of students' reaction when the teacher explained with least technical terms**

Number 1, (7.55%), represents the students' better feeling, but they still did not understand.

Number 2, (52.83%), represents the students feeling better, where they did have a better understanding.

Number 3, (39.62%), represents the students' expression that the teacher still had to repeat the explanation more than one time.

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Questionnaire answer 5: The students expressed their opinions about the important factors that helped them to understand the Biology lesson mostly.

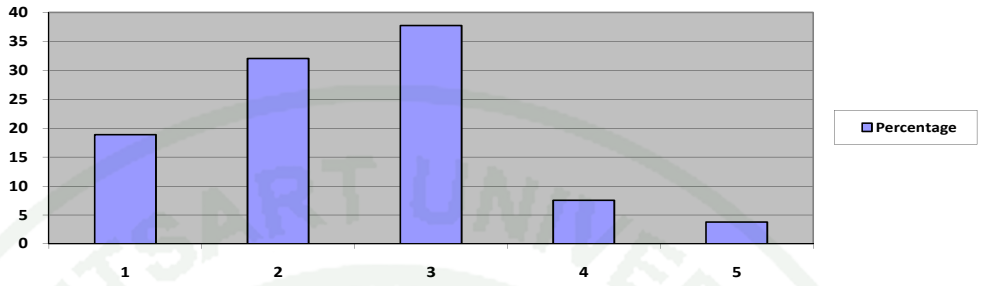

Figure 7 **Percentage of students' attitudes about the factor they think most important to help the student understand the Biology class**

Number 1, (18.87%), represents PowerPoint.

Number 2, (32.07%), represents teaching with fewer technical terms.

Number 3, (37.74%), represents discussion with teacher and friends.

Number 4, (7.55%), represents difficulty with the lecture content.

Number 5, (3.77%), represents experimentation concerning the content.

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Questionnaire answer 6: The students expressed their opinions about their preparation in previous study before the next lecture.

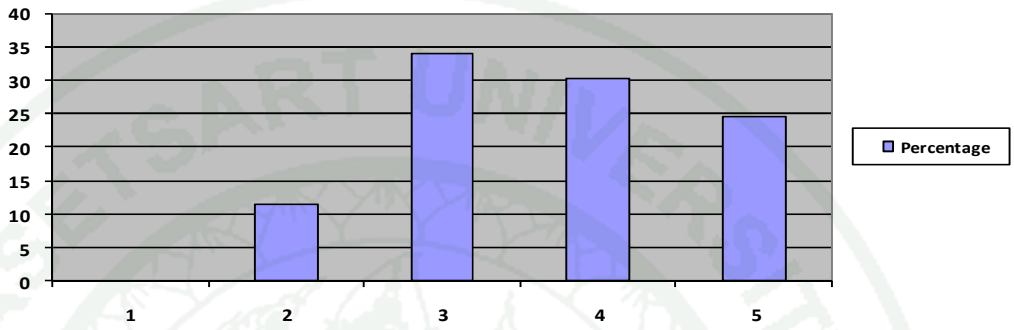

Figure 8 Percentage of students' attitudes about their preparation in previous study before the next lecture

Number 1, (0%), represents OFTEN.

Number 2, (11.32%), represents SOMETIMES.

Number 3, (33.96%), represents NOT REALLY.

Number 4, (30.19%), represents BARELY DO IT.

Number 5, (24.53%), represents NEVER.

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Questionnaire answer 7: The students expressed their opinions about teacher's explanation and repetition to encourage better understanding.

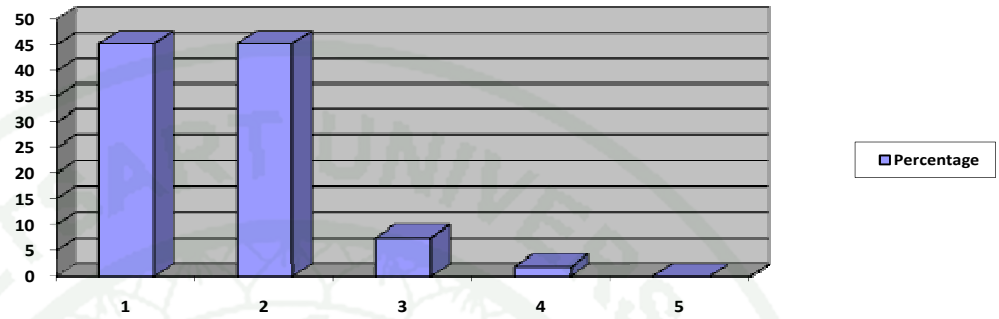

Figure 9 Percentage of students' attitudes about teacher's explanation repetition to influence the betterment of understanding

Number 1, (45.28%), represents the repetition of explanation as excellent.
Number 2, (45.28%), represents the repetition of explanation as good.
Number 3, (7.55%), represents the repetition of explanation as sufficient.
Number 4, (1.89%), represents the repetition of explanation as a little helpful.
Number 5, (0%), represents the repetition of explanation as not helpful.

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Questionnaire answer 8: The students showed their opinions about the relations between exchanges and understanding.

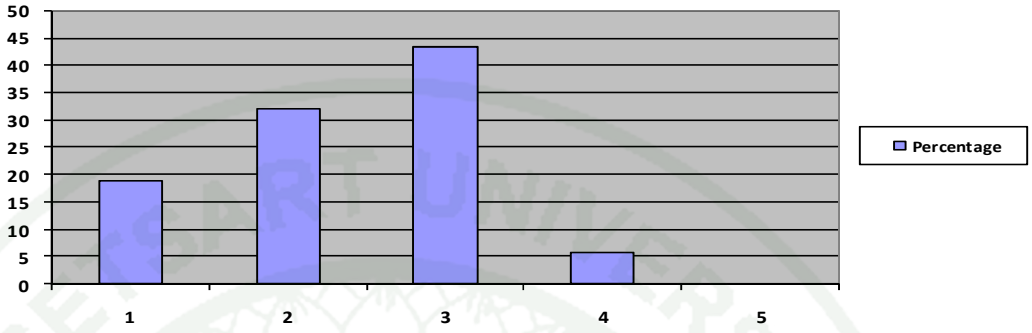

Figure 10 Percentage of students' attitudes about the relations between exchanges and understanding

Number 1, (18.87%), represents exchanges helping to enhance understanding very well.

Number 2, (32.07%), represents exchanges helping to enhance understanding quite well.

Number 3, (43.40%), represents exchanges helping to enhance understanding sufficiently.

Number 4, (5.66%), represents exchanges not really helping to enhance understanding.

Number 5, (0%), represents exchanges not helping to enhance understanding at all.

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Questionnaire answer 9: The students showed their opinions about the cause of student's confusion in the lectures.

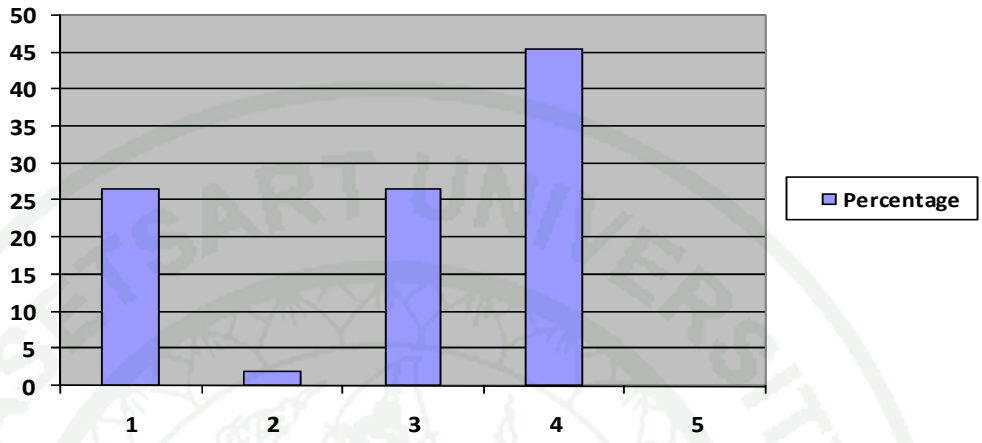

Figure 11 Percentage of students' attitudes about the cause of confusion in the lectures

Number 1, (26.41%), represents student's poor attention in class.

Number 2, (1.89%), represents teacher's accent is not understandable.

Number 3, (26.41%), represents too many technical terms.

Number 4, (45.29%), represents the teacher's teaching ability.

Number 5, (0%), represents inadequacy of in-class materials.

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Questionnaire answer 10: The students showed their opinions about a denial in asking teacher in class about confusion in a timely manner.

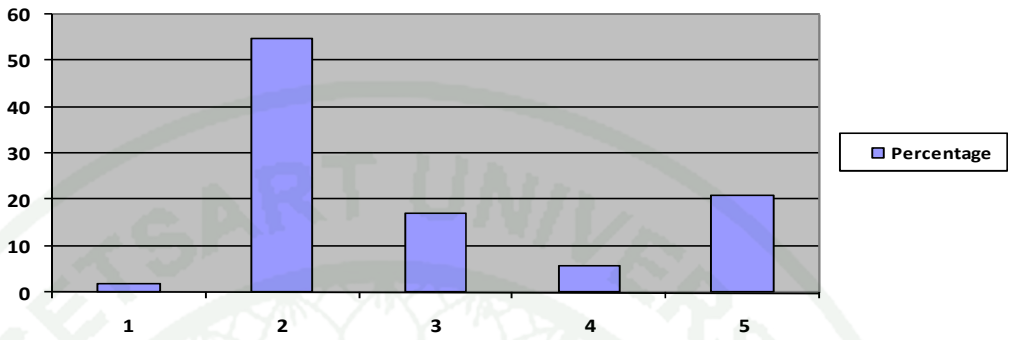

Figure 12 Percentage of students' attitudes about a denial in asking a teacher in class about the confusion in a timely manner

Number 1, (1.89%), indicates that the student is shy.
Number 2, (54.72%), indicates that the student hesitates to ask.
Number 3, (16.98%), indicates that the student never fails to ask questions in time.
Number 4, (5.66%), indicates that the student is afraid of their friends making fun.
Number 5, (20.75%), indicates that the student will ask the question after class.

Analysis of the Link between the Questionnaires and the Transcripts

The questions used in the questionnaires were made to find evidence of the IRE pattern. This means the students' answers can reflect the way the students interact with the teacher in the classroom. Thus, the percentages to be reported are the choices that the students answered mostly. The teacher is the interlocutor who controls Initiation and Evaluation while the students are responsible for Response, so questions 1, 3, 6, 8, and 10 are used to directly question the students in order to explore the frequency of students' responses. Thus, the aforementioned questions were employed for the analysis. The highest percentages of each choice in the five questions are shown below.

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Question 1 The students expressed different attitudes when were asked about their reactions if they could not understand the Biology lesson.

Most chosen choice: Number 4, (45.28%)

Description of Answer 4: The choice represents no students' response to the teacher, but they ask friends about what they have not understood.

Question 3 The students expressed different attitudes when were asked about the students' reactions when they were still confused after the first explanation.

Most chosen choice: Number 1, (30.2%)

Description of Answer 1: The choice represents the immediate response to the teacher.

Question 6 The students expressed their opinions about their revision of previous study before the next lecture.

Most chosen choice: Number 3, (33.96%)

Description of Answer 3: The choice represents NOT REALLY

Question 8 The students showed their opinions about the relations between exchanges and understanding.

Most chosen choice: Number 3, (43.40%)

Description of Answer 3: The choice represents exchanges helping to enhance understanding commonly

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Question 10 The students showed their opinions about a denial in asking a teacher in class about the confusion in a timely manner.

Most chosen choice: Number 2, (54.72%)

Description of Answer 2: The choice indicates that the student hesitates to ask.

Question # 1, 6 and 10 show the nature of responses of the students in the class in which the students did not want to respond to the teacher initiation because they hesitated to ask and that they did not really prepare to study in advance. This can be seen from Appendix A where almost forty percent of the initiation requiring response had zero responses. Some students wanted to keep silent and ask friends later about the questions. However, as for Question # 3, about 30.2% of the students stated that they would ask the teacher immediately if they do not understand the lecture, but there is no evidence of such responses in the transcripts. Question # 8 presents that 43.40% of the students showed the preference in class that exchanges bring about better understanding.

In accordance with to the transcription and the answers from questions 1 to 10, the results illustrate that even though some students know that exchanges can develop better understanding in a lecture, they still do not want to give a response to the teacher because they may keep silent and ask friends later, they may ask the teacher after class, they are shy, or they are afraid that their friends are going to make fun of them.

b) Exploring the teacher's attitude on the strategies employed in class

This section is relevant to the attitudes of the teacher towards the interactions of the students when the teacher is facing difficulty in accomplishing explanation. The teacher was interviewed with five questions related to the classroom conversation. The results are shown in the transcripts below.

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Interview question 1: When you teach a science subject, what would you do when students seem not to understand the content of the subject?

Answer: This happens lots of times. When students are confused about a particular topic, I normally discuss it again using a different approach, using lighter vocabulary, usually citing examples which are much easier for them, and I also mention situations associated in their daily lives.

Interview question 2: If you are asked by students in class to repeat your explanation on scientific terms, difficult parts, or complicated processes, what strategy will you use?

Answer: Aside from repeating the explanation using easy vocabulary, I speak slower than the first time I discussed the topic. Also, if possible, I use flow charts which I, myself draw for them, one step/process at a time.

Interview question 3: Do you think using easy language or evocative words to describe lessons can help student to succeed in their cognition?

Answer: Yes. But we have to make sure that the words that we use are not repetitive which means that there should also be progress in the degree of difficulty with respect to word usage.

Interview question 4: How often do you employ exchanges? Why?

Answer: As often as I could. Students tend to get bored when the teacher uses the "Chalk and Talk" approach. This of course leads to failure for the day. The key to success in a classroom is the students' interest about the topic. We can get them to be interested in so many ways. The best way is to get them involved in the discussion.

Interview question 5: Do you think that some in-class materials play an important role for students to gain lesson insight? How?

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Answer: If you are referring to multi-media in classrooms, then my answer is yes. Using computer/projector in classroom is a very powerful tool in the teaching-learning process. The main reason is that the teacher will be able to have more time to interact with students because the visual aids/writings are already prepared. Another fact is that students tend to be more interested in colorful presentations compared to traditional board writings using chalk/markers.

An Analysis under Cazden's (1988) Framework

The teacher's attitudes towards classroom discourse in a Biology class are shown in the answers to five interview questions. This part analyzes the teacher's strategies with respect to Cazden (1988) who establishes three main issues in scaffolding: the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. However, this study focuses only the second issue emphasizing the Pre-formulation and Re-formulation employed by the teacher to achieve the in-class conversational objectives. Nevertheless, only pre-formulating was evident in the dialogue of this classroom discourse.

Pre-formulating

Commencing from Answer 1, the teacher showed a direct expression on the question when he seemed to encounter difficulty in explaining, claiming that he had to employ a pre-formulating method to comprehend the students. The teacher sometimes raised topics that are close to the students' situations or environments, or he might give some examples to assist his explanation. This means the teacher was trying to formulate questions that can easily convey the insight of the lesson to the student. Therefore, the teacher's strategy is considered to be compatible with Cazden (1988) who theorizes that pre-formulating is the process where the teachers preface the question they want the student to answer with one or more utterances which enables the student to become familiar with the relevant area of experience.

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The teacher's answer from the interview is compatible with the transcription shown in Appendix A. The teacher did employ pre-formulating. The dialogue excerpted is illustrated below:

Sequence # 36 Teacher: Give us an idea, because we will be talking aboutcycles, what is a cycle?

1st Initiation

Sequence # 37 Teacher: Think about bicycle, think about motorcycle, what is a cycle?

2nd Initiation

Student # 22: It's a kind of wheel. **1st Response**

There are two sequences, 36 and 37, which are found to show pre-formulating employment. From Sequence # 36, it is obvious that the teacher was trying to compare the biological cycle with a bicycle. This is meant to exemplify the students with intimate experience so as for them to gain the understanding from the question by showing similarity between the process of biological cycle and bicycle.

Other Strategies Obtained from the Interview

From Answer # 2 and 3, the teacher stated that when he had to give lecture that is full of technical terms and complicated processes, he tried to replace the difficult terms with easier vocabulary. In addition, he claimed that he always slowed his second explanation to simplify listening of the students. The teacher also used diagrams and charts to help to describe the content. However, the teacher added that it is not necessary to simplify the language all the time, but he expected the students to derive the knowledge of inherent relationships between the meaning and the difficulty of the technical terms. That is to say, the students were expected to understand the

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difficult technical terms simultaneously otherwise they would have no progress in learning.

With reference to Answer # 4, the teacher stated that he usually gave chances to the students by providing exchanges to convince the students into participating in the conversation. From his point of view, discussion between the teacher and the students helps both interlocutors to achieve the goal of learning and teaching. The teacher's expression shows the nature of classroom discourse that is congruous with Mehan (1978), the IRE pattern. The teacher also showed his opinion on the classroom conversation that he did not prefer the Chalk and Talk approach. This means he saw no benefit derived from a one-way communication. Thus, to his idea, providing exchanges or a chance to construct the IRE pattern between teacher and students is useful.

With respect to Answer # 5, the teacher added that the presentation program and other in-class electronic devices were influential in the teaching and learning process. Because of the preparation showing colorful slides, the students seemed to become more involved in the interactions. In brief, the teacher gave importance to the tools that create a chance to generate exchanges in class.

This chapter has discussed the results of the present study by analyzing and exploring the conversational pattern in the science classroom through the different frameworks of Mehan (1978): the IRE pattern, Mehan (1979): the structure of classroom lessons, and Cazden (1988): scaffolding including pre-formulating and re-formulating. In the following chapter, discussion, implications, limitations, and the conclusion will be presented.

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CHAPTER V

DISCUSSION

This chapter discusses the research findings with respect to the research questions, limitations, recommendations, and the conclusions of the study.

Discussions of the Research Findings

The results derived from the transcripts can be employed to answer the two main research questions:

1. What is the nature of spoken discourse in a Biology class at Matthayom Watnairong School with the perspectives of the IRE pattern (Mehan, 1978); under the framework of classroom lessons (Mehan, 1979), scaffolding, introduced by J. Campione, in Pearson and Gallagher (1983), and Cazden (1988)?

2. How do teachers and students perceive the strategies employed during real teaching and learning situations?

The Nature of Spoken Discourse in Science Classroom at Matthayom Watnairong School in Accordance with the IRE Pattern (Mehan, 1978)

The spoken discourse observed in the science classrooms was constructed naturally through the pattern of the Initiation-Response-Evaluation model. Nevertheless, it shows that not all patterns of conversation illustrated a complete cycle of IRE. Some initiations are considered as the openings of the discourse in which the teacher aimed to begin the class by using coherent subject-related talks to attract students' attention so that they would follow and give responses to the teacher for further evaluation. From the observation, thirty one out of fifty initiations required responses, but there were nineteen responses or 61.3%. However, there were nineteen

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evaluations (100%) from the teacher for all of the responses made by the students. From this point of view, it can be seen that the lack of response primarily causes an incomplete cycle of the IRE pattern.

The reasons for the lack of response can be shown by the answers from the questionnaires filled out by the participating students. There are ten questions in the questionnaire asking the students topics covering their responses, attitudes about Biology, and the teacher's practice. Five out of ten questions (questions 1, 3, 6, 8, and 10) asked for student responses and opinions about why they wanted or did not want to give responses to the questions in class. The answer for each question is the most selected choice that indicates the reason for making a response or remaining silent.

Question 1: What will you do if you do not understand a science lesson that has just been taught?

Most selected answer: The students (45.28%) do not want to ask the teacher in class when they do not understand because they want to ask their friends about it later.

Question 3: What will you do if the teacher's explanation is still not understandable to you?

Most selected answer: The students (30.2%) tend to respond abruptly when they do not understand the teacher's first explanation.

Question 6: Do you prepare the lesson before the lesson of the next class begins?

Most selected answer: The students (33.96%) do not prepare themselves in advance. Thus, they expressed that they do not have any significant questions to ask the teacher about the lesson.

Question 8: Do you think having an opportunity for you to exchange ideas with the teacher is a part to bring you more understanding?

Most selected answer: The students (43.40%) illustrate that having exchanges with the teacher in class helps to enhance understanding.

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Question 10: In case you have any confusion at the moment, what is the reason that causes you to not ask a teacher question(s) in a timely manner?

Most selected answer:The students (54.72%) claim that when they experience confusion in class, they are too shy to ask questions spontaneously.

Table 5 shows that there was 61.3 % of the complete IRE cycle, and the incomplete loops were still remained the same. From the transcripts in Appendix A, results from Table 4, and the questionnaires, it can be interpreted that even though the students knew that having exchanges could bring about understanding, they still did not want to take any action to continue a conversation with the teacher. Thus, because the students' answers indicated that they did not want to prepare before the next lecture, that they would rather ask friends later instead of asking the teacher when they were confused, and that they were too shy to ask any question spontaneously, the students did not give responses to the initiations that needed an answer.

The Nature of Spoken Discourse in Science Classrooms at Matthayom Watnairong School under the framework of classroom lessons of Mehan (1979)

According to the framework of classroom lessons, the structure of classroom lessons in a Biology class at Matthayom Watnairong can be explained by three important aspects: phase, type of sequence, and organization of sequences.

Phase

With respect to the structure of classroom lessons, the phase comprises an opening, an instructional part, and a closing. However, even though this study aims to focus on interactions between the teacher and the students in a part of joint responsibility, the nature of the science classroom discourse by means of the structure of classroom lessons resembles the theory of Mehan (1979). The teacher began the conversation in the classroom with the opening which informed about what the

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students would be taught and what the students should be doing before the lecture started. The teacher wanted the students to be attentive.

After the opening, the teacher was the only interlocutor who provided the lecture; meanwhile, the students were listening to the teacher and looking at the screen which showed the slides of a presentation. When the teacher finished lecturing, he gave a chance for the students to ask questions. Some students questioned the teacher about the relevant aspects whereas some learners were called by the teacher to answer the teacher's questions. This is the part where the teacher and students were exchanging questions and answers, so the interactions between the two interlocutors are instructional parts. The nature of the classroom lessons explored by the researcher is found to have a similar scheme to Mehan's (1979).

Type of Sequences

According to the structure of classroom lessons by Mehan (1979), the second event, type of sequence, is composed primarily of directive, informative, and elicit conversational styles. One of the findings shows that the conversation in the science classroom at Matthayom Watnairong has a similar type of sequence. There were all types of conversational style found in the class. The teacher noticeably began the openings of a class in a directive form (Sequence # 2). He showed his objectives by suggesting that the learners should be attentive in class. In addition, there were ten sequences (Sequence # 1, 8, 9, 10, 12, 13, 20, 21, 22, and 23) which illustrate how the teacher started the openings in an informative style. The purposes of these statements are to provide information about the lecturing process, to begin a new initiation by using previous knowledge, and to give the students an opportunity to respond to questions.

An eliciting style was also found in Sequence # 33, 34, 47, and 48. The purpose of this conversational style was for the teacher to clarify knowledge that has been taught previously by initiating some questions for the students. As observed, the questions aimed to explore the students' cognition, so the teacher could evaluate the

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students' answers. Thus, the elicit pattern can also be interpreted as another form of initiation which functions to arouse the students to give responses, enabling the teacher to determine whether the learners had understood the lesson or not.

Organization of Sequences

The findings, in accordance with this type of sequence, are somewhat similar to that of Mehan (1978). There were several complete cycles of the Initiation-Response-Evaluation pattern in the conversation. However, for some openings, the following expected responses were not evident in the conversation. The students were silent and did not give any answer. Therefore, the nature of the IRE pattern in some openings is not always a full cycle.

The Nature of Spoken Discourse in Science Classrooms at Matthayom Watnairong School under the Framework of Scaffolding by Pearson and Gallagher (1983)

The structure of a scaffold by means of the proportion of responsibility is composed of three main parts: all-teacher, joint responsibility, and all-teacher. Nevertheless, the nature of science classroom discourse is different from the theory of Pearson and Gallagher (1983). As can be seen from Figure 2, the proportion of responsibility in the science class has four parts commencing from joint responsibility first, and the other parts followed. This means the allocation of proportions to the components of responsibility ranges from joint responsibility, all-teacher, joint responsibility, and all-teacher.

From the transcript in Appendix A, it can be seen that the teacher started the conversation by providing students a chance to exchange ideas. It seems that the teacher wanted to check students' understanding and to review past knowledge simultaneously. The teacher did not give a lecture immediately as modeled in Person and Gallagher (1983). However, the different outcome may be due to the fact that the observations were not made at the beginning of the semester, while the conversation

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in the classroom was collected in the middle of the semester. As a result, the teacher wanted to recall the past lecture by creating joint responsibility from the opening of the conversation. Therefore, this may influence the pattern of scaffolding and represents a distinguishable aspect from the conventional scaffolding model.

The Nature of Strategies Employed by the Teacher

According to Cazden (1988), the three main issues in scaffolding are the process of internalization, getting the answer versus getting the understanding, and the nature of knowledge being acquired. However, as mentioned earlier that this research focuses only on the second issue, getting the answer versus getting the understanding, and it can be seen that the teacher employed a pre-formulating strategy to sustain the conversation in the lecture so as to accomplish the lesson's objectives. The teacher simplified the questions and language used when he encountered student confusion. Moreover, the teacher was trying to explain the lesson with familiar vocabulary words that can be found in the student's daily life. In addition, one of the results from the questionnaire which reflects the students' attitude about the teacher's strategy used shows that 52.83% of all participants had a better understanding when the teacher used simple, commonly-used language. The students can feel a positive change in learning with the pre-formulating strategy.

Limitation of the Study

There are three limitations that need to be addressed regarding this research. The first limitation involves the number of participants, the students and teacher in this research. There were thirty students and one science teacher being observed. The research was conducted to explore the science classroom discourse in Biology class at Matthayom Watnairong School only, so the results of the nature of the discourse are localized. The outcome from this study cannot be generalized and is just a reflection of a certain group of EP interlocutors. It may not be generalized to indicate or to apply what has been found by other English Program schools in Thailand.

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The second limitation is related to the culture of the interlocutors in this research. Regarding the pattern of IRE by Mehan (1978), the participants used in the research were westerners. Both the teachers and the students in Mehan's have different self expressions, personal attitudes, and individualities. They had been educated in different systems compared to the Asian participants employed in this research. Therefore, the sequences of the conversation in some parts, with respect to the nature of IRE pattern at Matthayom Watnairong School, differ from Mehan's. The Thai students have shown a mild degree of self expression and self confidence, so this nature influences the way students express themselves verbally in class. The students tend to occupy a silent zone of interactions, so the number of responses (R) in the IRE pattern was not as many as the responses found in the research with western participants.

The third limitation involves the language used in the classroom discourse. Since the participants in the referential research, Mehan (1978), were native English speakers, the fluency of English speaking is, of course, different from the Thai students observed in this research. The students speak English as a second language, but they had to use English as the main medium in class. According to McIntyre (1998), the pre-stage of recognition in participating and sharing conversation or the willingness to communicate (WTC) in a second language with the teacher in a timely manner might be eclipsed and results in the limitation of the willingness to speak. Therefore, even though the language in classroom discourse in Mehan (1978) and the language used in the Biology class at Matthayom Watnairong is English, the participants in the present study do not speak English as the first language.

Recommendations for Further Studies

For the present study, the following recommendations for further studies are as follows: First of all, more studies could be conducted specifically on the science classroom discourse in other English Program schools in Thailand. The studies are required to validate the findings of this research into the nature of science classroom discourse in EP schools in Thailand. Classroom discourse has different characteristics

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regarding subject, culture, nationality, knowledge background of the learner, etc. Therefore, exploring the nature of science classroom discourse can bring about furtherance for the upcoming science classroom discourse researches, and the derived knowledge can be used to develop classroom conversation between the learners and the teachers in English Programs in Thailand. Furthermore, the results are probably capable of showing EP teachers some facts related to their responsibility in teaching in the future. They may be required to give importance to develop spoken discourse in science classroom by employing practical strategies and applying them with Thai learners.

Secondly, more studies are required to focus on specific science subjects in the English Program in Thailand. As this research was conducted in only one subject, Biology, the way the teacher proposed and controlled the conversation might not totally resemble the nature of other science subjects. The nature of various subjects is considered as the basis upon which a teacher produces conversation and interaction in class. Some lessons of other science subjects may encourage the teacher to employ different styles of initiation and evaluation. Showing a calculation process might require modifications to conversational sequences, or having a distinct conversational pattern might occur in a Physics class, for example.

Lastly, it is interesting to conduct further studies of the strategies EP teachers employ to elicit responses from Thai learners in science classroom since there is a variety of nationalities of science teachers in the English Program in Thailand. Thus, there might be a number of approaches found to cover a topic so this can be compared in future research.

Conclusion of the Study

This study aimed to answer the research questions about the nature of spoken discourse in a Biology class at Matthayom Watnairong School through the IRE pattern of Mehan (1978); the structure of classroom lesson of Mehan (1979), the structure of scaffold introduced by Pearson and Gallagher (1983), and the strategies

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the teacher employs through the perspective of Cazden (1988). The data were gathered through a video camera, a classroom observation check-sheet, a questionnaire, and a semi-structure interview, all of which were analyzed through the aforementioned frameworks. The nature of science classroom discourse was explored. The findings revealed that the spoken discourse observed in the Biology class was conducted mainly through the pattern of the Initiation-Response-Evaluation model even though it shows that not all patterns of conversation illustrated a complete cycle of IRE. The reasons for the lack of response are no advance preparation before class, having the expectation to ask friends later instead of asking the teacher, and personal shyness.

In addition, the findings about the nature of spoken discourse in the Biology class under the framework of classroom lessons resemble the theory of Mehan (1979). That is to say, the nature of spoken discourse in the Biology class showed identical components of phase, type of sequence, organization of sequences, and participants. As for the analysis of the discourse through the framework of scaffolding by Pearson and Gallagher (1983), the data revealed that the nature of Biology classroom discourse is different to the theory. The teacher commenced the conversation by providing students a chance to exchange ideas as the teacher wanted to check students' understanding and to review past knowledge before initiating the next lesson. As a consequence, the teacher recalled the past lecture by creating joint responsibility from the opening of the conversation, so this may influence the pattern of scaffolding which is a distinguishable feature from the conventional scaffolding model. Lastly, when the teacher's interview was analyzed regarding strategies employed in classroom discourse through Cazden (1988), the teacher has, so far, used *Pre-formulation* to help simplify his teaching language when he was encountering difficulty in explaining scientific terms and processes.

The findings may be useful for individuals who are interested in studying science classroom discourse in other English Program schools in Thailand or in other science classes conducted in the English language with L2 learners. The EFL and ESL teachers may conduct a future plan to suit the practice in teaching a particular science

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class. Furthermore, since many economic and educational systems of Thailand will be synchronized with ASEAN Community in 2015, the results of this research possibly reflects promising issues of some Thai learners in terms of further preparation and improvement. In the next three years, there will possibly be high competition in the fields of business, job opportunity, specialist, and others in which these fields are founded mainly on the effective education. Thus, if an appropriate development starts from the classroom, this will, in a certain level, enable Thai educational practices to encourage Thai students and enhance Thai students' ability to collaborate and to have an opportunity to work effectively when ASEAN Community commences its role in Thailand.

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APPENDICES

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Appendix A

Table of Transcripts

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Table of Transcripts

Table 1 The Pattern of Initiation – Response – Evaluation in Biology Class

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
1. *Teacher:* Now, I want you to study what I will uh.discuss for today, and then later on I will ask your group to present here ok?			
2.*Teacher:* You have to be very attentive for today.			2. The teacher is staring at the students in class while walking to the computer set.
3.*Teacher:* Ok, let's continue.			3. The teacher is tapping his microphone
4.*Teacher:* Ready? Are you ready? Are we ready?	No reply from the students		4. The teacher is tapping his microphone on one student's desk closed to his standing position for attention.
5.*Teacher:* No?			

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
6. *Student:* Teacher, may I go to the toilet please?	*Teacher:* No, I'll just have a quick review of what we had next time, alright?		
7.*Teacher:* So, last time I presented to you the reproductive system for male and female, right?			
8.*Teacher:* Now for male, what are the important parts of the reproductive system? Can you just tell me in any order?	*Student:* Testes.	*Teacher:* Testes, right.	8. The teacher is looking for more answer from the students.
	Student: Erectile tissue.	*Teacher:* Erectile tissue, Okay.	
	Student: Penis.	*Teacher:* Penis, ok. That's important of course.	
	Student: epidermis.	*Teacher:* Epidermis, we also have it in scrotum.	

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
9.*Teacher:* Now let's proceed to the other reproductive system. For female, the most important parts are? Actually three of them	*Students:* Ovary.	*Teacher:* The Ovary.	
	Students: Uterus.	*Teacher:* The uterus.	
	Students: Vagina.	*Teacher:* The vagina.	
10.*Teacher:* What else?	*Students:* Cervix.	*Teacher:* Cervix.	
11.*Teacher:* What else?			
12.*Teacher:* What do you call the…	*Students:* Oviduct.	*Teacher:* Yes, oviduct.	12. The teacher is raising his hand.
13.*Teacher:* Or?	*Student:* Fallopian tube.	*Teacher:* Or, fallopian tube.	
14.*Teacher:* Alright, now, let me just write something here on the board.			
15.*Teacher:* The part of the reproductive system for the male and female.			
16.*Teacher:* Now, let me remind you of this word, GONAD. What is the Gonad?			

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
17.*Teacher:* What is a Gonad, anybody?	No answer from students		
18.*Teacher:* Alright, then let me just start by writing that. It is only an organ. It is only an organ found in the reproductive system both of male and female. Now, if I tell you the responsibilities of Gonad, you will know what Gonad is. So, a gonad is an organ that produces the reproductive cells. Or, a gonad is an organ that produces the gametes.			
19.*Teacher:* Do you understand me?			19. Teacher pauses for a few seconds
20.*Teacher:* An organ that produces the gametes for male. So, for male and then for female.			

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
21.*Teacher:* For male, what is the name of their Gonad?	*Student:* Testes	*Teacher:* Testes, of course. Testes for male.	
22.*Teacher:* And then for female?	*Students:* Ovaries	*Teacher:* The ovary or the ovaries? Because there are two of them, right?	
23.*Teacher:* Now again, what do they produce?	*Students:* Sperm cells	*Teacher:* Sperm cells, for testes it produces sperm cells and then for ovaries?	
	Students: Egg cells.		
24.*Teacher:* Now, the reason why I, I discuss this to you now is that this has something to do with our lesson. Ok?			
(Teacher is explaining further on the related subject without exchange with students about 10 minutes.)	Students are listening to the lecture.	No evaluation	(Teacher is explaining further on the related subject without exchange with students about 10 minutes.)

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
25.*Teacher:* Now, this time, you have to be attentive because you're... uh…the result of how you will perform later will depend on how you will be able to understand this for nearly the next 20-25 minutes ok?	No response from students		
26.*Teacher:* Let's begin.			
27.*Teacher:* Before we have the discussion, let me have some vocabulary words for you. First is the ovarian cycle.			
28.*Teacher:* Now that is the cyclic change, uh... that occurs in the ovaries inside the ovary. a change that happens in the ovary, that's why they called the ovarian cycle.			

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
29.*Teacher:* And then another type of cycle, the menstrual cycle.			
30.*Teacher:* The cyclic changes happen in the uterus, ok? Now we will be concentrating uh, in two, just two major parts of the female reproductive system, the ovary and the uterus, ovary cycle and menstrual cycle			
31.*Teacher:* Now, listed here are the hormones that will take part in these changes in these cycles.			
32.*Teacher:* What's the date today?	*Students:* Thirteenth	*Teacher:* thirteenth, one three, where is one three? Stand up.	32.The student of number 13 is standing up.
33.*Teacher:* Now, I want you to tell me something about cycle.	*Student #13:* the…the oval.	*Teacher:* The oval?	

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
		Teacher: A cycle is an oval, alright good idea. What's your birthday?	
34.*Teacher:* Forget about these, what is a cycle?			34. The teacher waves his hand at the screen. The student is circling his finger like an oval shape as a response. Most students are laughing at the teacher's tone of evaluation.
	Student #13: Twenty two		
35.*Teacher:* twenty two, who's number twenty two?	No answer		35. Student of number 22 is standing up.
36.*Teacher:* Give us an idea, because we will be talking about cycles, what is a cycle?	No answer		36. The student is shy and is trying to answer.
37. *Teacher:* Think about bicycle, think about motorcycle, what is a cycle?	*Student # 22:* It's a kind of wheel.	*Teacher:* It's a wheel, it's a wheel. Ok. You're thinking of the same thing, thank you very much.	37.The student is spending time thinking of the answer and sits down.

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
38. *Teacher:* Come on, it doesn't have to be circular, it doesn't have to be an oval.			The teacher is tapping a microphone for attention.
39.*Teacher:* In this case, we will talk, we will be talking of cycle as a process that starts from the beginning and will end up ok?			
(The teacher is explaining on the related subject without interactions with the students about 10 minutes.)	The students are listening to the lecture.	No evaluation.	(The teacher is explaining on the related subject without interactions with the students about 10 minutes.)
41.*Teacher:* Now, what's your birthday?	*Student:* Fourteenth	*Teacher:* Fourteenth, who's number fourteen? You are number fourteen.	41.The teacher points at the student nearby.
42.*Teacher:* I just want you to tell us, please stand up.			42. The teacher points his finger to the student of number 14, and the student stands up.
43.*Teacher:* Just tell us what you notice about the individual graph.	(The student shows no response.)		43. Student # 14 stands still with no answer.

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
44.*Teacher:* Are they constant?			44. Student # 14 looks at the LCD projector screen more carefully.
45.*Teacher:* So? come on.			45. No response from the student.
46.*Teacher:* Are the graphs constant? Let's just see uh, LH. Let's talk.			
47. Teacher: The yellow, the yellow curve represents LH. Tell me about LH.			47. The teacher conveys the student's attention by pointing with his finger at the LCD projector screen, and the student looks at it.
48. *Teacher:* Come on.	*Student #14*: uh uh make the ovary.	*Teacher:* No, no, wait wait, wait. Not yet, not yet. Do not look at the menstrual and the ovarian cycle. Uh…just just focus on the level of LH.	48. The student murmurs and shows his expression of incapability of understanding.

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Table 1 (Continued)

INTIATION	RESPONSE	EVALUATION	NON-VERBAL UTTERANCES
49. *Teacher:* Again, do not look at this, do not look at that. What do you notice? What is the main thing that you see about LH? Is it constant? That's the main clue.			49. The student is murmuring
50. *Teacher:* Exactly, that's what I want you to think, thank you very much.	(still no response)		50. The student sat down.

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Appendix B

Letter of Reliability

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5th March 2012

Validation of Research Interpretations and Findings

I, Stephen John Cannell, am writing to confirm that the data, which are in the form of transcriptions of video recordings of actual classroom discourse in science classes at Mattayom Watnairong School has been correctly interpreted in accordance with the research of Mehan (1978).

Mehan's research posited that classroom dialogue occurs in a cycle of initiation, response and evaluation and although the cycles were not always complete, and that sometimes evaluation was carried over from one class to the next, the researcher correctly identified the patterns in the empirical data.

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12th March 2012

Validation of Research Interpretations and Findings

I, Chester L. Morgan, am writing to certify that the transcriptions of video recordings of actual classroom discourse in science classes at Mattayom Watnairong School have been congruously clarified with respect to the research of Mehan (1978).

Mehan's research suggested that classroom dialogue occurs in a cycle of initiation, response and evaluation. However, the cycles were not always complete because sometimes evaluation was carried over from one class to the next. The researcher correctly identified the patterns in the empirical data.

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13th March 2012

Validation of Research Interpretations and Findings

I, Simon David Stone, am writing to substantiate that the data in the form of transcriptions of video recordings of actual classroom discourse in science classes at Mattayom Watnairong School has been appositely explicated in accordance with the research of Mehan (1978).

According to the Mehan's research, he explained that classroom dialogue appears in a cycle of initiation, response and evaluation, but the cycles were sometimes incomplete. In addition, the evaluation was periodically brought into the next class. The researcher correctly identified the patterns in the empirical data.

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Appendix C

Questionnaire

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Direction: Please choose only one answer which corresponds to your in-class behaviors.

1. What will you do if you do not understand a Biology lesson that has just been taught?

a) I will ask the teacher immediately.

b) I will ask the teacher when a chance is given.

c) I will keep silent and ask the teacher after class.

d) I will keep silent and ask the one close to me when a chance is given.

e) Other:_____(please explain if you choose e)

2. To your opinion, what is the most difficult part in a Biology lesson?

a) If I have to study the lecture that is full of many scientific terms

b) If I have to study the lecture that is full of complicated process

c) If I cannot catch the spoken speed or understand the accent of the teacher

d) If I cannot translate the vocabulary words used in lecture even though the teacher repeats his explanation

e) Other:_____ (please explain if you choose)

3. When a chance is given to ask questions with respect to the lecture that has just been taught, what will you do if the teacher's explanation is still not understandable to you?

a) I will ask the teacher immediately to explain about the same question again.

b) I will keep silent and wait to ask the teacher the same question when a chance is available or ask after class.

c) I will ask friend later.

d) I will note the unclear part and do self-study after class, and I may ask the teacher the same question out of the class.

e) Other:_____ (please explain if you choose e)

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4. How do you feel when the teacher tries to repeat his explanation about the part of your confusion in the lecture with easier language?

a) I feel better even though I still don't really understand about it.

b) I feel better because I believe that I will have a better understanding.

c) I feel better because I really do understand it after the 2nd or 3rd explanation.

d) I feel nothing because I have some problems in English communication.

e) Other:_____ (please explain if you choose e)

5. To your opinion, what is the in-class factor that helps you to understand a Biology lesson most?

a) PowerPoint

b) Easy teaching language

c) Discussion with teacher and friends

d) Difficulty level of the lecture content

e) Other:_____ (please explain if you choose e)

6. Do you study what the teacher is going to teach next class?

a) Yes, I often do it.

b) Yes, I sometimes do it.

c) Not really.

d) I barely do it.

e) Never

7. Do you think when the teacher repeats explanation or question with evocative words or pictures can help gain better understanding?

a) Yes, I think they are excellent.

b) Yes, I think they are good.

c) Yes, I think they are ok.

d) They help just a little.

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e) No, they don't help.

8. Do you think having an opportunity for you to exchange ideas with teacher is a part to bring about understanding of the lesson's objectives?

a) Very much

b) Quite much

c) Mediocre

d) Not really

e) Not at all

9. To you idea, where confusion in Biology is rooted from?

a) Student's poor intention in class

b) Teacher's accent is not understandable.

c) Technical terms of the subject learned in class

d) Teacher's teaching ability

e) Insufficiency of in-class materials (If you choose this choice, please identify the material you think it helps you to understand better._____)

10. In case you have any confusion at the moment, what is your reason that causes you to deny asking teacher question(s) in timely manner?

a) I am shy.

b) I hesitate to ask.

c) No, I always ask question right away when I don't understand.

d) I'm afraid my friends are going to make fun of me.

e) I will ask the question after class.

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BIOGRAPHIC DATA

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