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COMPARATIVE STUDY BETWEEN CONCEPT MAPPING AND TRADITIONAL INSTRUCTIONS ON ENGLISH READING COMPREHENSION ABILITIES OF VOCATIONAL CERTIFICATE STUDENTS AT CHIANG MAI COLLEGE OF AGRICULTURE AND TECHNOLOGY

นฤมล สีดาคำ
NARUEMON SEEDAKHAM

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาครุศาสตรมหาบัณฑิต
สาขาวิชาภาษาศาสตร์ประยุกต์-ภาษาอังกฤษเพื่อวิชาการและนวัตกรรม
คณะครุศาสตร์อุตสาหกรรม
สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง
พ.ศ. 2556
KMITL-2013-ED-M-252-095

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NARUEMON SEEDAKHAM

A THESIS SUBMITTED IN PARTTIAL FULFILLMENT
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2013

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สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง
ใบรับรองวิทยานิพนธ์

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Comparative Study Between Concept Mapping and Traditional Instructions on English Reading Comprehension Abilities of Vocational Certificate Students at Chiang Mai College of Agriculture and Technology

นักศึกษา นางนฤมล สีดาคำ
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อาจารย์ที่ปรึกษาวิทยานิพนธ์ รศ.ดร.ภัทรพร ธรรมประดิษฐ์
อาจารย์ที่ปรึกษาวิทยานิพนธ์ร่วม -

คณะกรรมการสอบวิทยานิพนธ์		ลายมือชื่อ
ผศ.ดร.อำนาจ	ตั้งเจริญชัย	
รศ.ดร.ภัทรพร	ธรรมประดิษฐ์	
รศ.ปรียาภา	จิตต์บุญ	
รศ.สุขุมาลย์	นิลรัตน์	
รศ.เฉลิมศรี	ปรีชาพานิช	

วัน / เดือน/ ปี ที่สอบ 23 กันยายน 2556 เวลา 10.00 น. เป็นต้นไป
สถานที่สอบ ณ ห้องเรียนปริญญาเอก คณะครุศาสตร์อุตสาหกรรม

คณะครุศาสตร์อุตสาหกรรมรับรองแล้ว

(รองศาสตราจารย์ พีระวุฒิ สุวรรณจันทร์)
คณบดี คณะครุศาสตร์อุตสาหกรรม
วันที่ 30 **เดือน** กรกฎาคม **พ.ศ.** 2556

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นักศึกษา	นางนฤมล สีดาคำ
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บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ (1) เปรียบเทียบความสามารถในการอ่านภาษาอังกฤษระหว่างการใช้การสอนแบบแผนผังมโนทัศน์กับการสอนแบบดั้งเดิม และ (2) ศึกษาผลของการสอนแบบแผนผังมโนทัศน์กับการสอนแบบดั้งเดิมต่อความสามารถในการอ่านภาษาอังกฤษ กลุ่มตัวอย่างได้มาจากการสุ่มตัวอย่างแบบเจาะจง (Purposive Random Sampling) จากนักเรียนระดับประกาศนียบัตรวิชาชีพ ชั้นปีที่ 2 วิทยาลัยเกษตรและเทคโนโลยีเชียงใหม่ จำนวน 80 คน โดยแบ่งออกเป็น 2 กลุ่มๆ ละ 40 คน โดยกลุ่มแรกเป็นกลุ่มทดลอง สอนโดยใช้แผนผังมโนทัศน์ และกลุ่มควบคุม สอนโดยการสอนแบบดั้งเดิม ใช้เวลาทำการวิจัย 6 สัปดาห์ๆ ละ 2 ชั่วโมง เครื่องมือที่ใช้ในการทดลองคือ แบบทดสอบก่อนเรียน และหลังเรียนซึ่งเป็นข้อสอบคู่ขนานเกี่ยวกับการอ่านเรื่องราวการเกษตร และแผนการสอนโดยใช้แผนผังมโนทัศน์กับการสอนแบบดั้งเดิม ทำการวิเคราะห์ ค่าคะแนนเฉลี่ย ค่าส่วนเบี่ยงเบนมาตรฐาน และค่า t-test แบบ Independent โดยใช้โปรแกรมสำเร็จรูปทางสถิติ ผลการวิจัยพบว่า ความสามารถในการอ่านภาษาอังกฤษของนักเรียนระหว่างการสอนโดยใช้แผนผังมโนทัศน์กับการสอนแบบดั้งเดิมมีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติที่ระดับ 0.01 ($t=3.53$, $p<0.01$)นอกจากนี้ ยังพบว่านักเรียนที่สอนโดยใช้แผนผังมโนทัศน์นั้น มีความสามารถในการอ่านภาษาอังกฤษดีกว่านักเรียนที่สอนโดยใช้การสอนแบบดั้งเดิม ($\bar{x}$ =15.18 และ$\bar{x}$ = 13.83 ตามลำดับ)

Thesis Title	Comparative Study between Concept Mapping and Traditional Instructions on English Reading Comprehension Abilities of Vocational Certificate Students at Chiang Mai College of Agriculture and Technology
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Student ID.	53631524
Degree	Master of Arts
Program	Applied Linguistics (English for Science and Technology)
Year	2013
Thesis Advisor	Assoc. Prof. Dr. Pattaraporn Thampradit

ABSTRACT

The objectives of this study were: (1) to compare the students' English reading comprehension abilities between using Concept mapping and the traditional instructions, and (2) to study the effects of Concept mapping and traditional instructions in English reading comprehension abilities. The samples were 80 second year vocational certificate students at Chiang Mai College of Agriculture and Technology. Those students were split into two groups, 40 students each, by Purposive Random Sampling. The first was the experimental group, taught by concept mapping instruction, whiles the other, the controlled group, taught by the traditional instruction. The period of the study was six weeks, two hours a week. The instruments were Pre-and Post-tests, having parallel questions on the same reading comprehension texts related to agricultural fields, and the lesson plans of concept mapping and traditional instructions.The analysis of data was used of mean, standard deviation and the t-test Independent by using of a statistical analysis package. The results showed that there were statistically significant differences in students' English reading comprehension abilities between using the Concept mapping and the traditional instructions ($t=3.53$, $p=0.001<0.01$). The study also found that using Concept mapping instruction was more practical than that of the traditional one ($\bar{x}$ =15.18 vs.$\bar{x}$ = 13.83respectively).

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The completion of this Master's thesis has been possible because if the assistance of the following people.My greatest appreciation goes to my thesis advisor, Assoc. Prof. Dr. Pattaraporn Thampradit, Department of Applied Arts, King Mongkut's Institute of Technology Ladkrabang for her thorough guidance, contributions and support as my research advisor of this study.Grateful thanks are for Asst. Prof. Dr.Samran Khansamrong, Ms. Samantha Burman, Department of Humanity, Mahachulalongkornrajavidalaya University, Chiang Mai Campus for giving ideas and comments of my research tools and Mrs. Kanikar Chaikuna, Chiang Mai CAT for giving information concerning with statistical methods. My appreciation also goes to the Director of Chiang Mai CAT for supporting me during gathering data. And my thankfulness goes to the second year vocational certificate students who voluntarily participated in this research.

Finally, I would like to acknowledge my indebtedness to my mother and father for their endless love and encouragement. Unforgotten, I would like to give aspecial thanks to Mr. Aphirom Seedakham, my husband, who encouraged me to fight with every problem occurring during doing this thesis.

Naruemon Seedakham

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CHAPTER 1
INTRODUCTION

This chapter consists of 10 sections: statement and significance of the problems, goal and objectives, research questions, scopes of the study, conceptual framework of the study, research hypotheses, process of the study, definitions of terms used, anticipated outcomes and limitation of the study.

1.1 Statement and Significance of the Problems

Reading is an essential skill for further learning, especially for students who have to read in order to get information from text books, research or reports. Moreover, higher level learners have to read more various kinds of books and complicated texts. Wei (2005) cited in Aegpongpaow (2008) states that reading is an important part of the four necessary language skills for acquiring knowledge and gathering information for those learning English as a second or foreign language (ESL/EFL) both for academic success and for professional development. Reading is regarded as the most vital and necessary skill for students in both a classroom context and an extracurricular environment (Grabe and Stoller, 2002). In English learning reading is an essential skill for the acquisition of knowledge and exchange of information (Huang, 2005 and Salinger, 2003). In the EFL context, the literature suggests that the best way to learn English is to read extensively (Nuttall, 1996), and that reading is the most important source of language learning (Alderson, 1984 and Grabe, 1993). Dubin and Bycina (1991) state that academic reading or reading for the purpose of learning has become one of the most important methodological topics in the field of teaching English to speakers of other languages. In classrooms of higher education, Thai college and graduate students need efficient reading skills to comprehend a mass of reading materials from various sources related to their studies (Piyanukool, 2001).

Research shows that most ESL/EFL students have problems in reading English texts. Limited vocabulary and knowledge of sentence structure is regarded as the main problem (Gunning, 2002). Supakitjumnong (2002) cited in Phonpradit (2004) claimes that Thai students often have a low level of reading proficiency. Additionally, Singtui (2008) cited in Siriphanich (2010) states that the students who have low ability in reading comprehension cannot reorganize the information learned from the text and cannot connect their own knowledge to the new information received from the reading text. Furthermore many Thai students lack motivation to read. Soonthornmanee (2002) claims that the usual method of teaching English reading

comprehension in the Thai classrooms is based on translation from English into Thai instead of based on a reading process which would help the readers construct meaning from a text. These studies reveal that Thai students have difficulties in reading English texts which in turn impede their reading achievements.

Similarly, at Chiang Mai College of Agriculture and Technology (Chiang Mai CAT), in which the researcher works for, English reading comprehension is a particular problem for certificate vocational students. The students approach their reading assignment by putting all their effort and concentration into the passages they read. However, they cannot understand the meaning of certain texts; cannot identify the main idea, nor remember the content they have read in a previous section. In this regard, there is a need to use the supportive tools and strategies to improve students' reading ability which can enhance their reading comprehension.

One of the tool that is used for instruction, and is work out on the basis of meaningful learning model is called "concept mapping". According to Novak and Gowin (1984), "concept mapping serves to clarify links between new and old knowledge and force the learner to externalize those links. These are very useful tools to help students learn about their knowledge structure and the process of knowledge construction, and also help the students learn how to learn." Novak and Canas (2008) claim that concept mapping is chosen by some teachers as a strategy to empower students to be more effective readers and knowledge creators. Concept mapping has been shown to support struggling readers by building off of students' prior knowledge and asking them to reflect on their understanding while reading. They are easy to construct and can be used across all content areas (Lovitt and Horton, 1994). Concept mapping is the best tool to present information (Shariatifar, 2009). Therefore, concept mapping as the strategy can be used to improve students' ability in English reading comprehension. Furthermore concept mapping is a graphical representation that can help to enhance text comprehension and lead to more meaningful information retention.

This research revealed important reflection on how concept mapping instruction improves students' ability in English reading comprehension. However, to my knowledge there is a few studies draw attention in using of concept mapping instruction to enhance English reading comprehension abilities in vocational students in Thailand. Hence, this study attempted to fill the current literature gap pertaining to the use of cognitive strategies and more specifically, concept mapping instruction, which can elevate students' English reading comprehension ability in vocational certificate students at Chiang Mai College of Agriculture and Technology.

1.2 Goal and Objectives

The goal of this study compared the concept mapping and traditional instructions on English reading comprehension abilities of certificate vocational students at Chiang Mai College of Agriculture and Technology. The study provided a comparison of two types of teaching method: concept mapping and traditional instructions. The objectives of this study are as follows:

1.2.1 To compare the students' English reading comprehension abilities between using concept mapping and the traditional instructions.

1.2.2 To study the effects of concept mapping and traditional instructions in English reading comprehension abilities.

1.3 Research Questions

1.3.1 Are there any differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions?

1.3.2 What is/are the effect(s) of concept mapping and traditional instructions on students' English reading comprehension abilities?

1.4 Scope of the Study

1.4.1 The population in this study were 160 second year vocational certificate students at Chiang Mai College of Agriculture and Technology. They enrolled on the English for Agriculture and Technology course in the second semester of the academic year 2012.

1.4.2 There were 80 students of the second year vocational certificate and those students were selected as the samples for the study by Purposive Random Sampling.

1.4.3 Variables:

1) Independent variables: Teaching methods based on concept mapping and traditional instructions.

2) Dependent variables: The students' English reading comprehension abilities by using concept mapping and traditional instructions.

1.4.4 The six agricultural English reading comprehension were selected from text books based on the English for Agriculture and Technology course syllabus according to the Certificate in Vocational Education Curriculum, B.E. 2546 of the Vocational Education Commission.

1.5 Conceptual Framework of the Study

1.5.1 The Concept Mapping Instructional Method

David Novak developed the concept mapping technique in the 1970s at Cornell University. Novak and his research team based their work on David Ausubel's Cognitive Assimilation Theories (Novak and Gowin, 1984; Canas et. al., 2003)

Concept maps are graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts as shown in Figure 1.1 below:

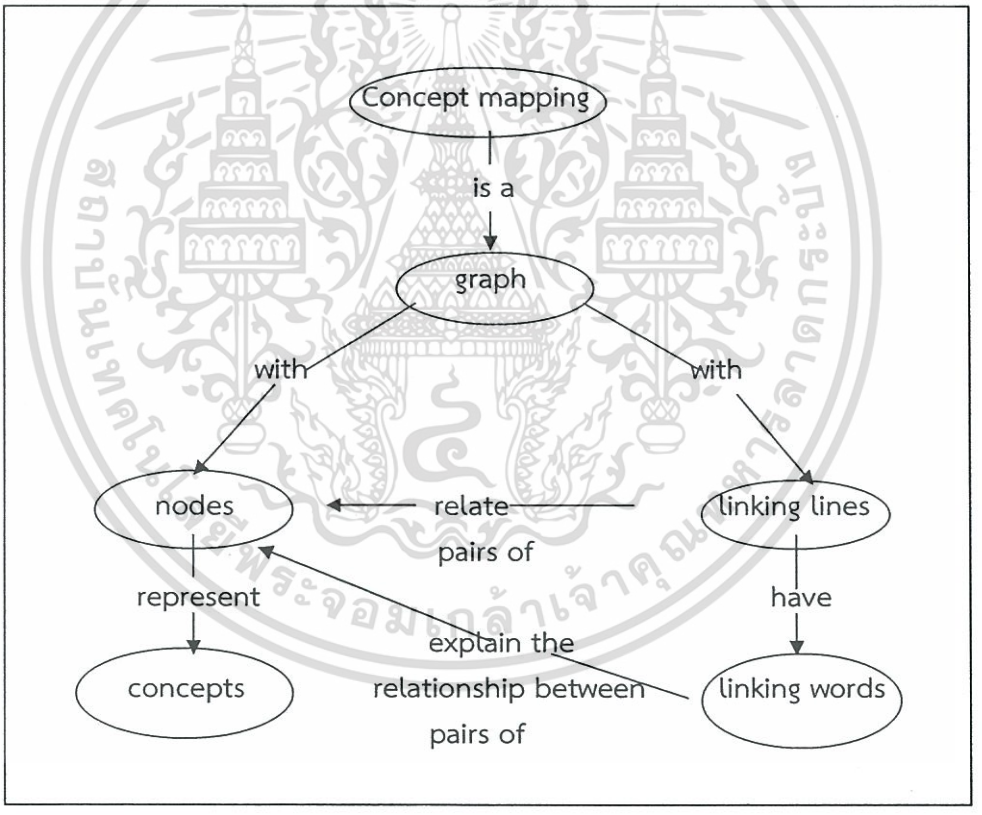

Figure 1.1 Structure of a Concept Mapping

Source: Tinnerman, 2003

1.5.2 Characteristics of Concept Mapping

The general concept is at the top of the structure, more specific concepts are placed down the structure. The concept map also has cross links. The cross links are

the links between concepts in different segments or domains of the concept map. Cross links help to see how a concept in one domain of knowledge represented on the map is related to a concept in another domain. These cross links allow for development of new knowledge by making new connections as shown in Figure 1.2 below:

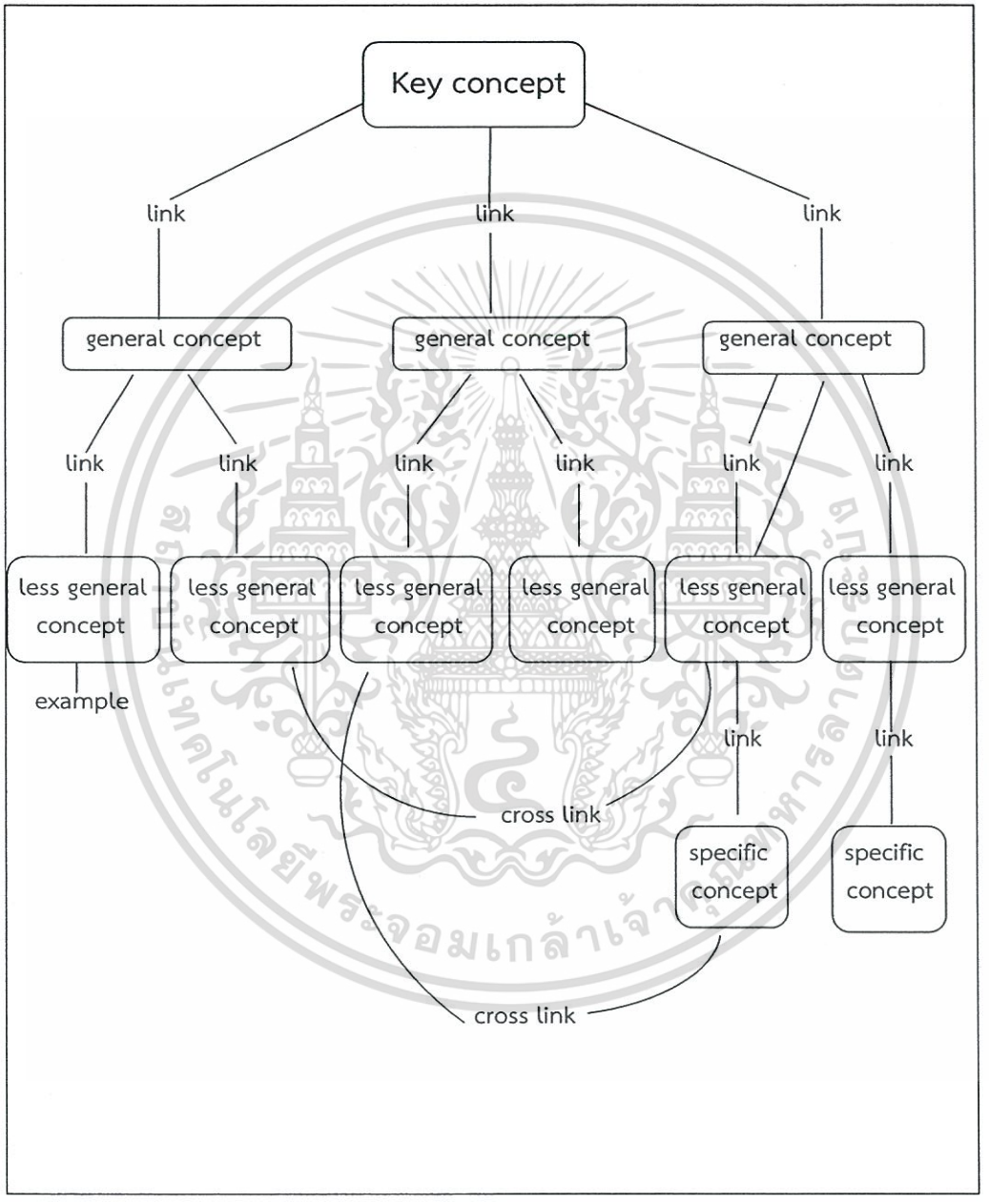

Figure 1.2 Characteristics of Concept Map with Domain-Cross Links
Source: Novak and Gowin, 1984

Various concept mapping strategies have been developed in recent years. The strategy linked with the related nodes concept map is the most widely used (Novak and Gowin, 1984). This strategy takes one concept as the center, and related concepts and details emerge as the mapping develops from the central to external. The kinds of concept mapping can be classified in two categories: (1) The concept mapping that developed from inner to outer as shown in Figure 1.3 below; (2) the concept mapping that developed from upper to lower (Fisher et. al., 1991) as shown in Figure 1.4 below:

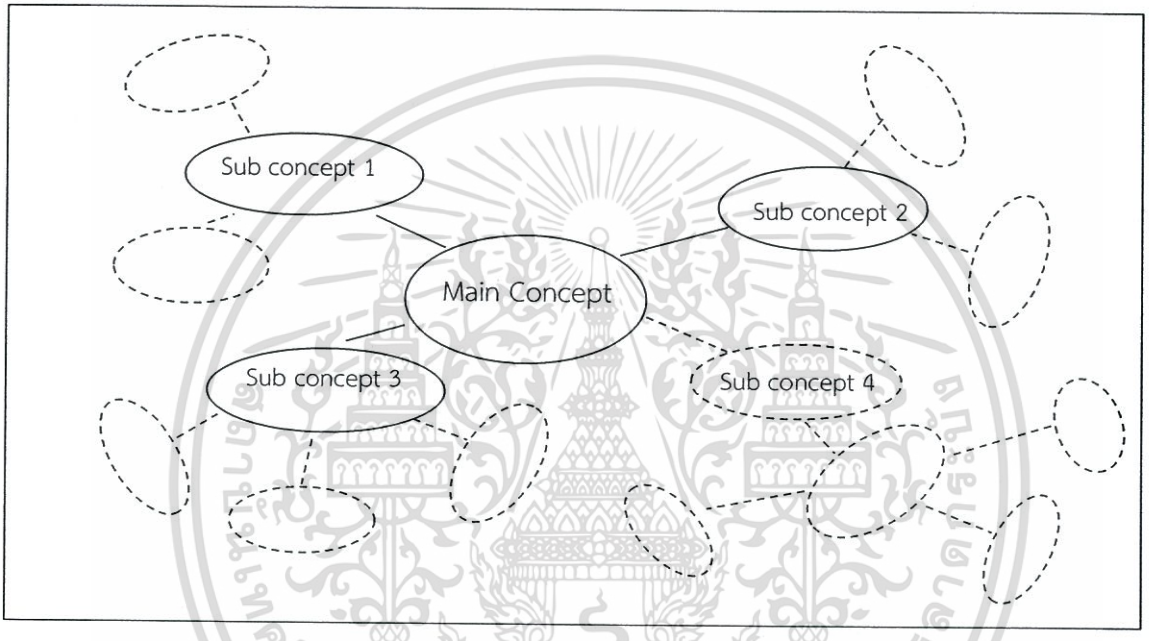

Figure 1.3 Concept Mapping Develops from Inner to Outer
Source: Fisher et. al., 1991

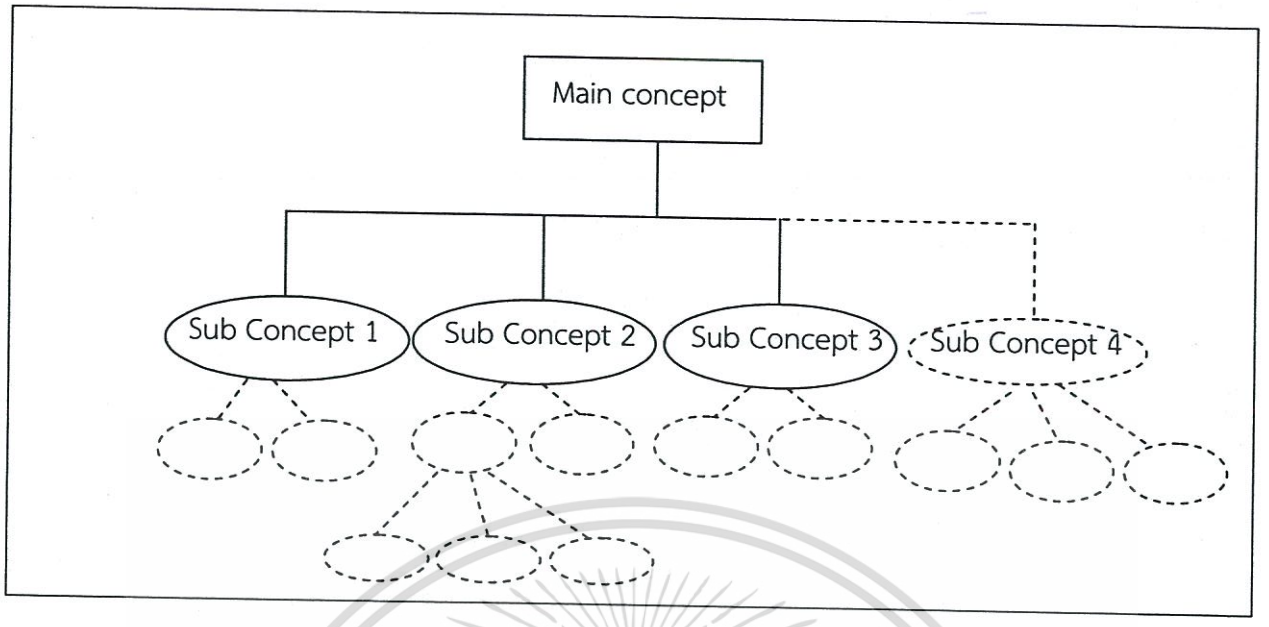

Figure 1.4 Concept Mapping Develops from Upper to Lower
Source: Fisher et. al., 1991

1.5.3 Traditional Teaching Method

Traditional teaching method is concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher and they play the role of instructor and decision maker. They regard students as having 'knowledge holes' that need to be filled with information. The traditional teacher views that it is the teacher who causes learning to occur (Novak, 1998).

In this study, the researcher led the students to read, translate and discuss the reading text with the students. The researcher interrupted the class and provided explanation when they had difficulties in reading.

1.6 Research Hypotheses

Hypothesis 1: There is a difference in students' English reading comprehension abilities between using concept mapping and the traditional instruction.

Hypothesis 2: The students' mean score of the post-test when using concept mapping instruction is higher than that of the post-test when using traditional instruction.

1.7 Processes of the Study

The processes of the study were as follows:

1.7.1 The contents of English agricultural reading comprehension texts were selected from text books based on the English for Agriculture and Technology course syllabus according to the Certificate in Vocational Education Curriculum, B.E. 2546 of the Vocational Education Commission.

1.7.2 The contents, the unit tests, the Pre-test, the Post-test and the lesson plans were designed, adapted and modified.

1.7.3 The quality of the contents, the tests and the lesson plans were approved by the advisor and the experts in the field of English.

1.7.4 The contents and the tests were revised in accordance with suggestions of the advisor and the experts in English teaching.

1.7.5 The Pre- and Post-tests, having three paralleled reading comprehension and level of difficulty. It consisted of 20 four-multiple-choice questions. They were tried out with the second year of vocational certificate students apart from the samples who studied the same course of English for Agriculture and Technology in the second semester of academic year 2012 to statistically check its validity and reliability before being used with the samples.

1.7.6 The samples of the students were split into two groups: the experimental and the controlled group by Purposive Random Sampling.

1.7.7 The Pre-test (a researcher-constructed agricultural English reading test) was given to the samples at the beginning of the course to measure students' pre-instructional level of English reading comprehension ability.

1.7.8 The experimental and controlled groups read the six agricultural English reading comprehension (one agricultural English reading comprehension lasting two hours).

1.7.9 The experimental and controlled groups were taught by the researcher.

1.7.10 The experimental group was given the agricultural English reading comprehension. And then the researcher taught them the reading skill through concept mapping exercises according to the lesson plans in order to practice using the strategy taught.

1.7.11 The controlled group was given agricultural English reading comprehension. Those students were led to read and translate the reading passages by the researcher.

1.7.12 Both the experimental and controlled groups took the Post-test (a parallel test) to measure students' achievement at the conclusion of the study.

1.7.13 The data obtain from the Post-test was analyzed. The mean score ($\bar{x}$) and the standard deviations (S.D) were used to calculate the Pre-test and Post-test score. The sample t-test was used to compare the difference of the mean score ($\bar{x}$).

1.8 Definitions of Terms Used

In this study, definitions of terms used are presented as follows:

English Reading Comprehension ability	The ability to comprehend a reading passage which was measured by reading test scores.
Concept Mapping Instruction	Concept mapping instruction is a kind of instruction which have graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between each concept.
Traditional Instruction	The teacher-centered instruction. The researcher led the class to read and translate the reading passages. The researcher interrupted the class and provided explanation when the students had difficulties in reading and doing exercises.
Unit Test	A test was given to the students at the end of each lesson. It was used to assess learners after each lesson.
Pre-Test	A test was used to assess the students before any of the lessons.
Post-Test	A test was used to assess the students after any of the lessons.

1.9 Anticipated Outcomes

1) The concept mapping will be used to provide another or an additional method for teaching English in the classroom.

2) The teaching-learning model which is based on concept mapping in organizing teaching-learning activities will help students to adapt their English reading comprehension learning processes.

1.10 Limitation of the Study

1.10.1 The goal of this study compared the concept mapping and traditional instructions on English reading comprehension abilities.

1.10.2 The population of this study was limited only to the second year vocational certificate students at Chiang Mai CAT. Therefore, this research cannot be generalized to other students with different educational levels or across disciplines.

CHAPTER 2

LITERATURE REVIEW

This chapter divides into four sections. The first section presents a definition of English reading comprehension. The second section outlines concept mapping. The third section discusses the traditional instruction. The fourth section examines the related research.

2.1 English Reading Comprehension

2.1.1 The Meanings of Reading Comprehension

Comprehension refers to understanding, which is the ability to get the meaning of something. According to Thorndike (1917) cited in Rubin (1993), reading of text material requires an active mind and thought. It involves the same sort of organization and analytic action of ideas as occur in thinking of higher sorts. Reading comprehension is a complex cognitive process. Psycholinguistics and cognitive psychology play an important role for research on reading comprehension. Most content reading concerns fall in the cognitive domain.

According to Finocchiaro (1958), reading comprehension is the ability that the readers understand the meaning of the reading text through words, sentence structures, and relationships of the reading components. They can grasp its gist and the details, conclude, interpret, and evaluate it. They are aware of the writing style, emotion, concept and purpose of the author. Comprehension is an active, dynamic, and growing process which requires interrelationship in a text. It would be better to refer to comprehension as readers' understanding of propositions or the basic units of meaning including words, phrases, sentences, and paragraphs in the text. As such, once the meaning of a certain proposition is grasped, it can be said that the reader is involved in comprehension.

Carrell (1989) stated that reading comprehension is the related processes of sentence structure, content and the reader's prior knowledge or schema, which is made up of knowledge, experiences, notion, feeling, and attitude in relation. Reading comprehension is attained through the combination of prior knowledge or schema and the language skills used for guessing and predicting while reading. As such, the readers' prior knowledge or schema and language skills are essential components for reading comprehension, which help readers to make a prediction effectively while reading the text. In addition, the predicting ability will increase if readers have prior

knowledge of the language structures as well, thereby promoting the reading comprehension.

For academic English, it is logical to teach reading skills to attain comprehension. The important comprehension skills to be enhanced for the reading skills include understanding the main idea, identifying important details, determining the sequence of events, identifying cause and effect and developing critical reading skills. Dopious and Askov (1982) suggested that understanding main ideas may be instructed by having the students select a choice from different alternatives before they write out the main idea on their own. Also, identifying important details is essential since it requires students to identify the main ideas and the key information to support each main heading in a form of outline process. This helps students identify important details. In addition, identifying cause and effect should be taught since not all paragraphs are organized in sequential or chronological order. Some paragraphs involve cause-effect relationship which could be recognized through key words like "therefore", "because", "since", "as a result", and "so". Like other reading skills, students should be able to recognize the relationship in the reading first before transferring it to other skills (speaking or writing for instance).

2.1.2 Reading Comprehension Levels

Bloom et. al. (1956) cited in Supakitjumnong (2007) states that a number of reading comprehension taxonomies emerge to classify cognitive levels of reading comprehension. Bloom's Cognitive Taxonomy is one of the popular models which is based on an ordered set of objectives moving from simple skills upward cumulatively to more elaborate skills. There are six levels: knowledge, comprehension (understanding), application, analysis, synthesis and evaluation. Bloom's Cognitive Taxonomy indicates that cognitive development is hierarchic in process, moving from lower to higher levels. Based on Bloom's hierarchy, reading can be involved in each level of cognitive development. Other reading comprehension models that are often referred to are Barrett's Taxonomy of Reading Comprehension which consists of four levels: literal comprehension, inferential comprehension, evaluation, and appreciation and the Nila Banton Smith's Taxonomy which divides the comprehension skills into four levels which can be described as follow:

Literal comprehension is the ability to obtain a low-level type of comprehension by simply recalling only information explicitly stated. Answers to literal questions are considered to involve lower level types of thinking skills than the rest of the levels.

Interpretation requires a higher level of thinking ability. Answers are not literally stated but are suggested or implied. To answer questions at the interpretative level, problem-solving ability is required and readers need to be able

to work at various abstract levels. Interpretation requires broad reading skills involving analysis, and synthesis. All reading skills in interpretation demand the reader's inferential ability. Some of the reading skills categorized under the interpretation level include determining word meaning from context, finding main ideas, drawing inferences or reading between the lines, drawing conclusions, making generalizations, recognizing cause-and-effect relationships, and recognizing analogies.

Critical reading, the next step in the hierarchy, involves evaluation or personal judgment on the value of the reading information which requires the reader's ability to connect, interpret, apply, analyze and synthesize the reading text. Critical reading includes the ability to distinguish between fact and opinion, fantasy and reality, and the ability to perceive propaganda techniques as well.

Creative reading, the highest level of comprehension, requires a variety of thinking skills so that the reader will be able to get new or alternative solutions different from what the writer presents.

Reading comprehension involves a variety of skills. These include recognizing words and word groups, and deducing word meaning by understanding word formation and contextual clues. It requires understanding conceptual meaning and also explicitly and implicitly stated information. In addition, the reader must have the abilities to identify the main ideas, generate and draw conclusions and read critically, as well as adopt a flexible approach and various reading strategies relevant to the reading text type and objective.

2.1.3 Factors which Influence English Reading Ability Levels

There are three factors that reflected on reading attainment: (a) word recognition, (b) language, and (c) background –or world knowledge. Word recognition itself is categorized into three areas: lexis (letter pattern), phonics (letter sounds), and semantics (word meanings which involve strings of letter patterns and letter sounds or strings of the relationship between lexis and phonics). Language itself is concerned with three parts of the linguistic knowledge: (a) syntax (grammatical arrangement of words in a sentence), (b) cohesion (linguistic devices that hold together the words in the sentence strings), and (c) text structure (the underlying organization of the rhetorical devices of a written text such as problem-solution, cause effect, chronology, and so on) (Urquhart and Weir, 1998). Finally, background or world knowledge refers to the individual experiences that facilitate readers' understanding of a text.

In addition, according to Ruddell and Ruddell (1995), six key factors that enhance effective reading achievement are (a) word analysis, (b) language knowledge, (c) prior or background knowledge, (d) reading motivation, (e) text interaction, and (f) effective comprehension strategies. Word analysis involves

knowledge in lexis, phonics, and the semantic meaning of words. Language knowledge is the linguistic knowledge that helps readers infer meaning from relational or lexical elements within sentences. Background knowledge is related to literacy and prior knowledge drawn up from personal experiences concerning the text being read. Reading motivation is the intellectual curiosity that helps readers make better sense of what they read. Text interaction is the reading process by which a reader uses their language knowledge related to word meanings, sentences, and story structure to enhance their understanding of the reading passage. Additionally, effective comprehension strategies are formed by the personal tactics that successful readers normally use to help them better understand what is being read. In conclusion, there are many educators proposing a variety of key factors that influence readers' reading achievement. Understanding the factors that influence reading in L2 may help teachers to develop teaching plans for their reading classroom in order to improve their students' proficiency.

2.1.4 Basic Approaches to Understanding Reading

Some researchers (Kintsch and van Dijk 1978; Rumelhart and Ortony 1977; Winograd, 1977) have applied an information processing analogy to help understand the reading process (Mikulecky and Jeffries, 2005), that is to interpret the reading process by means of simple controlling metaphors. The three popular metaphors to dominate reading refer generally to reading processes: bottom-up (primary emphasis on textual decoding), top-down (primary emphasis on reader interpretation and prior knowledge), and interactive processing (Grabe, 1991). These three perspectives on reading are explained below.

Top-Down Approaches

Top-down approaches emphasize the importance of schemata (i.e. networks of information stored in the brain which act as filters for incoming information), and the reader's contribution, over the incoming text.

Bottom-Up Approaches

Bottom-up approaches are series models where the reader begins with the printed word, recognizes graphic stimuli, decodes them to sound, recognizes words and decodes meanings. Each component involves sub processes which take place independently of each other, and build upon prior sub processes. Bottom-up approaches owe much to the work of Smith (1971) and Goodman (1969, 1982) (Alderson, 2005).

Interactive Approaches

Interactive approaches to reading are another perspective on reading. According to Grabe (1991), the term interactive approaches can refer to two different concepts:

First, the term 'interactive approach' refers to the general interaction which takes place between the reader and the text. The reader (re)constructs the text information based in part on the knowledge drawn from the text and in part from the prior knowledge available to them (Barnett, 1989; Carrell, 1983).

Second, the term 'interactive approach' refers to the interaction of many component skills potentially in simultaneous operation; the interaction of the cognitive skills leads to fluent reading comprehension. This kind of reading involves both an array of lower-level rapid, automatic identification skills and an array of higher-level comprehension/interpretation skills (Carrell 1988, 1989; Eskey, 1986; Eskey and Grabe, 1988; Rayner and Pollatsek, 1989; Samuel and Kemil, 1984).

2.2 Concept Mapping

2.2.1 Learning Psychology of Concept Mapping

Concept Mapping was developed and based on the learning psychology of Ausubel who was interested in teaching-learning processes. Ausubel's theory of learning claims that learners could create concepts of learning by themselves. One of the most fundamental goals in the use of concept mapping is to foster meaningful learning. Meaningful learning required three conditions: 1) the materials to be learned must be conceptually clear and presented with language and examples linkable to the learner's prior knowledge. Concept Mapping can be helpful to meet this condition, both by identifying large general concepts held by the learner prior to instruction of more specific concepts, and by assisting in the sequencing of learning tasks though progressively explicit knowledge that can be anchored into developing conceptual frameworks. 2) The learner must possess relevant prior knowledge. This condition can be met only when the learner is 3 years old or higher for any domain of subject matter. It is necessary, however, to be careful and explicit in building conceptual frameworks if one hopes to present detailed specific knowledge in any field in subsequent lessons. 3) The learner must choose to learn meaningfully. One condition over which the teacher or mentor has only indirect control is the motivation of students to choose to learn by attempting to incorporate new meanings into their prior knowledge, rather than simply memorizing concept definitions or propositional statements or computational procedures. The creation of concept mapping supports the incorporation of new meanings into prior knowledge (Novak and Canas, 2006).

As noted above, it is important to recognize that because individuals vary in the quantity and quality of the relevant knowledge they possess, and in the strength of their motivation to seek ways to incorporate new knowledge into relevant

knowledge they already possess, the rote-meaningful distinction is not a simple dichotomy but rather a continuum. Creativity can be seen as a very high level of meaningful learning. These ideas are shown in Figure 2.1 below.

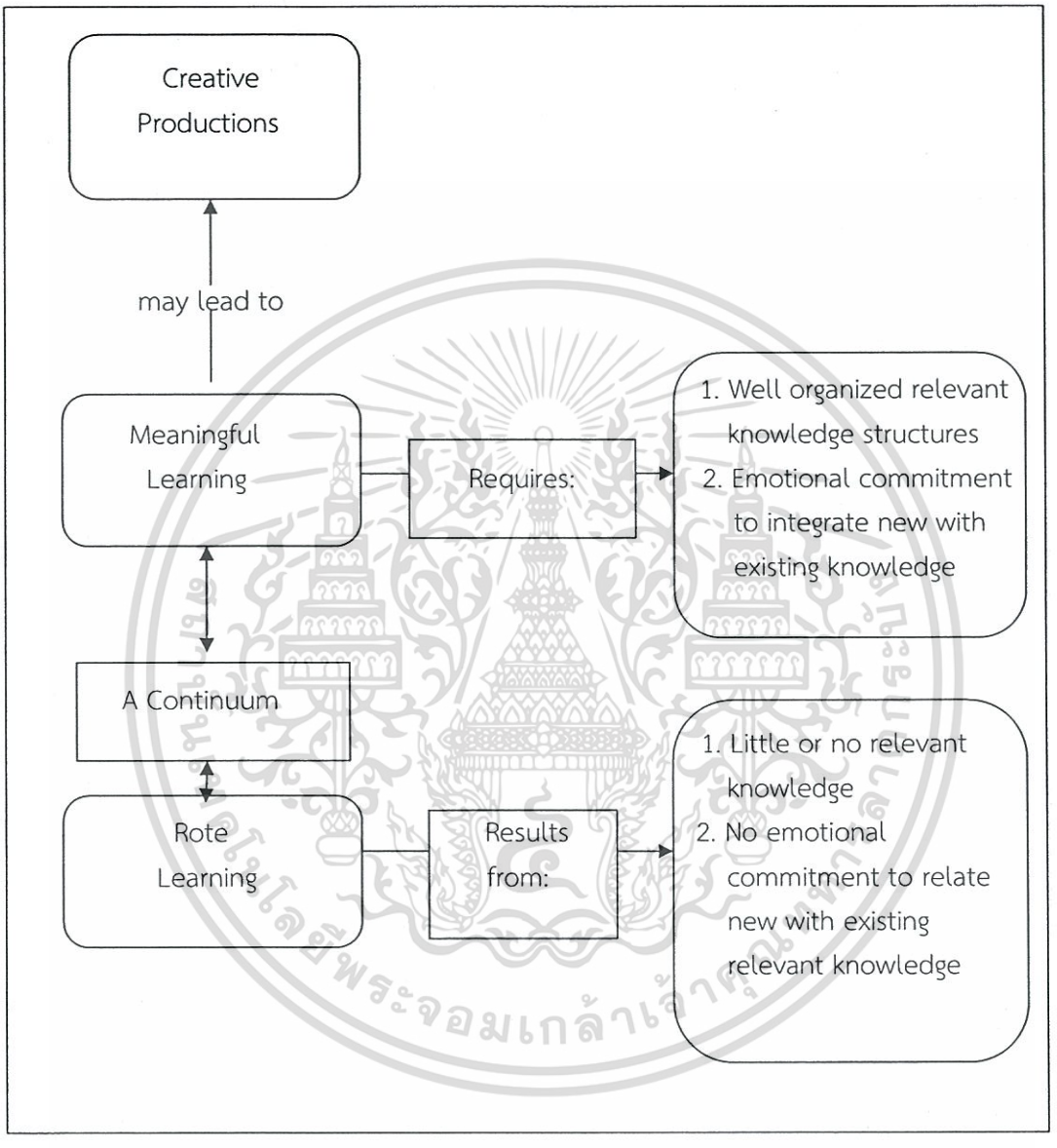

Figure 2.1 Rote Learning and Meaningful Learning Theory

Source: Novak, J.D. and A.J., 2006

2.2.2 Characteristics of Concept Mapping

Concept mapping was first created and developed by Novak and his coworkers at Cornell University. They searched for models of learning by which learners could learn science meaningfully. Novak and his co-workers' work was based on the learning psychology proposed by Ausubel. The fundamental idea in Ausubel's cognitive psychology is that learning takes place by the assimilation of new concepts and propositions into existing concept and propositional frameworks held by the learner. Concept maps are graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts. Definition of concept is a perceived regularity in events or objects, or records of events or objects, designated by a label. The label for most concepts is a word, and sometimes more than one word is used. Propositions are statements about some object or event in the universe, either naturally occurring or constructed. Propositions contain two or more concepts connected by using linking words or phrases to form a meaningful statement. Sometimes these are called semantic units, or units of meaning. (Novak and Gowin, 1984; Canas et al., 2003).

The most general concept is at the top of the map, and more specific concepts are place down the structure. The concept map also has cross links. The cross links are the links between concepts in different segments or domains of the concept map. Cross links help one see how a concept in one domain of knowledge represented on the map is related to a concept in another domain (See Figure 1.2, p. 5) In brief; concept maps are the graphical representations of knowledge that is comprised of concepts and the relationships between them with properly linking words in term of meaningful statements.

2.2.3 Concept Mapping Reading Comprehension Strategy

While adopting concept mapping in reading, learners need to confirm the concept of the topic, working from its characters to words, to sentences, and paragraphs, and to arrange the concepts around a main concept. Then learners must link and align the relationship of some concepts, and then comprehend the whole reading passage. This constructed process is bottom-up reading comprehension. In addition when mapping, learners apply personal prior schema to organize the new message so that the learners can develop a new schema actively (Ruddell and Boyle, 1989). After mapping, the learners can also review the relationships between concepts. This process of the readers' utilizing prior schema to construct meaning

has the positive effect of a top-down reading model. In conclusion, the mapping process integrates the bottom-up and top-down comprehension models (Huang, 2005; Kintsch and Van Dijk, 1978).

Various concept mapping strategies have been developed in recent years. The strategy linked with the related nodes concept map is the most widely used (Novak and Gowin, 1984). This strategy takes one concept as the center, and related concepts and details emerge as the mapping develops from the central to external. The kinds of concept mapping can be classified in two categories: (1) The concept mapping that develops from inner to outer; (2) The concept mapping that develops from upper to lower (Fisher et. al., 1991) as in Figure 2.2 below and Figure 2.3 on page 18.

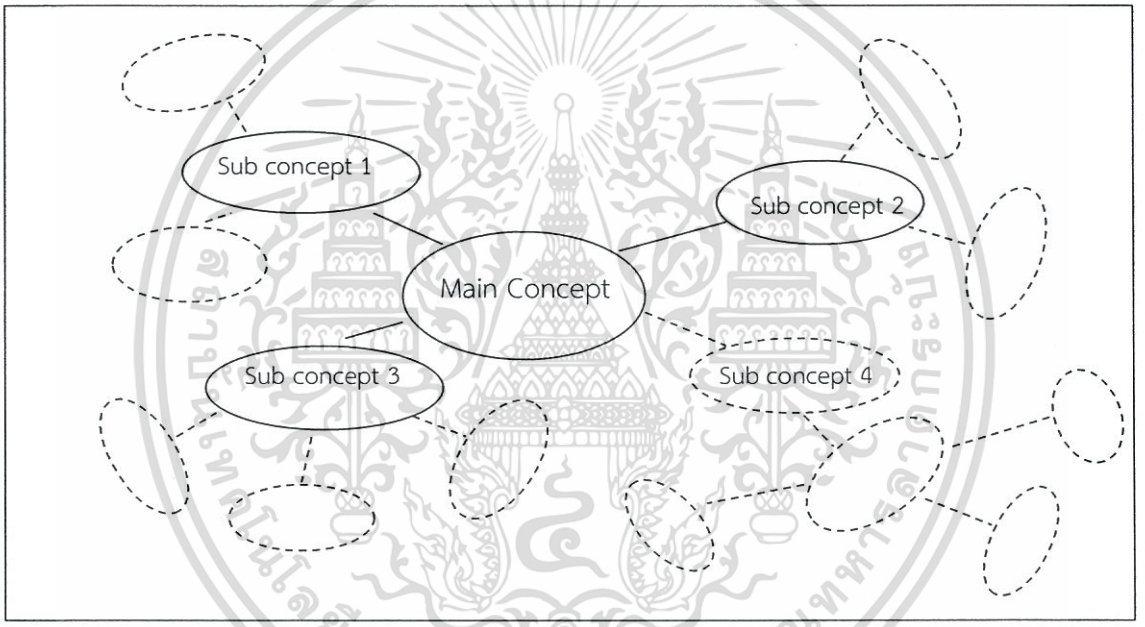

Figure 2.2 Concept Mapping Develops from Inner to Outer Source
Source: Fisher et. al., 1991

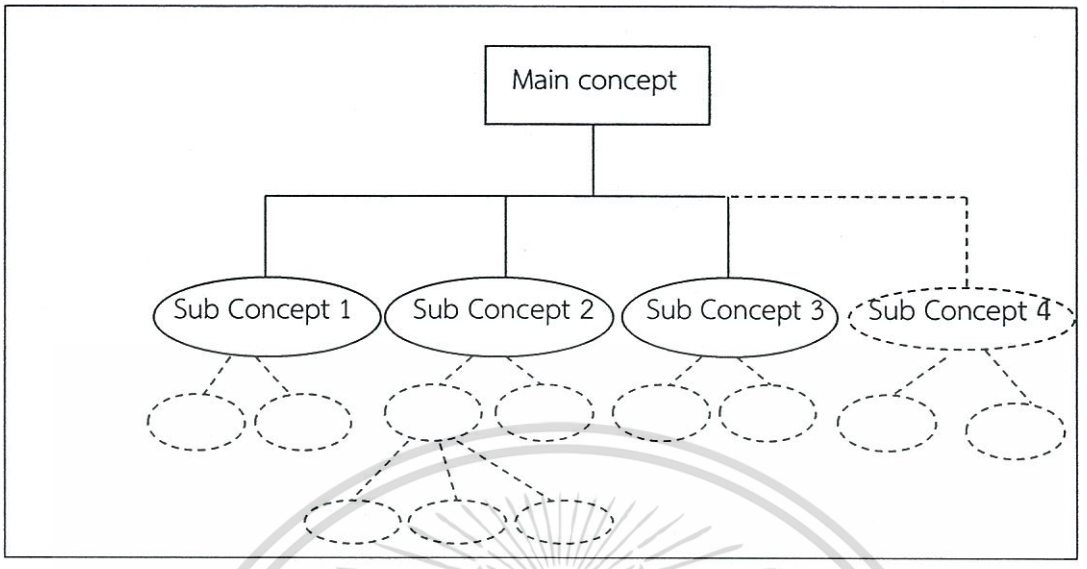

Figure 2.3 Concept Mapping Develops from Upper to Lower
Source: Fisher et. al., 1991

The two approaches of concept mapping are used in class: one is the learner-constructed concept map; the other one is the expert-constructed concept map. For the learner-constructed concept map, teachers ask learners to construct concept maps themselves after explaining and demonstrating concept mapping to them. The process helps students to recognize the important concepts, relationships, and structures of a text (Boyle and Weishaar, 1997; McCagg and Dansereau, 1991; Reese, 1988). The expert-constructed concept map is another method of teaching learning strategies. It is developed by the instructor. The expert-constructed concept map is used to train learners in comprehension of a text and to save instructors' time in teaching (Hall, 1988; Jonassen et. al., 1993).

In this study, the researcher used the expert-constructed concept mapping (See Figure 2.2 - 2.3, pp. 17-18) as the method of teaching learning strategy in comprehension of a text and in order to save the researcher's time in teaching.

2.3 Traditional Instruction Method

Traditional teaching methods are concerned with the teacher being the controller of the learning environment. Power and responsibility are held by the teacher and they play the role of instructor (in the form of lectures) and decision maker (in regards to curriculum content and specific outcomes). They regard students as having 'knowledge holes' that need to be filled with information. In short, the

traditional teacher views that it is the teacher that causes learning to occur (Novak, 1998).

To sum up, the traditional instruction puts the responsibility for teaching and learning mainly on the teacher and it is believed that if students listen to the teacher's explanations and doing the exercises, they will be able to understand the lessons.

2.3.1 Characteristics of Teacher-Centered and Student-Centered Instruction

According to Cuban, L. (1983), the characteristics of teacher-centered and student-centered instruction are as follows:

1) **Teacher-centered instruction** means that a teacher controls what is taught, when and under what conditions within a classroom. The indicators are:

- Teacher talk exceeds student talk during instruction.
  Instruction occurs frequently with the whole class; small-group or individual instruction occurs less often.
- Use of class time is largely determined by the teacher.
- The teachers rely heavily upon the textbook to guide curricular and instructional decision making.
- The classroom furniture is usually arranged into rows of desks or chairs facing a chalkboard with a teacher's desk nearby.

According to Smaldino et al. (2008), teacher-centered instructional strategies are those directed specifically by the teacher who is the focus and who serves to direct the learning in very purposeful ways. Teacher-centered instruction is the traditional approach of teaching a lesson in front of a classroom and it involves planning for instruction, implementing the instructional plan, and evaluating students' learning toward the instructional objectives (Palincsar and Brown, 1984). Teacher-centered instructional approaches are more traditional and didactic, and students are passive recipients of information who acquire knowledge by listening to the teacher, by reading a textbook, or both (Uwameiye and Ojikutu, 2008). Moreover, teacher-centered instruction is useful for conveying new information and materials to small or large groups at one time and it literally means that the teacher is the person who is imparting knowledge or information to the student and the student is the receiver of this knowledge (Palincsar and Brown, 1984). Halperin stated that the teacher-centered model, "students sit quietly, passively, receiving words of wisdom being professed by the lone instructor in front of the class" (Catalano, G.D. and Catalano, K., 2012).

2) Student-centered instruction means that students exercise a substantial degree of responsibility for what is taught, how it is learned, and for movement within the classroom. Some indicators are:

- Student talk about learning tasks is at least equal to, if not greater than, teacher talk.
- Most instruction occurs individually, in small groups (2 to 6 students) or in moderate-sized groups rather than being directed at the entire class.
- Students help choose and organize the content to be learned.
- Teachers permit students to determine, partially or wholly, rules of behavior, classroom rewards and penalties, and how they are to be enforced.
- Varied instructional materials (e.g., activity centers, learning stations, interest centers) are available in the classroom so that students can use them independently or in small groups.

The classroom is usually arranged in a manner that permits students to work together or separately, in small groups or in individual work spaces; no dominant pattern in arranging classroom furniture exists, and desks, tables, and chairs are aligned frequently.

2.4 Related Research

2.4.1 Research Conducted in Thailand

Wongkrajang (2006 : 34) studied using concept maps to develop English reading comprehension skills of mathayom suksa III students. The samples consisted of 35 Mathayom Suksa III students in the first semester of the 2006 academic year at Mae Chaem School, Mae Chaem District, Chiang Mai. It was found that the students' competence level and reading behavior after the instruction were higher in all level groups. The students' abilities in using concept maps to conclude the text is in good level. The students' competence in reading comprehension after the instruction was found to be significantly higher at the .01 level.

Janhom (2004 : 12) studied the effects of using the concept mapping technique in the Visual Arts segment of the "Aesthetic Appreciation" course at Rajabhat Institute Chiang Mai. The subjects of this study were 66 first year students. It found that the academic achievement was statistically significantly increased after using the concept mapping technique in teaching. Pre-test and Post-test total mean scores were at the high moderate level and were increased after teaching. The result indicated that the

concept mapping technique can be applied successfully in teaching the Visual Arts segment of the Aesthetic Appreciation course.

Rawangsuk (2002 : 26) studied an assessment of conceptual knowledge in science by using concept mapping. The samples were 38 of Prathom Suksa IV students of Watlumnow school at Nakorn Si Thammarat. It was found that the alpha for the fill-in-the-map for the content of "Earth Changing Process" and "Astronomy and Space" was .46 and .76 respectively. The highest generalized ability coefficient was found for the convergence score the concurrent validity of concept mapping assessment considering with teacher's diagnosis, the construct-a-map were ranged from.72 to .92 and the fill-in-the-map ranged from .40 to .68. From interviewing with teacher and students, it was found that the concept mappings were practicable in classroom assessment.

2.4.2 Research Conducted Abroad

A few studies have been done on concept maps in second language, especially on reading comprehension (Kalhor, 2012).

Kalhor (2012 : 729) investigated the effect of teaching English reading comprehension to Iranian students through concept mapping. In doing so, a pre-test and a post test were used. First 38 third grade high school female students in Karaj city were selected systematically and then they were divided into control and experimental groups randomly. The experimental group was thought using concept mapping, while control group was not exposed to such kind of teaching technique and the students in this group were thought in common way of reading comprehension teaching. The findings showed that using concept map as a teaching strategy has a positive effect on meaningful learning improvement and English reading comprehension of students. The students in experimental group which were exposed to concept map strategy in class did better in the post test than the students in control group that deprived from such kind of instruction.

Halimi (2006) cited in Habok (2012 : 461) investigated whether concept maps help students comprehend texts, and whether they could easily notice and recall the main ideas and grasp text cohesion. Students were divided into two groups. The experimental group was introduced to concept maps as tools of text analysis. In the meantime, the other group analyzed texts using traditional text analysis techniques. In the second part of the study the roles of the two groups were transposed. At the end of the study the students in the experimental group were requested to do free recalling on the texts, write down what they could remember and then answer open-ended questions. According to the results, concept maps facilitated the work of students. In conclusion, the group which was first introduced to the concept mapping achieved better results.

Vakilifard and Armand (2006) cited in Habok (2012 : 462) studied combination the activation of text comprehension and prior knowledge in their study. They introduced concept maps to foreign language students. 18 students took part in the study, 9 students were placed the experimental group and 9 in the control group. The students in the experimental group took part in a four-session training course. At the beginning the group got a concept map in which nodes and linking phrases from a given list were to be completed. Later, students were provided with a text. After having read it, students had the possibility of studying the given map and making changes based on their own opinions. Before reading the text, the control group was given a multiple-choice test to fill out. This activity was followed by reading the given text, and on the basis of this students could correct their previous answers base on prior knowledge. At the end of the study, the students' performance in the experimental group turned out to be better than that in the control group. The experimental group was given questions at the end of the study to find out whether concept mapping had been helpful for them. Almost all the participants reported that they found concept maps useful for exploring the text structure, finding the key ideas and establishing the relationship between them and organizing information.

Based on the related research, concept mapping appears to be an effective way to teach and learn about new information and overarching concepts. Furthermore, the researchers as mention above used concept mapping as a tool for good achievement and understanding results. However, to my knowledge there is a few studies have been done on concept mapping instruction to enhance English reading comprehension abilities in vocational students in Thailand. Hence, this study was conducted on vocational certificate students in order to investigate the comparative study between concept mapping and traditional instructions on English reading comprehension abilities of vocational certificate students at Chiang Mai College of Agriculture and Technology.

CHAPTER 3
RESEARCH METHODOLOGY

This study was conducted according to the objectives of the research. This chapter consists of six sections: Population and Samples of the Study, Research Design, Research Instruments, Instructional Strategies and Materials, Procedures, and Data Analysis.

3.1 Population and Sample of this Study

Population: Population in this study was 160 of second year vocational certificate students at Chiang Mai College of Agriculture and Technology who enrolled on the English for Agriculture and Technology course in the second semester of the academic year 2012.

Sample of students: There were 80 students of the second year vocational certificate in the second semester of the academic year 2012. All of those students were selected as the samples by Purposive Random Sampling (Patton, 1990). Those 80 students were divided into two groups by Purposive Random Sampling (Patton, 1990); experimental and controlled.

3.2 Research Design

This research was a quasi-experimental research, which two groups of students: experimental and controlled groups. The experimental group was taught by using the concept mapping instruction, while the controlled group was taught by using the traditional instruction. The study was conducted two hours once a week for six weeks. The study took place during the second semester of the academic year 2012. Both experimental (concept mapping) and controlled (traditional) groups used teaching processes as shown in Table 3.1 on page 24.

Table 3.1 Teaching Processes

	Concept Mapping Instruction Group (N=40)	Traditional Instruction Group (N=40)
Instructor	the researcher was the instructor	
Materials	six agricultural reading comprehension in English	
Setting	instruction with agricultural reading comprehension through concept mapping (2 hrs. a week for 6 weeks)	instruction with agricultural reading comprehension through traditional (2 hrs. a week for 6 weeks)

At the end of the study, both the experimental (concept mapping) and controlled (traditional) groups took the Post-test which is diagramed as follows:

Groups	Pre-test	Method of Instructions	Post-test
C	T_1	No X	T_2
E	T_1	X	T_2

As above, in the following notation is used to illustrate:

C represents the controlled group

E represents the experimental group

T represents the Pre-test and Post-test to both controlled and experimental groups:

T_1 represents the test given as a Pre-test to both controlled and experimental groups

T_2 represents the test given as a Post-test to both controlled and experimental groups

"No X" represents the controlled group that was taught through traditional instruction.

"X" represents the experimental group was taught through concept mapping.

3.3 Research Instruments

Research instruments were divided into two categories: experimental instruments and data collection instruments.

There were two experimental instruments: the six of agricultural English reading comprehension and the lesson plans with concept mapping instruction and the lesson plans with the traditional instruction.

3.3.1 Experimental instruments.

1) The agricultural English reading comprehension. The selected texts were based on the course syllabus of English for Agriculture and Technology according to the Certificate in Vocational Education Curriculum, B.E. 2546 of the Vocational Education Commission. The contents consisted of six agricultural passages. The objectives were for students to identify to read for topics and meaning of sentences.

2) The two lesson plans: six concept mapping instruction and six traditional instruction lesson plans. Each one took two hours per week.

a) The lesson plans with concept mapping instruction: The lesson plans which use concept mapping were based on suggestions in Novak and Gown's Learning How to Learn (1984). The students were provided with lists of words to consider for placement within concept maps (See Appendix C, p. 50). Class activities and tasks were students to identify to read for topics and meaning of sentences, and were prepared for group work.

b) The lesson plans with the traditional instruction. The students were led to read and translate the passages by the teacher. Class activities and tasks were students to identify to read for topics and meaning of sentences, and were prepared for group work (See Appendix C, p. 61).

The instructional procedures for each lesson plan followed three steps: presentation, practice and production. The presentation provided the students with the topic of each lesson. The practice carried out the instruction according to the set objectives. In the production step, both of the experimental and controlled groups were provided the unit test by doing in individual.

3.3.2 Data Collection Instrument

There was only one data collection instrument.

Pre-test and Post-test

The Pre- and Post-tests, having three paralleled reading comprehension and level of difficulty (See Appendix E-F pp. 149-158). It consisted of 20 four-multiple-choice questions. Those tested the students' cognitive in reading comprehension ability. The questions required both literal and interpretive level of comprehension which based on Nila Banton Smith's Taxonomy.

After it had been written, the two tests were given to the advisor and the experts in English to check and adjust their content if necessary. Then the tests were tried out with 40 students who were not the samples and who also studied the

course of English for Agriculture and Technology in the second semester of academic year 2012. The Statistical Program of the Item Analysis Table using the 27 % Technique by Jung Teh Fan (Fan, 1952) was used to check the difficulty, reliability and validity.

Finally, the tests were given to the sample students before and after the instruction English reading comprehension to check the increase in students English reading comprehension abilities by comparing the value of the mean and the standard deviation.

3.4 Instructions Strategy and Materials

3.4.1 Concept Mapping Reading Instruction

In this study the expert-constructed concept mapping was used as the method of teaching learning strategies in comprehension of a text and was conducted over a six week period. The topics and concept lists were related to the material taught in class, and included agricultural concepts known to students in order to help them focus on learning the process of concept mapping (Hall, 1988; Jonassen et al, 1993). There were five key points made in the teaching procedures:

1) Introducing and explaining students what the concept mapping is.
2) Giving an example how to map out the hierarchical relationships among the ideas.
3) Providing students some lists of word and incomplete concept mapping.
4) Excluding irrelevant ideas.
5) Mapping out the hierarchical relationships among the ideas.

The mapping types that the researcher demonstrated for the students were mainly the "Concept map linked with related nodes" that Fisher et al. (1991) proposed. These mapping types taught learners to focus on one central concept, integrate that concept with the related concepts and details, and develop comprehension from inner to outer and upper to lower (See Figure 1.3-1.4, p. 6).

3.4.2 Traditional Instruction

In this study the instruction was divided into two activities: reading the passage and doing the exercise on giving meaning of the details of the passage. The students were led to read, translate the passages by the teacher. The procedures of the instruction and reading activities were as follow:

1) Activating the students' learning and background knowledge by asking questions or telling a passage in the text.

2) Leading students to read and translating the passages by the teacher.

3) Checking the students' reading comprehension and giving feedback to the students.

3.4.3 Materials

The materials used in this study consisted of six agricultural passages. Both of the experimental and controlled groups read those passages. The objectives for students were to read for topics, and meanings of the sentences.

3.5 Procedures

This research was a quasi-experimental research, which two groups of students: experimental and controlled groups. The experimental group was taught by using the concept mapping instruction, while the controlled group was taught by using the traditional instruction. The study was conducted two hours a week for six weeks. The study took place during the second semester of the academic year 2012. The processes of the study were as follows:

1) Each group of students: the experimental and the controlled groups; consisted of forty students by Purposive Random Sampling (Patton, 1990).

2) The Pre-test was given to the samples at the beginning of the course to measure students' pre-instructional English reading comprehension ability level.

3) In each lesson, the experimental group was taught through concept mapping while the controlled group was taught through traditional instruction.

4) At the end of the study, both the experimental and controlled groups took the same Post-test to evaluate students' post- instructional English reading comprehension ability level.

3.6 Data Analysis

The data analysis was divided into two sections:

3.6.1 Analysis of Research Tools

To check the research tools; the comprehension tests were whether reliable and valid or not. The comprehension tests were tried out with other 40 students who were not the samples, to check the difficulty, reliability and validity by using technique 27 % of the Statistical Program of the Item Analysis Table by Jung Teh Fan (Fan, 1952). The level of difficulty and the P-value for Pre-and Post-tests were 0.50 and 0.51 respectively. The P-value (0.50 to 0.51) indicates that the tests had a

moderate level of difficulty which was valid for testing (Nikmanon, 2000). For checking reliability, the Kuder-Richardson formula (KR-20) was used. The results of Pre-and Post-tests showed the reliability of 0.7014 and 0.7048 respectively (see Appendix G, p. 167). The value range of 0.70-0.80 can be interpreted as good reliability for a classroom test (Nunnally, 1967).

3.6.2 Analysis of research questions

Descriptive statistics was used to report the students' demographics in terms of percentages.

Inferential statistics: analysis of independent Sample t-test was used to find the value of means and standard deviations and to compare the differences in the samples' English reading comprehension abilities of the two groups.

CHAPTER 4
RESULTS

This chapter presents the research findings following the two main questions: 1) are there any differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions? 2) what is/are the effect(s) of concept mapping and traditional instructions on students' English reading comprehension abilities? The data were analyzed by comparing the values of means and the standard deviation of the English reading comprehension test before and after concept mapping and traditional instructions of vocational certificate students at Chiang Mai College of Agriculture and Technology. The data were collected from November 2nd, 2012 to February 4th, 2013.

The findings of the study are presented according to the research questions mentioned above.

4.1 Demographic Data of the Students

Table 4.1 General Data of the Students.

Data		Experimental group		Controlled group		Total of percent
		N	percent	N	percentage	
Gender (N=80)	Male	23	28.75	27	33.75	62.5
	Female	17	21.25	13	16.25	37.5
Age (N=80)	16 - 20 years old	39	48.75	38	47.5	96.25
	21 - 24 years old	1	1.25	2	2.25	3.75
Fields of study (N=80)	Plants Science	18	22.5	34	42.5	65
	General agriculture	-	-	6	7.5	7.5
	Farm mechanic	12	15	-	-	15
	Agro-industry	10	12.5	-	-	12.5
Total		40	100	40	100	100

Table 4.1 indicated that of all 80 students, there were 62.5% male and 37.5% female. Each group of students: the experimental and the controlled groups; consisted of forty students (23 male, 17 female for experimental group and 27 male, 13 female for controlled group). Most of the students were 16 – 20 years old (96.25%), followed by 21 - 24 years old (3.75%). Most of them studied in Plants Science field (65%), follow by Farm Mechanic field (15%), Agro-industry field (12.5%) and General Agriculture (7.5%), respectively.

4.2 **Result of Research Question One:** are there any differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions?

To compare the unit test scores between the two groups, the mean ($\bar{x}$) and standard deviation (S.D.) for each group was calculated as shown in Table 4.2 below.

Table 4.2 Minimum, Maximum, Mean ($\bar{x}$) and Standard Deviation (S.D.) of Unit Tests Scores for the Experimental and Controlled Groups.

Unit Test	Experimental Group (N=40)				Controlled Group (N=40)			
	Min.	Max.	$\bar{x}$	S.D.	Min.	Max.	$\bar{x}$	S.D.
Unit 1 (10 points)	6	8	7.07	.730	6	8	7.23	.698
Unit 2 (6 points)	4	6	4.88	.757	4	6	4.78	.800
Unit 3 (5 points)	3	5	3.95	.815	3	5	3.63	.628
Unit 4 (5 points)	4	5	4.45	.504	3	5	3.92	.730
Unit 5 (9 points)	7	9	7.60	.632	6	8	6.95	.704
Unit 6 (5 points)	4	5	4.60	.496	3	4	3.48	.506
Total (40 points)	29	38	32.55	2.53	25	36	29.97	2.33

Table 4.2 shows that the mean score of six unit tests in the experimental group was 32.55 which was higher than that of the mean score of the controlled group (29.77). However, with concerning the mean score in each unit test, it was found that the mean score for the experimental and controlled groups are very close to each other ($\bar{x}$ =7.07, 4.88, 3.95, 4.45, 7.60 and 4.60, $\bar{x}$ = 7.23, 4.78, 3.63, 3.92, 6.95 and 3.48, respectively).

4.3 Result of Research Question Two: what is/are the effect(s) of concept mapping and traditional instructions on students' English reading comprehension abilities?

To compare the Pre and Post-test scores before and after learning through concept mapping and traditional instructions, the mean ($\bar{x}$) and differences for each group was calculated as shown in Table 4.3 below. The data were also analyzed by Independent Samples t-test to compare the learning achievement before and after learning at 0.01 significant levels.

Table 4.3 Mean ($\bar{x}$) and Standard Deviation (SD) of Post-test Scores for the Experimental and Controlled Groups

Group	The Post-test			t	P-Value
	Highest Possible Score	Mean	S.D.		
Experimental Group (n=40)	20	15.18	1.81	3.53	0.001**
Controlled Group (n=40)	20	13.83	1.59		

** Significance at level 0.01

From Table 4.3, based on the data obtained by Post-test scores, the mean score for the experimental group were found at 15.18, while that the mean score of the controlled group were found at 13.83. That is, the mean scores of the Post-test in the experimental group were higher than that the mean scores in the controlled group. Moreover, there were statistically significant differences in students' English reading comprehension abilities between using the concept mapping and the traditional instructions ($t=3.53$, $p=0.001<0.01$).

To further examine the improvement of English reading ability of the concept mapping and controlled groups, the Pre and Post-test scores before and after learning through concept mapping and traditional instructions were compared. The mean and standard deviation (SD) for each group was calculated as shown in Table 4.4 to 4.5 on page 32. The data were also analyzed by Independent Samples t-test to compare the learning achievement before and after learning at 0.01 significant levels.

Table 4.4 Pre and Post-test Results of Experimental Group

Experimental Group (N=40)	$\bar{x}$	SD	t	P-Value
Pre-test	9.90	1.54		
			35.74	0.00**
Post-test	15.18	1.81		

** Significance at level 0.01

According to Table 4.4, the mean scores of the Post-test for learning through the concept mapping instruction were much higher than that the mean scores of the Pre-test ($\bar{x}$ =15.18 and 9.90 respectively). There were statistically significant differences between the two tests at the level of 0.01 (t=35.74, p=0.00<0.01). This shows that the English reading comprehension ability improved after learning through concept mapping method.

Table 4.5 Pre and Post-test Results of Controlled Group

Controlled Group (N=40)	$\bar{x}$	SD	t	P-Value
Pre-test	9.48	1.26		
			24.51	0.00**
Post-test	13.83	1.59		

** Significance at level 0.01

According to Table 4.5, the mean scores of the Post-test for learning through the traditional instruction were much higher than that the mean scores of the Pre-test ($\bar{x}$ =13.83 and 9.48 respectively). There were statistically significant differences between the two tests at the level of 0.01 (t=24.51, p=0.00<0.01). This shows that the English reading comprehension ability improved after learning through the traditional method.

CHAPTER 5

CONCLUSION DISCUSSION AND SUGGESTION

Chapter five presents conclusion, discussion and suggestions. The suggestions are for pedagogical as well as further studies. The details are as follows.

The purposes of this study were: 1) to compare the students' English reading comprehension abilities between using concept mapping and the traditional instructions, and 2) to investigate the effects of concept mapping and traditional instructions in English reading comprehension abilities. The samples were eighty second year vocational certificate students in the second semester of the 2012 academic year at Chiang Mai College of Agriculture and Technology. The research instruments consisted of six lesson plans, and the Pre- and Post-tests. Both tests were parallel reading comprehension tests with similar level of difficulty. There were twenty items which concerned with Agricultural English reading comprehension. The data were analyzed by using mean score ($\bar{x}$), standard deviations (S.D), and the sample t-test.

5.1 Conclusion

The research questions of the study were: 1) are there any differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions? 2) What is/are the effect(s) of concept mapping and traditional instructions on students' English reading comprehension abilities?

Based on the research questions of the study, it was hypothesized that: 1) there are differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions which supported to the first hypothesis. 2) The students' mean score of the post-test when using concept mapping instruction is higher than that the mean scores of the post-test when using traditional instruction. The finding accepted the second hypothesis.

5.1.1 Research Results

Research Question One: are there any differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions?

It was found that there were statistically significant differences in students' English reading comprehension abilities between using concept mapping and the traditional instructions. Students who were instructed through concept mapping method scored higher in the comprehension test than those who were instructed

through traditional method. Moreover, the results demonstrated that there were statistically significant differences between the concept mapping and traditional instructions.

Research Question Two: what is/are the effect(s) of concept mapping and traditional instructions on students' English reading comprehension abilities?

The study indicated that there were statistically significant differences between Pre-test and Post-test mean scores of concept mapping and traditional instructions on students' English reading comprehension abilities. In other words, the results demonstrated that their English reading comprehension abilities were more improved if learning through concept mapping than the students' abilities which learning through the traditional method.

5.2 Discussion

Based on the findings, the mean scores of the Post-test in the experimental group that was taught by concept mapping was higher than that of the controlled group that was taught by the traditional method. The results also showed that there were statistically significant differences between the two groups. Moreover, teaching through concept mapping was more practical than that of the traditional method in improving English reading comprehension achievement.

The traditional instruction which widely used in reading classes in Thailand, the teacher tends to play an important role in students' learning. The teacher usually explains everything to students rather than helping students to read by promoting thinking about its meaning (Chandavimon, 1998 cited in Panmanee, 2009). Moreover Chandler and Sweller (1991) state that the traditional method of teaching may heighten cognitive demand which lead attention away from important aspects in learning. Traditional teaching method is concerned with the teacher being the controller of the learning environment that regards students as having 'knowledge holes' that need to be filled with information that causes learning to occur: therefore, the students learn by rote memorization. Moreover, information learned by rote in the absence of connections with previously acquired frameworks is largely forgotten (Novak, 1998).

The result again, showed that the mean scores of the Post-test in the experimental group that was taught by concept mapping was higher than that of the controlled group that was taught by the traditional method after instruction. The results also showed that there were statistically significant differences between the two groups. This finding support concept mapping is the graphical representation of knowledge that is comprised of concepts and the relationships between them with

properly linking words in term of meaningful statements (Novak and Gowin, 1984; Canas et al., 2003). Kalhor (2012), Halimi (2006) and Vakilifard and Armand (2006) used concept mapping in teaching comprehension texts. Their studies revealed that concept mapping as a teaching strategy has a positive effect on meaningful learning improvement and English reading comprehension of students. Moreover, concept maps helped students to comprehend texts, and they could easily notice and recall the main ideas and grasp text cohesion. Furthermore, their studies revealed that concept mapping had a positive effect on comprehension.

Even though there are a number of advantages for concept mapping to support problem solving there are also a number of limitations. One of the difficulties in implementing concept mapping as a reading comprehension strategy is the difficulty in convincing learners to make use of a learning tool with which they are not familiar (Naidu, 1991). Drawing and making revisions to the concept maps may be time consuming; though helpful, this often requires that the entire process be restarted from scratch (De Simone, 2007). Daley (2004), also discussed the complexity of concept mapping that causes the format to be difficult for participants to comprehend if they unfamiliar with the strategy of concept maps. Additionally, the links become increasingly more difficult as the concept maps become more complicated requiring the use of other data analysis methods in combination with the concept maps. Students require time and repeated exposure to develop their abilities to recognize discourse organizing the texts. Related to time the researcher found that during the instruction to the students, additional time was needed to teach students the concept of mapping because the concept mapping which aims to foster meaningful learning and was new to them. Thus, in this study, the amount of training once a week for six weeks might not be enough for students to get used to the reading strategy. In addition, Thai students who used to be passive learners might need more time and more assistance to get used to the new strategy, concept mapping.

However, the findings reveal that the traditional instruction is not as effective as concept mapping instruction in improving students' reading comprehension. Meanwhile teachers should realize that there are several effective teaching reading methods. The teacher should find and employ the teaching methods that promote students' thinking and encourage students to take an active role in their own learning and use it in the reading class.

5.3 SUGGESTIONS

5.3.1 Suggestions for Pedagogical Instruction

Concept mapping instruction could have difficulties if the students' inadequacy in many areas such as vocabularies, grammatical knowledge and finding main ideas. Hence, teacher should concern that:

1) Concept mapping strategy need to be taught over a sufficient duration for the training to be effective and make sure learners will be able to use the strategy skillfully.

2) Teacher should provide the learners appropriate content. Too much content and lengthy reading passage may bring down learners' attention and steal classroom time.

3) Vocabulary in the passage for concept mapping strategy is another consideration to be appropriate to learners' knowledge background which affects their motivation and progress.

5.3.2 Suggestions for Further Studies

This research indicates that concept mapping could promote learning of students and brought about their English reading improvement in such a short period of training. The suggestions for further studies are as follows.

1) Further investigation can be pursued on the effect of concept mapping on English writing or speaking ability.

2) It would be interesting to further investigate the effect of concept mapping instruction, with a larger number of students and various fields.

3) Further research should be done to compare students' English abilities across disciplines: such as, Engineering, Medical Science and Humanities, and in various educational levels so as to see the overall impact among them.

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APPENDICES

Appendix A

Course Schedule

Course Schedule

Course Schedule

Week	Experimental Group	Controlled Group	Time (hour)
1	Pre-test	Pre-test	1.30
2	Reading unit 1: Safe Pest Control: For Humans and the Land	Reading unit 1: Safe Pest Control: For Humans and the Land	2
3	Reading unit 2: A natural way of caring for lawns - Really!	Reading unit 2: A natural way of caring for lawns - Really!	2
4	Reading unit 3: GM Crops	Reading unit 3: GM Crops	2
5	Reading unit 4: Biotechnology	Reading unit 4: Biotechnology	2
6	Reading unit 5: Tobacco	Reading unit 5: Tobacco	2
7	Reading unit 6: Cloning	Reading unit 6: Cloning	2
8	Post-test	Post-test	1.30

Appendix B

The lesson Plans in Summary

The Lesson Plans for Concept Mapping Instruction in Summary

Stages	Objectives	Teaching Materials	Methodology	Evaluations
1 Presentation 2 Practice 3 Production	Students should be able to: 1. draw a concept after reading the passage 2. comprehend the reading passage 3. correctly answer the questions about the passage	1. Reading Sheet Unit 1: A natural way of caring for lawns - Really! 2. Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land 3. Reading Sheet Unit 3: GM Crops 4. Reading Sheet Unit 4: Biotechnology 5. Reading Sheet Unit 5: Tobacco 6. Reading Sheet Unit 6: Cloning 7. Worksheet 8. Word cards 9. Unit tests	1. Introduce and explain students what the concept mapping is. 2. Give an example how to map out the hierarchical relationships among the ideas. 3. Ask students what the main reading text is and the supporting details are from the example text. 4. Elicit answers from students by asking them questions about topic of the passages. 5. Give students the reading sheet. 6. Demonstrate and explain to them how to predict the content and organization of ideas. 7. Ask students to scan through the passage quickly and ask them the questions.	1. From students' doing activities. 2. From students' concept mapping. 3. From students' answers. 4. From students' reading comprehension test. (Unit Test).

(continued)

Stages	Objectives	Teaching Materials	Methodology	Evaluations
			8. Present new words from the passages. 9. Provide students some lists of word and incomplete concept mapping. 10. Put students into groups of 3. 11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas. 12. Correct students' concept maps. 13. Ask students the questions based on the concept map. 14. Review what has been studied (either in Thai or English). 15. Give students the Unit test	

The Lesson Plans for Traditional Instruction in Summary

Stages	Objectives	Teaching Materials	Methodology	Evaluations
1 Presentation 2 Practice 3 Production	Students should be able to: 1. comprehend the reading passage 2. correctly answer the questions about the passage	1. Reading Sheet Unit 1: A natural way of caring for lawns - Really! 2. Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land 3. Reading Sheet Unit 3: GM Crops 4. Reading Sheet Unit 4: Biotechnology 5. Reading Sheet Unit 5: Tobacco 6. Reading Sheet Unit 6: Cloning 7. Worksheet 8. Word cards 9. Unit tests	1. Elicit answers from students by asking them questions about topic of the passage. 2. Give students the reading sheet. 3. Present new words from the passage. 4. Tell students the meanings of unknown words in the passage. 5. Put students into groups of 3. 6. Ask students the details from the passage. 7. Review what has been studied (either in Thai or English). 8. Give students the Unit test	1. From students' doing activities. 2. From students' answers. 3. From students' reading comprehension test. (Unit Test).

Appendix C

Lesson Plans and Teaching Materials for the Experimental and Controlled Groups

Lesson Plan 1

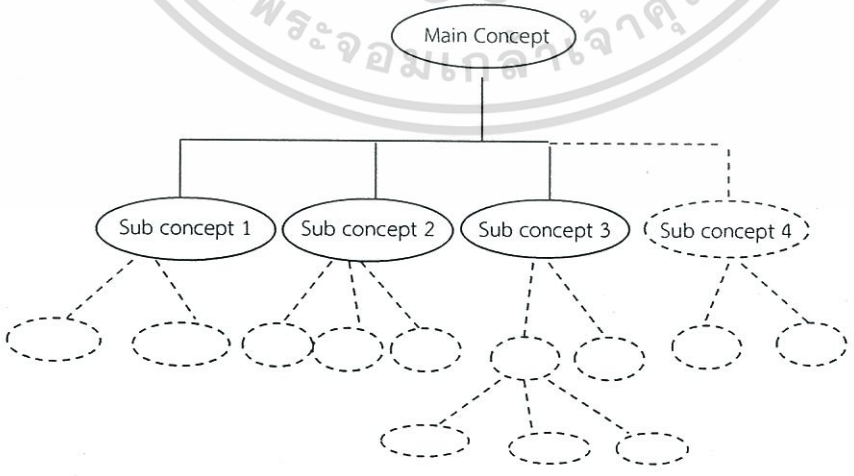
Lesson Plan Using Concept Mapping Instruction

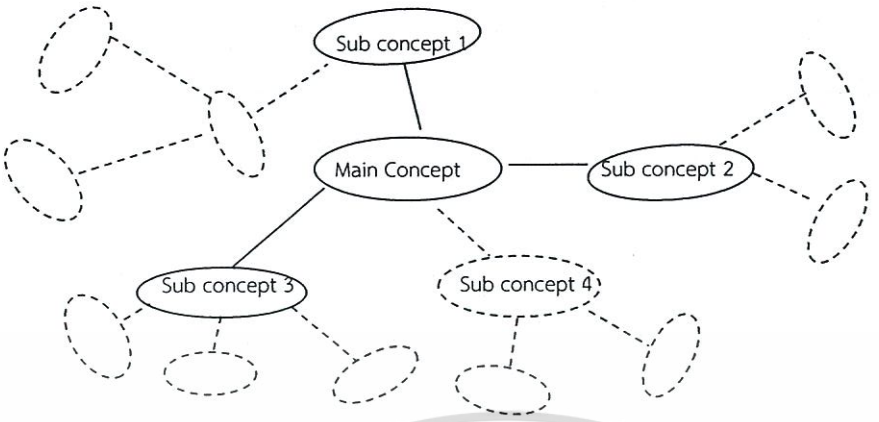
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: A natural way of caring for lawns - Really!
Assumption	:	Students have learned the meanings of these words: lawn, fertilizer, grass, weed, care, soil, root, insect, bug, pest, feed and rake
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw a concept map after reading the passage 3. correctly answer the questions about the passage
Teaching materials	:	1. Reading Sheet Unit 1: A natural way of caring for lawns - Really! 2. Worksheet (a concept mapping) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

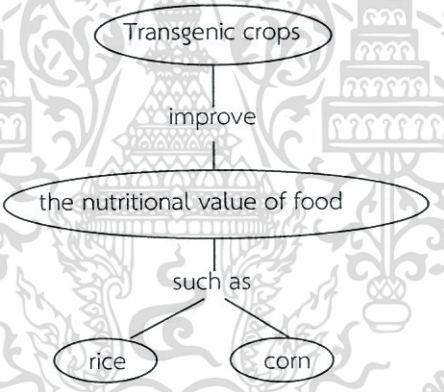
1. Introduce and explain students what the concept mapping is.





2. Give an example how to map out the hierarchical relationships among the ideas.

"Transgenic crops can improve the nutritional value of food, such as rice and corn, which are very important in the diets of people throughout the word."



Ask students the following questions.

- What is the main reading text?
- What are the supporting details?

Practice

3. Elicit answers from students by asking them questions about the phrases "caring for lawn" and "natural way"

-What are some of the ways we could care for a lawn?

-What does the "natural way" mean?

4. Give students the Reading Sheet Unit 1 : A natural way of caring for lawns

- Really!. Demonstrate and explain to them how to predict the Content and organization of ideas:

- Look at the title, sub-title, illustrations, highlighted words and quickly skim the content.

5. Ask students to scan through the passage quickly.
6. Ask students a question:

-From the title, sub-title, highlighted words and illustrations, what do you think the passage will be about?

7. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1. mow (v.)	:	to cut grass
2. blade (n.)	:	the flat part of a tool which has a sharp edge or edges for cutting
3. soak (v.)	:	to put sth. in liquid for a time
4. organic (adj.)	:	produced by or from living things
5. clipping (n.)	:	a piece cut off sth.
6. shallow (adj.)	:	not having much distance between the surface and the bottom
7. healthy (adj.)	:	not likely to become ill/sick
8. nutrient (n.)	:	substance to help a living thing to grow
9. break down (v.)	:	stop working because of a fault
10. lawn mower (n.)	:	a machine for cutting the grass on lawns

8. Provide students some lists of words used for filling the incomplete concept mapping for students.

-often mow the lawn
-release nutrients slowly
-plant's roots are long
-the grass clipping will be small and thin

9. Ask each student to complete the concept map (Concept Mapping Exercise).
10. Put students into groups of 3 to share and discuss their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Correct students' concept maps by showing students a concept map on

the over-head projector (See the key of concept mapping exercise).

13. Students correct their maps.
14. Ask students the following questions based on the concept map.
15. Review what has been studied (either in Thai or English).
16. Encourage students to use a concept map to summarize what they have read or to create a study guide for their own studying.

Production

17. Students do the reading comprehension exercises. (Unit Test: Unit 1)

Evaluation

1. From students' doing activities.
2. From students' concept mapping;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between all concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test)

Reading Sheet Unit 1
"A natural way of caring for lawns - Really!"

Read this passage and do the following exercises.

A natural way of caring for lawns - Really!

It used to be that when you took care of a lawn, you used a lot of water and fertilizer. You gave it a "crew cut" and made sure all grass clippings were raked from it. You pulled weeds and applied bug killer. What was the result? Usually, a dead-looking lawn!

You can have a healthy lawn without all that hard work and without spending a lot of money. How you ask? By caring for your lawn naturally. The goal to natural lawn care is keeping the soil and grass roots healthy and strong. Here's what you do.

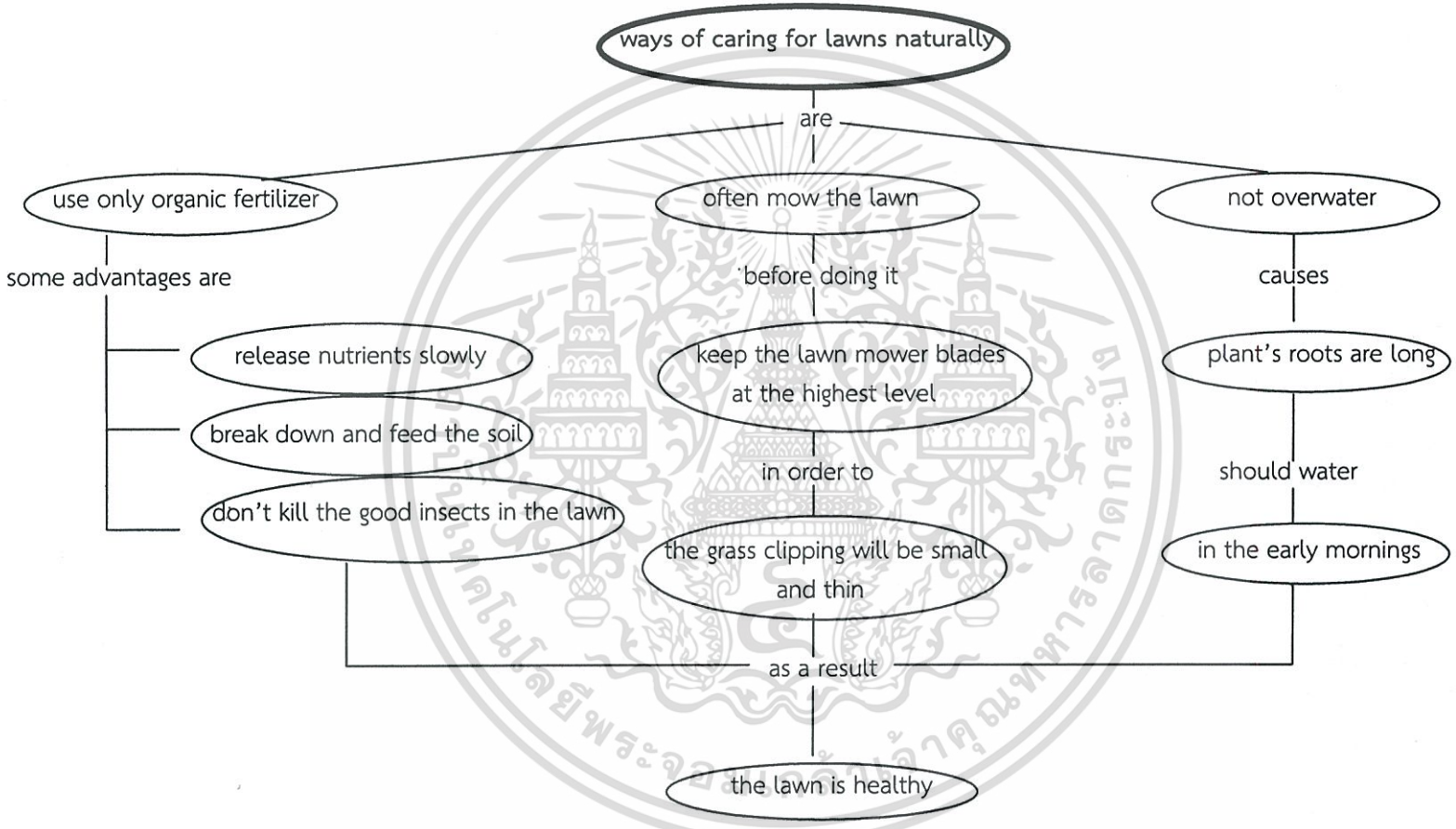
Use only organic fertilizers. These release nutrients slowly, so you don't have to fertilize as much. Also, organic fertilizers break down and feed your soil. The other thing about organic fertilizers is that they don't kill the good insects in your lawn. Those insects eat the bad ones- the pests that can and will eat up your lawn. The second one is mowing your lawn often. Keeping your lawn mower blades at the highest level. You only want to clip a quarter inch off the top of your lawn each time. The grass clippings will be small and thin. So leave them on your lawn. They'll decompose quickly. It's a natural fertilizer. And don't overwater. A healthy lawn means having long roots. That way your lawn can make it through the dry periods. Over-watering will create shallow roots that can't handle dry periods. How much water should you give your lawn? When grass is growing, lawns need only an inch of water per week. Soaking the lawn early in the day; water in the early mornings by the time evening comes, the grass is dry.

(Excerpted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 101)

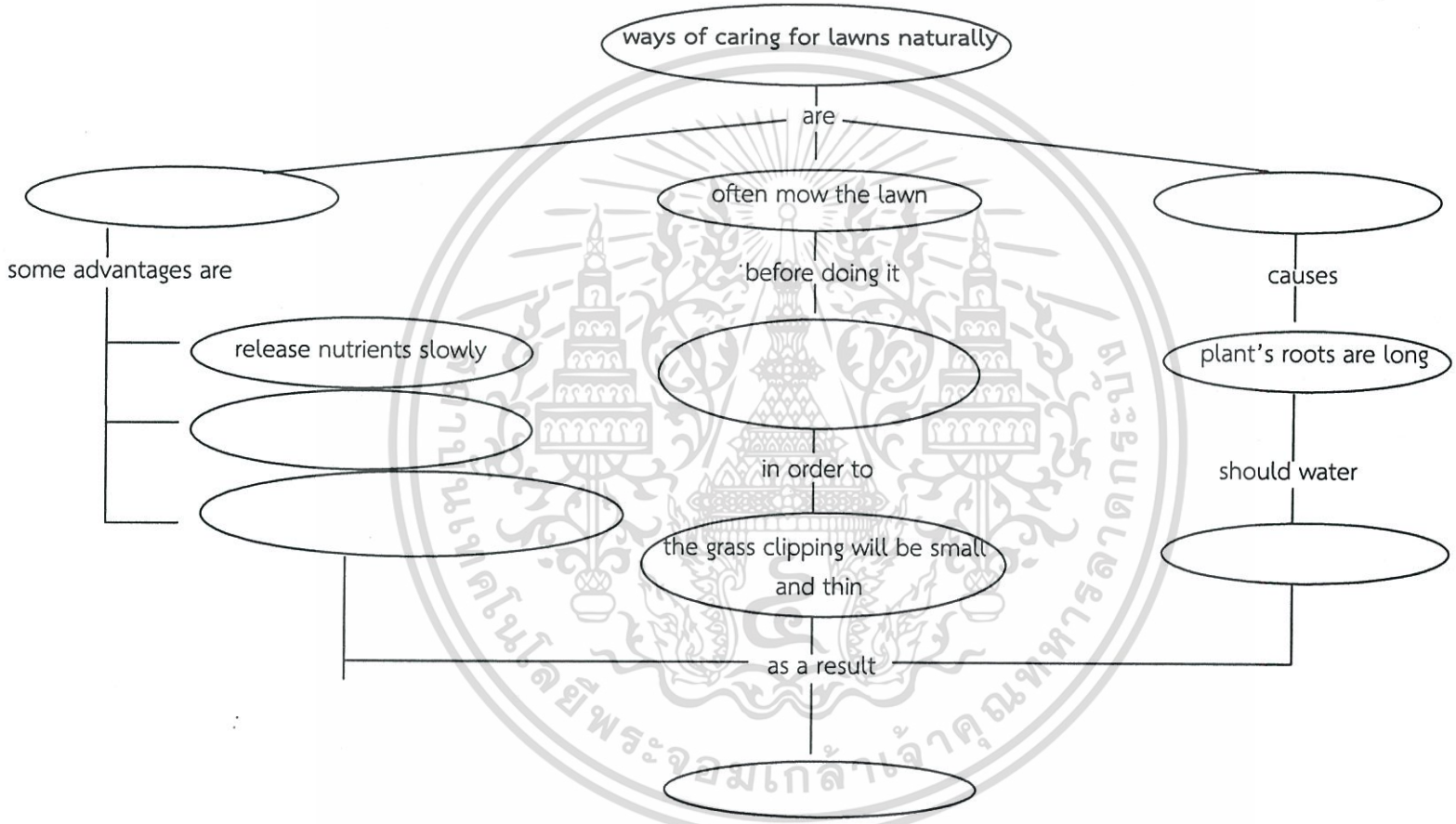
Vocabulary

1.	mow (v.)	:	to cut grass
2.	blade (n.)	:	the flat part of a tool which has a sharp edge or edges for cutting
3.	soak (v.)	:	to put sth. in liquid for a time
4.	organic (adj.)	:	produced by or from living things
5.	clipping (n.)	:	a piece cut off sth.
6.	shallow (adj.)	:	not having much distance between the surface and the bottom
7.	healthy (adj.)	:	not likely to become ill/sick
8.	nutrient (n.)	:	substance to help a living thing to grow
9.	break down (v.)	:	stop working because of a fault
10.	lawn mower (n.)	:	a machine for cutting the grass on lawns

The Key of Concept Mapping Exercise: "A natural way of caring for lawns - Really!"



The incomplete concept mapping Exercise: "A natural way of caring for lawns - Really!"



Unit Test : Unit 1
"A natural way of caring for lawns-Really!"

Part I

Directions: Complete the blanks with the given words.

mow	shallow	early	healthy	organic
breaks down	natural	overwater	blades	grass clippings
decompose	insects	long	nutrients	soil

.....(1)..... lawn care is keeping the .....(2)..... and grass roots .....(3)..... and strong. By caring for the lawn naturally. You should .....(4)..... The lawn often, use .....(5)..... fertilizer and not .....(6)..... .

Organic fertilizer don't kill the good .....(7)..... in the lawn. And it .....(8)..... and feed the soil. Also, it releases .....(9)..... slowly when it is used on the lawn.

The roots are .....(10)..... if they are overwatered. When grass is growing, lawns need only an inch of water per week. And you should water the lawn in the .....(11)..... mornings. The plant's roots will be .....(12)..... .

Mow the lawn frequently with the lawn mower .....(13)..... at the highest level. If you do this, the .....(14)..... will be small and thin. Leave them on the lawn so they will .....(15)..... and be a natural fertilizer.

Part II

Directions: Answer these questions.

1. How many ways can you think of for caring for a lawn naturally?
   What are they?

   .....

   .....

   .....

   .....

   .....

2. By caring for the lawn naturally, what will be good for?

   .....

   .....

3. Should we weed and apply bug killer on the lawns?
   Why or why not?

   .....

   .....

   .....

4. What are the advantages of using organic fertilizers?

   .....

   .....

5. Should we overwater lawns? Why or why not?

   .....

   .....

6. When grass is growing, what is the best time for watering it?

   .....

   .....

7. Should we rake grass clippings off our lawns?
   Why or why not?

   .....

   .....

   .....

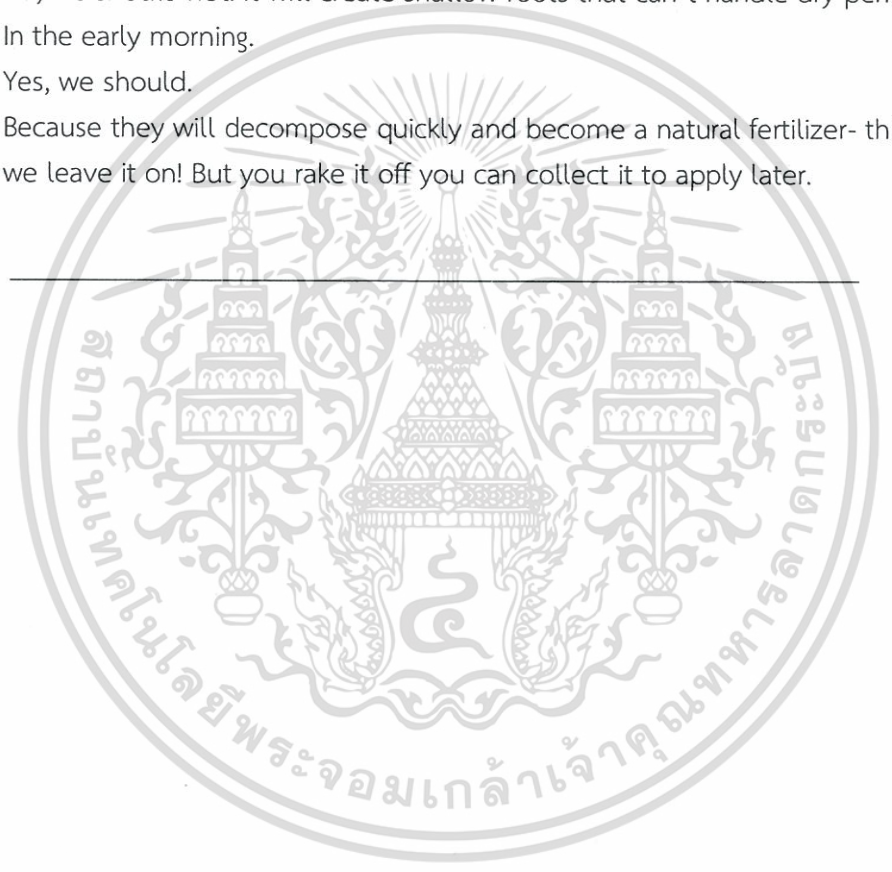
Answer key

Part I: Complete the blanks with the given words.

1. natural	2. soil	3. healthy
4. mow	5. organic	6. overwater
7. insects	8. breaks down	9. nutrients
10. shallow	11. early	12. long
13. blades	14. grass clippings	15. decompose

Part II: Answer these questions.

1. There are many ways.
   For examples, they are use organic fertilizers, often mow the lawn and not overwater.
2. The soil and grass roots will be healthy and strong.
3. No, we should not. The good insects would eat the bad ones.
4. They break down and feed the soil.
5. No, we should not. It will create shallow roots that can't handle dry periods.
6. In the early morning.
7. Yes, we should.
   Because they will decompose quickly and become a natural fertilizer- this is if we leave it on! But you rake it off you can collect it to apply later.



Lesson Plan 1
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	A natural way of caring for lawns - Really!
Assumption	:	Students have learned the meanings of these words: lawn, fertilizer, grass weed, care, soil, root, insect, bug, pest, feed and rake
Objectives	:	1. comprehend the passage 2. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 1: A natural way of caring for lawns - Really! 2. Word cards 3. Unit test

Procedures:

Presentation

1. Elicit answers from students by asking them some questions about the phrases "caring for lawn" and "natural way"
   -What are some of the ways we could care for a lawn?
   -What does the "natural way" mean?
2. Give students the Reading Sheet Unit 1: A natural way of caring for lawns - Really!
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1.	mow (v.)	:	to cut grass
2.	blade (n.)	:	the flat part of a tool which has a sharp edge or edges for cutting
3.	soak (v.)	:	to put sth. in liquid for a time
4.	organic (adj.)	:	produced by or from living things
5.	clipping (n.)	:	a piece cut off sth.

6. shallow (adj.)	:	not having much distance between the surface and the bottom
7. healthy (adj.)	:	not likely to become ill/sick
8. nutrient (n.)	:	substance to help a living thing to grow
9. break down (v.)	:	stop working because of a fault
10. lawn mower (n.)	:	a machine for cutting the grass on lawns

Practice

4. Tell students the meanings of unknown words in the passage.
5. Put students into groups of 3.
6. Students read the passage carefully and translate into Thai.
7. Students share and discuss the passage in their groups.
8. Ask students the details from the passage :
   "A natural way of caring for lawns-Really !".
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises. (Unit Test: Unit 1 "A natural way of caring for lawns-Really !").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 1).

Reading Sheet Unit 1
"A natural way of caring for lawns - Really!"

Read this passage and do the following exercises.

A natural way of caring for lawns - Really!

It used to be that when you took care of a lawn, you used a lot of water and fertilizer. You gave it a "crew cut" and made sure all grass clippings were raked from it. You pulled weeds and applied bug killer. What was the result? Usually, a dead-looking lawn!

You can have a healthy lawn without all that hard work and without spending a lot of money. How you ask? By caring for your lawn naturally. The goal to natural lawn care is keeping the soil and grass roots healthy and strong. Here's what you do.

Use only organic fertilizers. These release nutrients slowly, so you don't have to fertilize as much. Also, organic fertilizers break down and feed your soil. The other thing about organic fertilizers is that they don't kill the good insects in your lawn. Those insects eat the bad ones- the pests that can and will eat up your lawn. The second one is mowing your lawn often. Keeping your lawn mower blades at the highest level. You only want to clip a quarter inch off the top of your lawn each time. The grass clippings will be small and thin. So leave them on your lawn. They'll decompose quickly. It's a natural fertilizer. And don't overwater. A healthy lawn means having long roots. That way your lawn can make it through the dry periods. Over-watering will create shallow roots that can't handle dry periods. How much water should you give your lawn? When grass is growing, lawns need only an inch of water per week. Soaking the lawn early in the day; water in the early mornings by the time evening comes, the grass is dry.

(Excerpted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 101)

Vocabulary

1.	mow (v.)	:	to cut grass
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8.	nutrient (n.)	:	substance to help a living thing to grow
9.	break down (v.)	:	stop working because of a fault
10.	lawn mower (n.)	:	a machine for cutting the grass on lawns

Unit Test : Unit 1
"A natural way of caring for lawns-Really!"

Part I

Directions: Complete the blanks with the given words.

mow	shallow	early	healthy	organic
breaks down	natural	overwater	blades	grass clippings
decompose	insects	long	nutrients	soil

.....(1)..... lawn care is keeping the .....(2)..... and grass roots .....(3)..... and strong. By caring for the lawn naturally. You should .....(4)..... The lawn often, use .....(5)..... fertilizer and not .....(6)..... .

Organic fertilizer don't kill the good .....(7)..... in the lawn. And it .....(8)..... and feed the soil. Also, it releases .....(9)..... slowly when it is used on the lawn.

The roots are .....(10)..... if they are overwatered. When grass is growing, lawns need only an inch of water per week. And you should water the lawn in the .....(11)..... mornings. The plant's roots will be .....(12)..... .

Mow the lawn frequently with the lawn mower .....(13)..... at the highest level. If you do this, the .....(14)..... will be small and thin. Leave them on the lawn so they will .....(15)..... and be a natural fertilizer.

Part II

Directions: Answer these questions.

1. How many ways can you think of for caring for a lawn naturally?
   What are they?
   .....
   .....
   .....
   .....
   .....
2. By caring for the lawn naturally, what will be good for?
   .....
   .....
3. Should we weed and apply bug killer on the lawns?
   Why or why not?
   .....
   .....
   .....
4. What are the advantages of using organic fertilizers?
   .....
   .....
5. Should we overwater lawns? Why or why not?
   .....
   .....
6. When grass is growing, what is the best time for watering it?
   .....
   .....
7. Should we rake grass clippings off our lawns?
   Why or why not?
   .....
   .....

Answer key

Part I: Complete the blanks with the given words.

1. natural	2. soil	3. healthy
4. mow	5. organic	6. overwater
7. insects	8. breaks down	9. nutrients
10. shallow	11. early	12. long
13. blades	14. grass clippings	15. decompose

Part II: Answer these questions.

1. There are many ways.
   For examples, they are use organic fertilizers, often mow the lawn and not overwater.
2. The soil and grass roots will be healthy and strong.
3. No, we should not. The good insects would eat the bad ones.
4. They break down and feed the soil.
5. No, we should not. It will create shallow roots that can't handle dry periods.
6. In the early morning.
7. Yes, we should.
   Because they will decompose quickly and become a natural fertilizer- this is if we leave it on! But you rake it off you can collect it to apply later.

Lesson Plan 2

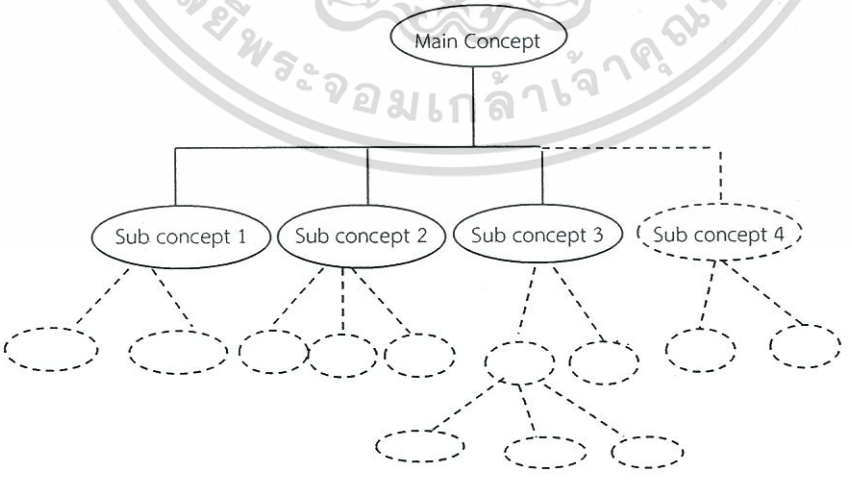
Lesson Plan Using Concept Mapping Instruction

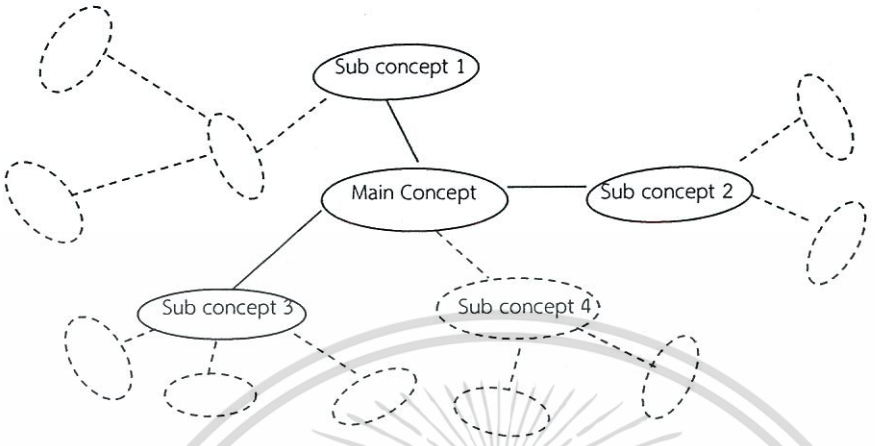
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Safe Pest Control: For Humans and the Land
Assumption	:	Students have learned the meanings of these words: crop, chemical, break down, insect and field
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw a concept map after reading the passage 3. correctly answer the questions about the passage
Teaching materials	:	1. Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land 2. Worksheet (a concept map) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

1. Review students on the over-head projector what the concept mapping is.





Practice

2. Elicit answers from students by asking them some questions about the word and phrases "pest", "pest control" and "safe pest control"
   -What is a pest? (and give examples.)
   -What are some of ways to control pests?
   -How can we control pests safely?
3. Give students the Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land. Demonstrate and explain to them how to predict the content and organization of ideas.
   -Look at the title, sub-title, illustration, highlighted words and quickly skim or scan the content.
4. Ask students to scan through the passage quickly.
5. Ask students a question:
   -From the title, sub-title, highlighted words and illustrations, what will the passage be about?
6. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1.	Pesticide (n.)	=	substances used to kill insects and weeds
2.	harm (v.)	=	damage or injury that is caused by a person or an event

3.	spray (v.)	=	to apply liquid to sth in very small drops
4.	release (v.)	=	let go
5.	ladybird (n.)	=	a small red beetle with black spots
6.	aphid (n.)	=	a small insect which sucks the sap from plants
7.	crop rotation	=	to grow different crops in the same field over a four- or five-year period

7. Provide students some lists of words used for filling the incomplete concept mapping for students.
   -ladybirds
   -natural pesticides
   -safe pest control
   -fewer pests appear
8. Ask student to complete the concept map (Concept Mapping Exercise).
9. Ask students to read each paragraph carefully.
   -To see is their prediction is correct or not, read each paragraph thoroughly to look for details supporting their predictions.
10. Put students into groups of 3 to discuss their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Show students concept map on the over-head projector (See the key of concept mapping exercise).
13. Students reconstruct their maps.
14. Ask students questions about words and phrases presented on the concept map.
15. Review what has been studied (either in Thai or English).
16. Encourage students to use concept maps to summarize what they have read.

Production

17. Students do the reading comprehension exercises. (Unit Test: Unit 2)

Evaluation

1. From students' doing activities.
2. From students' concept mapping;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between all concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test: Unit 2)

Reading Sheet Unit 2
"Safe Pest Control: For Humans and the Land"

Read this passage and do the following exercises.

Safe Pest Control: For Humans and the Land

Since the 1950s, farmers have though that pesticides made from chemicals are the best weapon against pests. But now, findings show that fewer pests are dying from these pesticides. Some studies report that pesticides have created other problems. Many pesticides do not break down quickly. They can stay around and harm the land and water supply, as well as humans and animals. Here are some methods for safe pest control.

Using other insects: When pesticides are sprayed on a crop, they also kill ''good insects''- bugs that eat harmful pests. In the animal world, some animals eat other animals for food. So farmers can control pests by releasing "good insects" into fields. For example, some farmers release ladybirds in their corn fields to control aphids. The ladybirds eat the aphids. In using natural pesticides farmers do not have to stop using all kinds of pesticides. Some natural pesticides control pests better than pesticides made from chemicals. Natural pesticides can be made from plants. They are less harmful to the land and water, and they are safe for humans and animals.

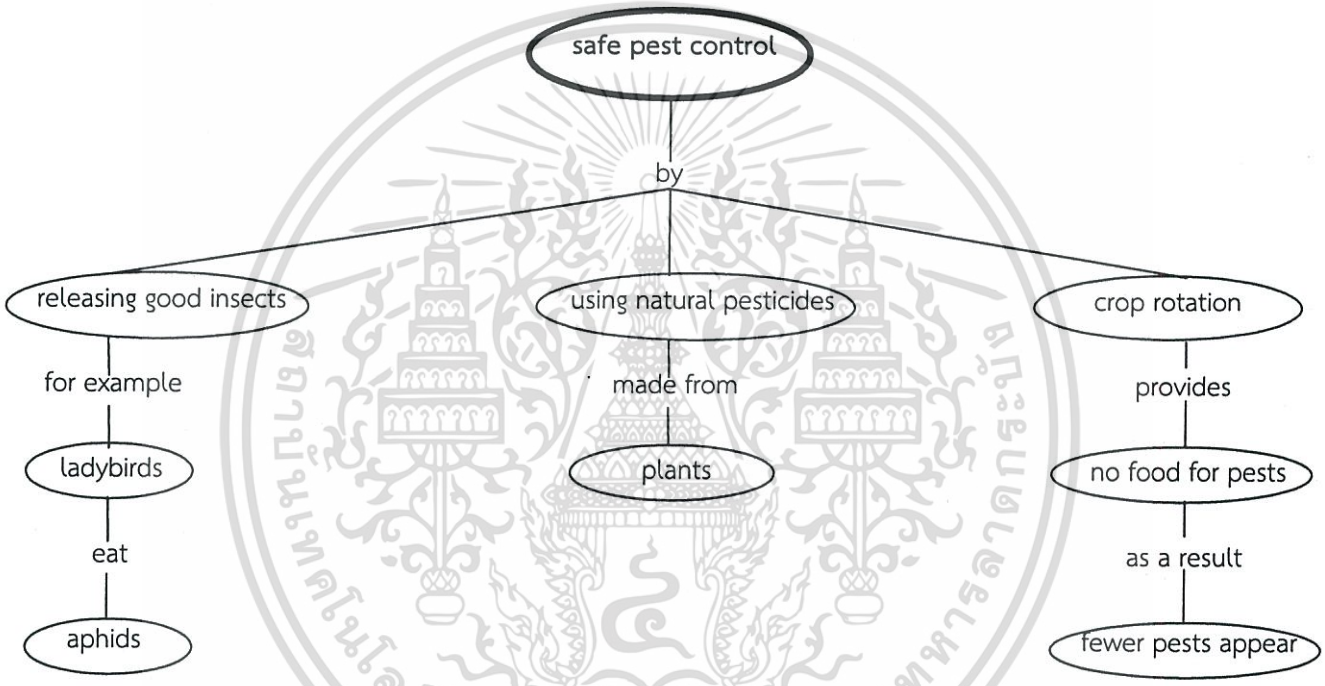
Another pest control method is crop rotation. Pests remember where they can find their food sources. Pests will return to the same field when the same crop-like corn-is planted year after year. Crop rotation provides less food, and in some years, no food for the pests. Fewer pests appear as a result of crop rotation.

(Excerpted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 20)

Vocabulary

1.	pesticide (n.)	=	substances used to kill insects and weeds
2.	harm (v.)	=	damage or injury that is caused by a person or an event
3.	spray (v.)	=	to apply liquid to sth in very small drops
4.	release (v.)	=	to let sb/sth come out of a place where they have been kept or trapped
5.	ladybird (n.)	=	a small red beetle with black spots
6.	aphid (n.)	=	a small insect which sucks the sap from plants
7.	crop rotation	=	to grow different crops in the same field over a four- or five-year period

The Key of Concept Mapping Exercise: "Safe Pest Control: For Humans and the Land"



The incomplete concept mapping Exercise: "Safe Pest Control: For Humans and the Land"

Unit Test : Unit 2
"Safe Pest Control: For Humans and the Land"

Part I

Directions: Complete the blanks with the given words.

animals	ladybirds	old farm	plants	harm
good insects	chemicals	less food	land and water	aphids

Pesticides made from chemicals .....(1)..... the land and water supply, and also human and animals. Some animals eat other .....(2)..... for food. Farmers can control pests by releasing .....(3)..... into their fields. For example, ...(4)..... in the corn fields, eat .....(5)..... .

Natural pesticides from .....(6)....., are better than pesticides made from .....(7)..... . They are less harmful to the .....(8)..... . Crop rotation is an .....(9)..... method. This method makes .....(10)..... for the pests and fewer pests appear.

Part II

Circle the correct answer based on the reading passage.

True False 1. The passage is about pest control.

True False 2. Some pesticides are made from plants.

True False 3. Natural pesticides are safe and effective.

True False 4. Pests do not know where to find the crops they like to eat.

True False 5. Pesticides kill weeds, bugs and other pests.

True False 6. Farmers can use the crop rotation method to control pests.

True False 7. Chemicals are effective and work better than natural pesticides.

True False 8. Farmers can use good insects to control other pests.

True False 9. Crop rotation means always planting the same crop in the same fields.

True False 10. Pesticides kill fewer pests and harm life and land.

Answer key

Part I: Complete the blanks with the given words.

1. harm	2. animals	3. good insects	4.ladybirds
5. aphids	6. plants	7. chemicals	8. land and water
	9. old farm	10. less food	

Part II: Circle the correct answer based on the reading passage.

1. True	2. False	3. True	4. False	5. True
6. True	7. False	8. True	9. False	10. True

Lesson Plan 2
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Safe Pest Control: For Humans and the Land
Assumption	:	Students have learned the meanings of these words: crop, chemical, break down, insect and field
Objectives	:	Students should be able to: 1. comprehend the passage 2. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land 2. Word cards 3. Unit test

Procedures:

Presentation

1. Elicit answers from students by asking them some questions about the word and phrases "pest", "pest control" and "safe pest control"
   -What is a pest? (and give examples.)
   -What are ways to control pests?
   -How to control pests safely?
2. Give students the Reading Sheet Unit 2: Safe Pest Control: For Humans and the Land
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1. pesticide (n.)	=	substances used to kill insects and weeds
2. harm (v.)	=	damage or injury that is caused by a person or an event
3. spray (v.)	=	to apply liquid to sth in very

			small drops
4.	release (v.)	=	to let sb/sth come out of a place where they have been kept or trapped
5.	ladybird (n.)	=	a small red beetle with black spots
6.	aphid (n.)	=	a small insect which sucks the sap from plants
7.	crop rotation	=	to grow different crops in the same field over a four- or five-year period

Practice

4. Tell students the meanings of unknown in the passage.
5. Students get into groups of 3.
6. Students read the passage carefully and translate into Thai.
7. Students share and discuss the passage in their groups.
8. Ask students the details from the passage :
   "Safe Pest Control: For Humans and the Land."
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises. (Unit Test: Unit 2 "Safe Pest Control: For Humans and the Land").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 2).

Reading Sheet Unit 2
"Safe Pest Control: For Humans and the Land"

Read this passage and do the following exercises.

Safe Pest Control: For Humans and the Land

Since the 1950s, farmers have though that pesticides made from chemicals are the best weapon against pests. But now, findings show that fewer pests are dying from these pesticides. Some studies report that pesticides have created other problems. Many pesticides do not break down quickly. They can stay around and harm the land and water supply, as well as humans and animals. Here are some methods for safe pest control.

Using other insects: When pesticides are sprayed on a crop, they also kill ''good insects''- bugs that eat harmful pests. In the animal world, some animals eat other animals for food. So farmers can control pests by releasing "good insects" into fields. For example, some farmers release ladybirds in their corn fields to control aphids. The ladybirds eat the aphids. In using natural pesticides farmers do not have to stop using all kinds of pesticides. Some natural pesticides control pests better than pesticides made from chemicals. Natural pesticides can be made from plants. They are less harmful to the land and water, and they are safe for humans and animals.

Another pest control method is crop rotation. Pests remember where they can find their food sources. Pests will return to the same field when the same crop-like corn-is planted year after year. Crop rotation provides less food, and in some years, no food for the pests. Fewer pests appear as a result of crop rotation.

(Excerpted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 20)

Vocabulary

1.	pesticide (n.)	=	substances used to kill insects and weeds
2.	harm (v.)	=	damage or injury that is caused by a person or an event
3.	spray (v.)	=	to apply liquid to sth in very small drops
4.	release (v.)	=	to let sb/sth come out of a place where they have been kept or trapped
5.	ladybird (n.)	=	a small red beetle with black spots
6.	aphid (n.)	=	a small insect which sucks the sap from plants
7.	crop rotation	=	to grow different crops in the same field over a four- or five-year period

Unit Test : Unit 2
"Safe Pest Control: For Humans and the Land"

Part I

Directions: Complete the blanks with the given words.

animals	ladybirds	old farm	plants	harm
good insects	chemicals	less food	land and water	aphids

Pesticides made from chemicals .....(1)..... the land and water supply, and also human and animals. Some animals eat other .....(2)..... for food. Farmers can control pests by releasing .....(3)..... into their fields. For example, ...(4)..... in the corn fields, eat .....(5)..... .

Natural pesticides from .....(6)....., are better than pesticides made from .....(7)..... . They are less harmful to the .....(8)..... . Crop rotation is an .....(9)..... method. This method makes .....(10)..... for the pests and fewer pests appear.

Part II

Circle the correct answer based on the reading passage.

True False 1. The passage is about pest control.
True False 2. Some pesticides are made from plants.
True False 3. Natural pesticides are safe and effective.
True False 4. Pests do not know where to find the crops they like to eat.
True False 5. Pesticides kill weeds, bugs and other pests.
True False 6. Farmers can use the crop rotation method to control pests.
True False 7. Chemicals are effective and work better than natural pesticides.
True False 8. Farmers can use good insects to control other pests.
True False 9. Crop rotation means always planting the same crop in the same fields.
True False 10. Pesticides kill fewer pests and harm life and land.

Answer key

Part I: Complete the blanks with the given words.

1. harm	2. animals	3. good insects	4. ladybirds
5. aphids	6. plants	7. chemicals	8. land and water
	9. old farm	10. less food	

Part II: Circle the correct answer based on the reading passage.

1. True	2. False	3. True	4. False	5. True
6. True	7. False	8. True	9. False	10. True

Lesson Plan 3

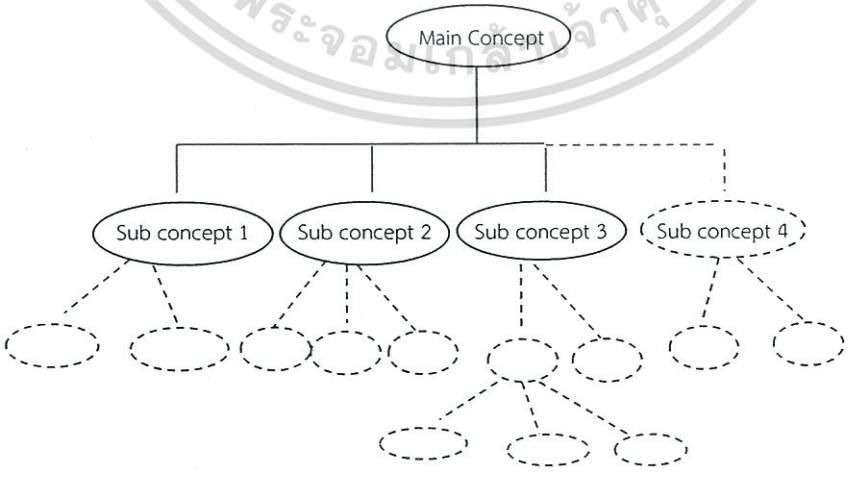
Lesson Plan Using Concept Mapping Instruction

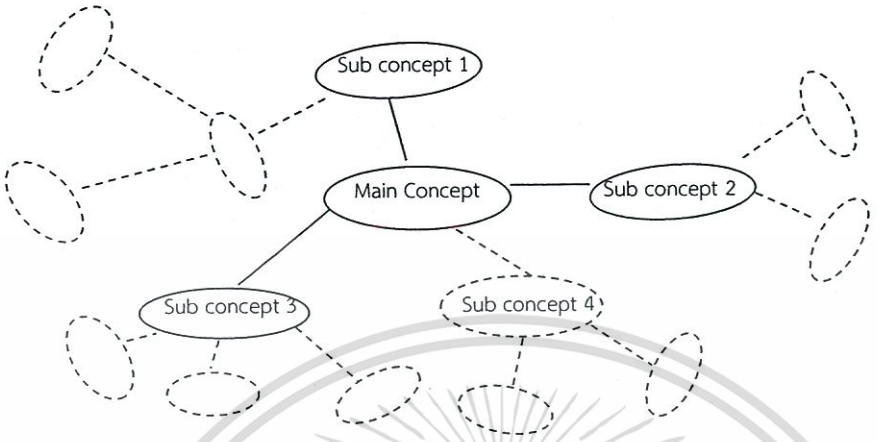
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: GM Crops
Assumption	:	Students have learned the meanings of these words: toxin and allergy
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw the concept mapping after reading the passage 3. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 3: GM Crops 2. Worksheet (a concept mapping) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

1. Review students on the over-head projector what the concept mapping is.





Practice

2. Elicit answers from students by asking them the questions about the phrase "GM Crop"
   -Do you know what GM crops are?
   -Give examples of GM crops.
   -What does GM stand for?
3. Give students the Reading Sheet Unit 3: GM Crops. Explain to them how to predict the content and organization of ideas.
   -Look at the title, sub-title, illustrations, highlighted words and quickly skim or scan the content.
4. Students scan through the passage quickly.
5. Ask students a question:
   -From the title, sub-title, highlighted words and illustrations, what will the passage be about?
6. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1.	genes (n.)	=	the units in the cells of a living thing that control its physical characteristic
2.	blueprint (n.)	=	the pattern in every living cell, which decides how the plant, animal or person will develop and what it will look like
3.	organism (n.)	=	a living thing, especially one that is

			extremely small
4.	artificial (adj.)	=	not natural but made by people
5.	surgery (n.)	=	the performing of medical operations
6.	to transfer (v.)	=	to move from one place to another
7.	herbicide (n.)	=	a chemical that is poisonous to plants
8.	consumer (n.)	=	a person who buys goods or uses services
9.	ecological (adj.)	=	connected with the relation of plants and living creatures to each other and to their environment
10.	evidence (n.)	=	a thing or things helpful in forming a conclusion or judgment
11.	insufficient (adj.)	=	not enough
12.	to judge (v.)	=	to form or give an opinion about sb/sth, after careful thought

7. Provide students some lists of words used for filling the incomplete concept mapping for students.
   -new toxins and allergies
   -enhance food value
8. Each student completes the concept map (Concept Mapping Exercise).
9. Students read each paragraph carefully to determine the details.
   -to see if their prediction is correct or not.
10. In groups of 3, students discuss with their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Give example of concept map on the over-head projector (See the key of concept mapping exercise).
13. Students correct their maps.
14. Ask students questions about the words and phrases in the concept map.
15. Review what has been studied (either in Thai or English).
16. Encourage students to make a concept map to summarize what they have read.

Production

17. Students do the reading comprehension exercises (Unit Test: Unit 3).

Evaluation

1. From students' doing activities.
2. From students' concept mapping;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test: Unit 3)

Reading Sheet Unit 3
"GM Crops"

Read this passage and do the following exercises.

GM Crops

Genetically modified foods (GM foods) are foods derived from genetically modified organisms (GMOs), by genetic engineering techniques. Genetic engineering is the process of artificially modifying these blueprints. By cutting and splicing DNA – with genetic surgery – genetic engineers can transfer genes from one organism to any other organism on earth.

In the case of plants, scientists want to transfer desirable qualities, for example, to enhance food value. They believe that this practice could lead to a secure supply food.

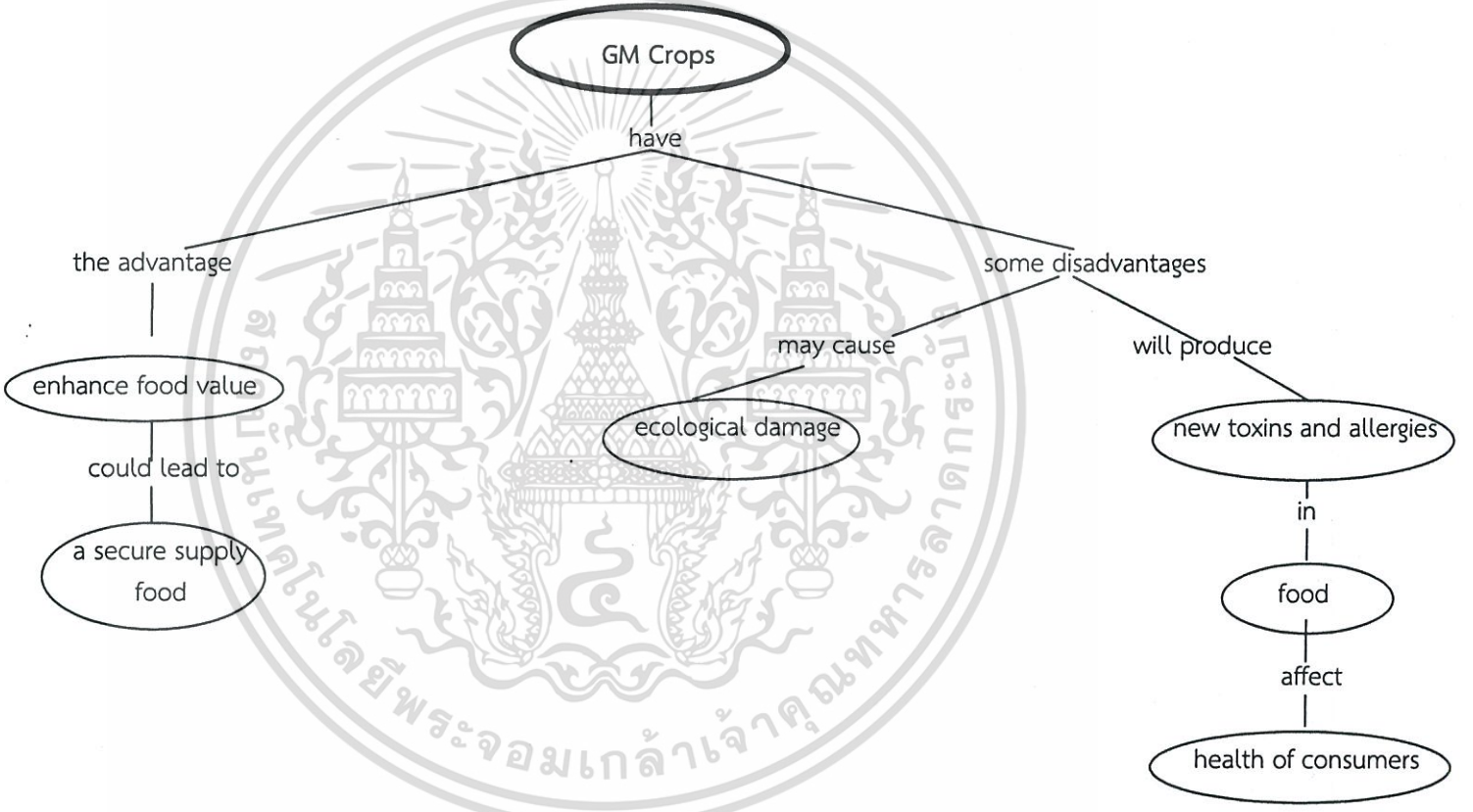
Another group of scientists disagree. They contend that genetically modified crops will produce new toxins and allergies in foods, affecting the health of consumers. They would also affect the environmental by ecological damage. Scientific evidence on GM crops is still insufficient to judge whether they are safe for human consumption.

(Adapted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 194)

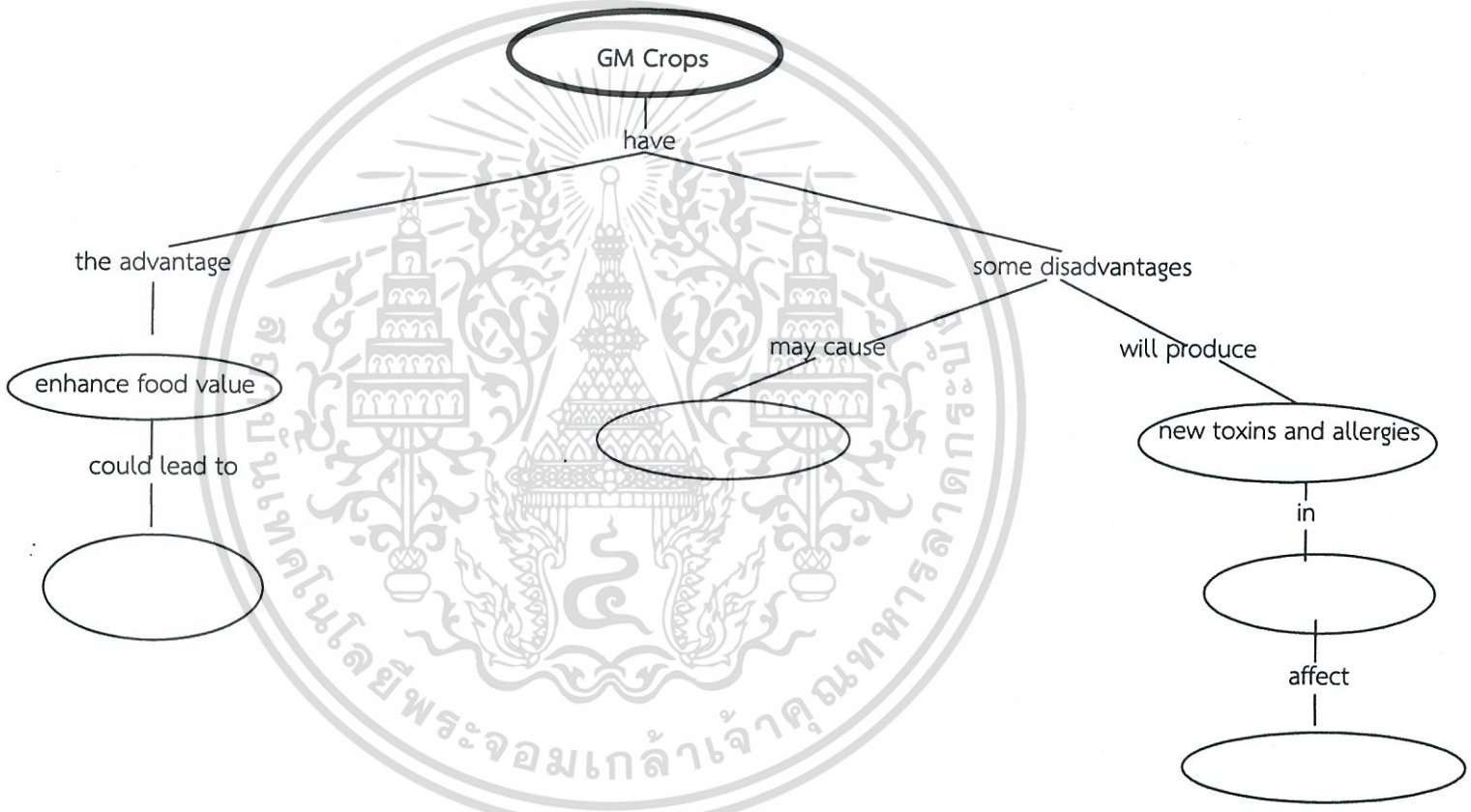
Vocabulary

1.	genes (n.)	=	the units in the cells of a living thing that control its physical characteristic
2.	blueprint (n.)	=	the pattern in every living cell, which decides how the plant, animal or person will develop and what it will look like
3.	organism (n.)	=	a living thing, especially one that is extremely small
4.	artificial (adj.)	=	not natural but made by people; not real
5.	surgery (n.)	=	the performing of medical operations
6.	to transfer (v.)	=	to move from one place to another
7.	herbicide (n.)	=	a chemical that is poisonous to plants
8.	consumer (n.)	=	a person who buys goods or uses services
9.	ecological (adj.)	=	connected with the relation of plants and living creatures to each other and to their environment
10.	evidence (n.)	=	a thing or things helpful in forming a conclusion or judgment
11.	insufficient (adj.)	=	not enough
12.	to judge (v.)	=	to form or give an opinion about sb/sth, after careful thought

The Key of Concept Mapping Exercise: "GM crops"



The incomplete concept mapping Exercise: "GM crops"



Unit Test : Unit 3
"GM Crops"

Directions: Answer these questions.

1. What does GM stand for?
   .....
   .....
2. What do GMOs stand for?
   .....
   .....
3. How is genetic engineering carried out?
   .....
   .....
4. What are the advantages of GM crops?
   .....
   .....
5. What are the disadvantages of GM crops?
   .....
   .....

Answer key

Directions: Answer these questions.

1. It stands for genetically modifying.
2. They stand for genetically modified organisms.
3. By cutting and splicing DNA with genetic surgery.
4. To enhance food value.
5. -They may produce new toxins in foods and allergies in people.
   -They may cause ecological damage.

Lesson Plan 3
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: GM Crops
Assumption	:	Students have learned the meanings of these words: toxin and allergy
Objectives	:	Students should be able to: 1. comprehend the passage 2. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 3: GM Crops 2. Word cards 3. Unit test

Procedures:

Presentation

1. Elicit answers from students by asking them some questions about the phrase "GM Crops"
   -Do you know what GM crops are?
   -Give examples of GM crops.
   -What does GM stand for?
2. Give students the Reading Sheet Unit 3: GM Crops
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1. genes (n.) = the units in the cells of a living thing that control its physical characteristic
2. blueprint (n.) = the pattern in every living cell, which decides how the plant, animal or person will develop and what it will look like
3. organism (n.) = a living thing, especially one that is extremely small
4. artificial (adj.) = not natural but made by people; not real

5. surgery (n.) = the performing of medical operations
6. to transfer (v.) = to move from one place to another
7. herbicide (n.) = a chemical that is poisonous to plants
8. consumer (n.) = a person who buys goods or uses services
9. ecological (adj.)= connected with the relation of plants and living creatures to each other and to their environment
10. evidence (n.) = a thing or things helpful in forming a conclusion or judgment
11. insufficient (adj.)= not enough
12. to judge (v.) = to form or give an opinion about sb/sth, after careful thought

Practice

4. Tell students the meanings of unknown words in the passage.
5. Students get into groups of 3.
6. Students read the passage carefully and translate into Thai.
7. Students discuss the passage in their groups.
8. Ask students the details from the passage : "GM Crops."
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises. (Unit Test: Unit 3 "GM Crops").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 3).

Reading Sheet Unit 3
"GM Crops"

Read this passage and do the following exercises.

GM Crops

Genetically modified foods (GM foods) are foods derived from genetically modified organisms (GMOs), by genetic engineering techniques. Genetic engineering is the process of artificially modifying these blueprints. By cutting and splicing DNA – with genetic surgery – genetic engineers can transfer genes from one organism to any other organism on earth.

In the case of plants, scientists want to transfer desirable qualities, for example, to enhance food value. They believe that this practice could lead to a secure supply food.

Another group of scientists disagree. They contend that genetically modified crops will produce new toxins and allergies in foods, affecting the health of consumers. They would also affect the environmental by ecological damage. Scientific evidence on GM crops is still insufficient to judge whether they are safe for human consumption.

(Adapted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 194)

Vocabulary

1. genes (n.) = the units in the cells of a living thing that control its physical characteristic
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10. evidence (n.) = a thing or things helpful in forming a conclusion or judgment
11. insufficient (adj.)= not enough
12. to judge (v.) = to form or give an opinion about sb/sth, after careful thought

Unit Test : Unit 3
"GM Crops"

Answer these questions.

1. What does GM stand for?
   .....
   .....

2. What do GMOs stand for?
   .....
   .....

3. How is genetic engineering carried out?
   .....
   .....

4. What are the advantages of GM crops?
   .....
   .....

5. What are the disadvantages of GM crops?
   .....
   .....

Answer key

Answer these questions.

1. It stands for genetically modifying.
2. They stand for genetically modified organisms.
3. By cutting and splicing DNA with genetic surgery.
4. To enhance food value.
5. -They may produce new toxins in foods and allergies in people.
   -They may cause ecological damage.

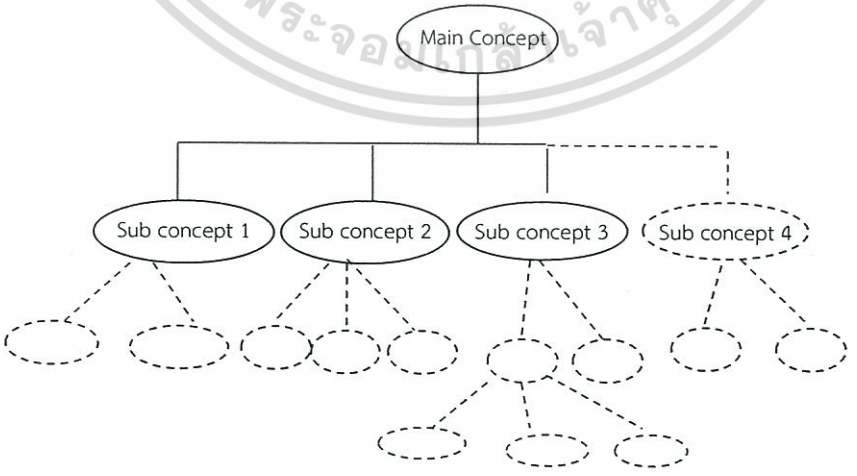
Lesson Plan 4
Lesson Plan Using Concept Mapping Instruction

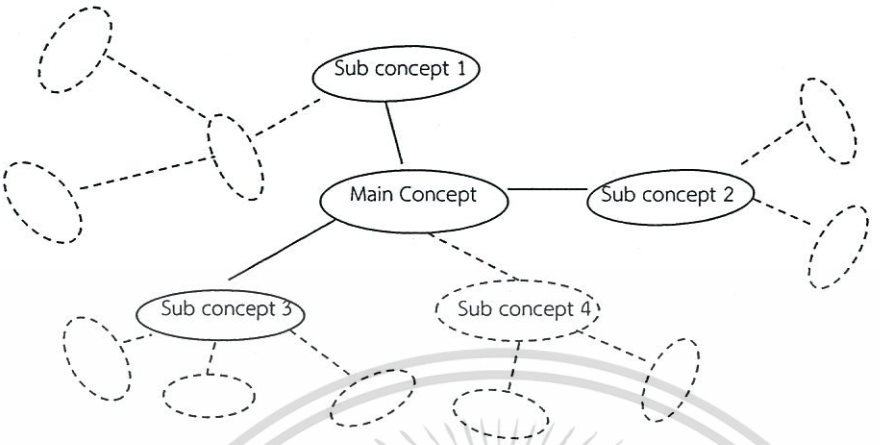
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Biotechnology
Assumption	:	Students have learned the meanings of these words: molecular, increase, produce and commodity
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw a concept map after reading the passage 3. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 4: Biotechnology 2. Worksheet (a concept map) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

1. Review students on the over-head projector what the concept mapping is.





Practice

2. Ask students to give the meaning of the words "biology" and "technology
3. Give students the Reading Sheet Unit 4: Biotechnology. Explain to them how to predict the content and organization of ideas.
   -Look at the title, sub-title, illustration, highlighted words and quickly skim or scan the content.
4. Students scan through the passage quickly.
5. Ask students a question:
   -From the title, sub-title, highlighted words and illustration, what will the passage be about?
6. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1. biological (adj.) = connected with the processes that take place within living things
2. application (n.) = the practical use of sth, especially a theory, discovery
3. fermentation (n.) = chemical changing by the action of a living substance such as yeast
4. to adopt (v.) = to take up and make one's own
5. to sustain (v.) = to maintain or prolong
6. to reduce (v.) = to make sth less or smaller

7. Provide students some lists of words used for filling the incomplete

concept mapping for students.

-understanding
-medicine
- producing value-added commodities
-farmers (2)

8. Each student completes a concept map (Concept Mapping Exercise).
9. Students read each paragraph carefully to determine the details.
   -to see if their prediction is correct or not.
10. In groups of 3, students discuss their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Showing students a concept map on the over-head projector (See the key of concept mapping exercise).
13. Students correct their maps.
14. Ask students the questions.
15. Review what has been studied (either in Thai or English).
16. Encourage students to make a concept map to summarize what they have read.

Production

17. Students do the reading comprehension exercises. (Unit Test: Unit 4)

Evaluation

1. From students' doing activities.
2. From students' concept maps;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between all concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test: Unit 4)

Reading Sheet Unit 4
"Biotechnology"

Read this passage and do the following exercises.

Biotechnology

Biotechnology is short for biological technology. It is the application of knowledge and understanding of biology to meet practical needs. It is largely used in medicine and agriculture; those are based on the knowledge of the genetic code of life. One of the examples of biotechnology is used in making bread, beer and cheese is called fermentation. In agricultural systems, the farmers are adopting sustainable cultural practices.

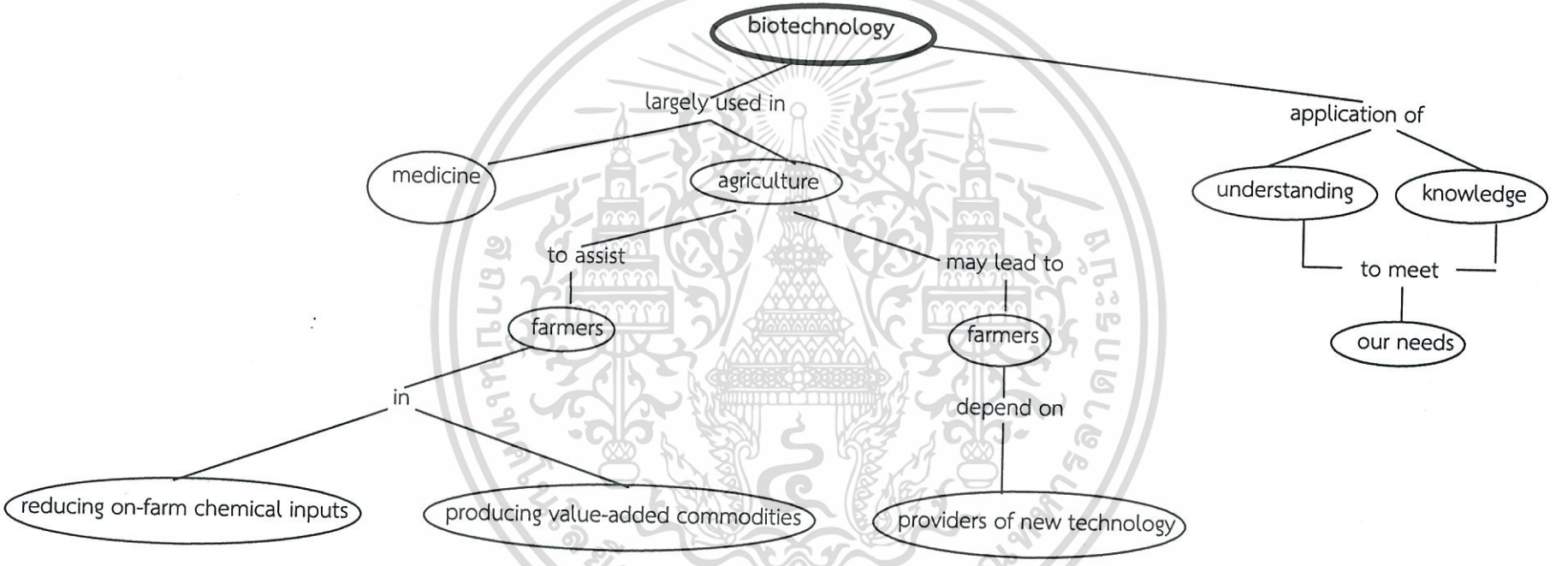
The advantages of biotechnology for farmers are reducing on- farm chemical inputs and producing value-added commodities. Biotechnology has also the disadvantage, that is farmers would depend on the providers of the new technology.

(Adapted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 250-251)

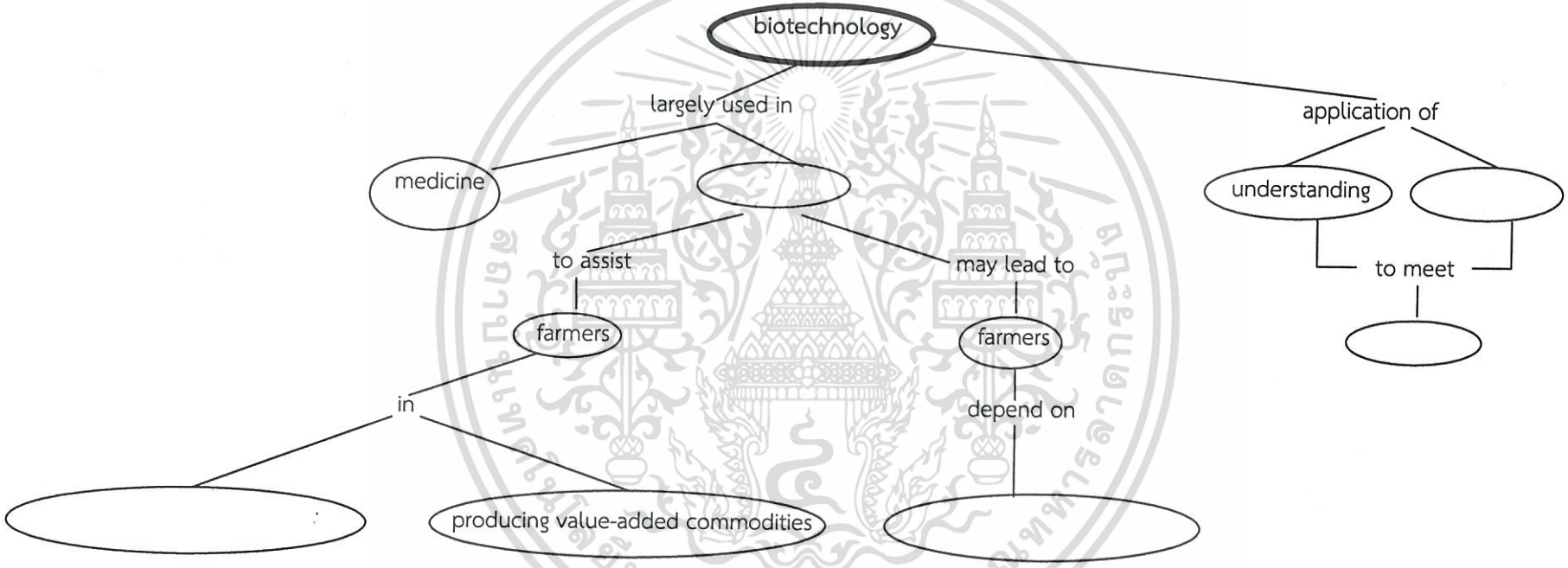
Vocabulary

1. biological (adj.) = connected with the processes that take place within living things
1. application (n.) = the practical use of sth., especially a theory, discovery
2. fermentation (n.) = chemical changing by the action of a living substance such as yeast
3. to adopt (v.) = to take up and make one's own
4. to sustain (v.) = to maintain or prolong
5. to reduce (v.) = to make sth. less or smaller

The Key of Concept Mapping Exercise: "Biotechnology"



The incomplete concept mapping Exercise: "Biotechnology"



Unit Test : Unit 4
"Biotechnology"

Directions: Answer these questions.

1. What does the word "biotechnology" come from?
   .....
   .....

2. What are the applications for biotechnology?
   .....
   .....

3. What fields of study are used largely in biotechnology?
   .....
   .....

4. What are the good points of biotechnology for farmers?
   .....
   .....

5. What is a bad point of biotechnology for farmers?
   .....
   .....

Answer key

Directions: Answer these questions.

1. It comes from two words: biological and technology.
2. They are understanding and knowledge.
3. They are medicine and agriculture.
4. The farmers can reduce on-farm chemical inputs and produce value-added commodities.
5. The farmers have to depend on the providers of new technology.

Lesson Plan 4
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Biotechnology
Assumption	:	Students have learned the meanings of these words: molecular, increase, produce and commodity
Objectives	:	Students should be able to: 1. comprehend the passage 2. correctly answer the questions about the passage
Teaching materials	:	1. Reading Sheet Unit 4: Biotechnology 2. Word cards 3. Unit test

Procedures:

Presentation

1. Ask students to give the meaning of the words "biology" and "technology
2. Give students the Reading Sheet Unit 4: Biotechnology
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English)

Vocabulary

1. biological (adj.) = connected with the processes that take place within living things
2. application (n.) = the practical use of sth, especially a theory, discovery
3. fermentation (n.) = chemical changing by the action of a living substance such as yeast
4. to adopt (v.) = to take up and make one's own
5. to sustain (v.) = to maintain or prolong
6. to reduce (v.) = to make sth less or smaller

Practice

4. Tell students the meanings of unknown words in the passage.
5. Students get into groups of 3.
6. Students read the passage carefully and translate into Thai.
7. Students discuss the passage in their groups.
8. Ask students the details from the passage : "Biotechnology."
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises. (Unit Test: Unit 4 "Biotechnology").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 4).

Reading Sheet Unit 4
"Biotechnology"

Read this passage and do the following exercises.

Biotechnology

Biotechnology is short for biological technology. It is the application of knowledge and understanding of biology to meet practical needs. It is largely used in medicine and agriculture; those are based on the knowledge of the genetic code of life. One of the examples of biotechnology is used in making bread, beer and cheese is called fermentation. In agricultural systems, the farmers are adopting sustainable cultural practices.

The advantages of biotechnology for farmers are reducing on- farm chemical inputs and producing value-added commodities. Biotechnology has also the disadvantage, that is farmers would depend on the providers of the new technology.

(Adapted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 250-251)

Vocabulary

1. biological (adj.) = connected with the processes that take place within living things
2. application (n.) = the practical use of sth., especially a theory, discovery
3. fermentation (n.) = chemical changing by the action of a living substance such as yeast
4. to adopt (v.) = to take up and make one's own
5. to sustain (v.) = to maintain or prolong
6. to reduce (v.) = to make sth. less or smaller

Unit Test : Unit 4
"Biotechnology"

Directions: Answer these questions.

1. What does the word "biotechnology" come from?
   .....
   .....

2. What are the applications for biotechnology?
   .....
   .....

3. What fields of study are used largely in biotechnology?
   .....
   .....

4. What are the good points of biotechnology for farmers?
   .....
   .....

5. What is a bad point of biotechnology for farmers?
   .....
   .....

Answer key

Directions: Answer these questions.

1. It comes from two words: biological and technology.
2. They are understanding and knowledge.
3. They are medicine and agriculture.
4. The farmers can reduce on-farm chemical inputs and produce value-added commodities.
5. The farmers have to depend on the providers of new technology.

Lesson Plan 5

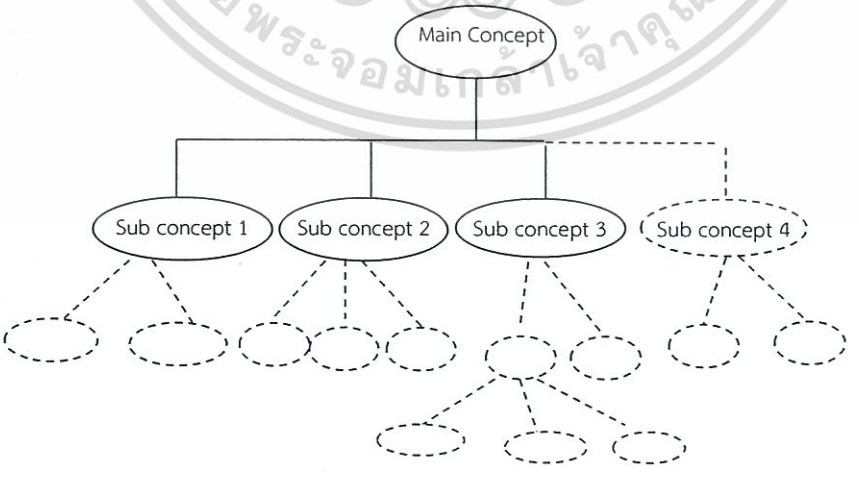
Lesson Plan Using Concept Mapping Instruction

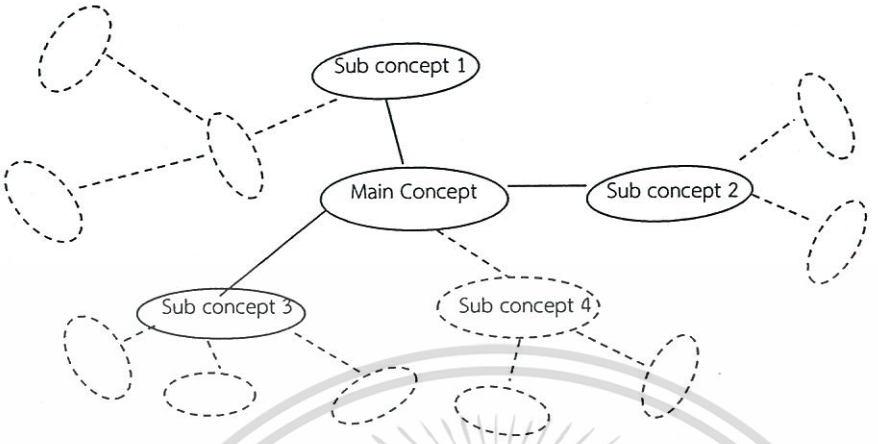
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Tobacco
Assumption	:	Students have learned the meanings of these words: tobacco, cash crop, herbicide, resistant, soil, seed, crop, seed bed, seedling, root, reduce and harvest.
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw a concept map after reading the passage 3. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 5: Tobacco 2. Worksheet (a concept map) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

1. Review students on the over-head projector what the concept mapping is.





Practice

2. Ask students to give the meaning of the word "Tobacco."
   -What is tobacco?
   -What parts of Thailand is tobacco grown?
3. Give students the Reading Sheet Unit 5: Tobacco. Explain to them how to predict the content and organization of idea.
   -Look at the title, sub-title, illustration, highlighted words and quickly skim or scan the content.
4. Students scan through the passage quickly.
5. Ask students a question:
   -From the title, sub-title, highlighted words and illustrations, what will the passage be about?
6. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1.	typical (adj.)	=	showing the main signs and qualities of a particular group
2.	to contain (v.)	=	to have sth. inside or as a part of it
3.	nicotine (n.)	=	an addictive chemical contained in tobacco
4.	producer (n.)	=	a person or company that produce goods, foods, or materials
5.	income (n.)	=	money which a person earns from work

6. to protect (v.) = to keep a person or thing safe from sth.
7. transplanting (n.) = moving sth. from one place to another
8. upper (adj.) = at or near the top of sth.
9. lower (adj.) = at or near the bottom of sth.
10. remaining (adj.) = still needing to be done or dealt with

7. Provide students some lists of words used for filling the incomplete concept mapping for students.

-hand
-China
-seedbeds
-the seedlings
-the field
-the soil
-further protect seedlings
-harvesting stage
-the lower part
-the upper part
-poorer soil

8. Each student completes a concept map (Concept Mapping Exercise).
9. Have students read each paragraph carefully to determine the details.
   -To see if their prediction is correct or not.
10. Students form groups of 3 to discuss their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Show students a concept map on the over-head projector (See the key of concept mapping exercise).
13. Students correct their maps.
14. Ask students questions about the passage.
15. Review what has been studied (either in Thai or English).
16. Encourage students to use the concept map to summarize what they have read.

Production

17. Students do the reading comprehension exercises. (Unit Test: Unit 5)

Evaluation

1. From students' doing activities.
2. From students' concept maps;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between all concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test: Unit 5)

Reading Sheet Unit 5
"Tobacco"

Read this passage and do the following exercises.

Tobacco

Tobacco is an agricultural product processed from the leaves of plants. It is a valuable cash crop for countries such as Cuba, India, China, and the United States. China is the largest producer, closely followed by the USA. The Chinese tobacco is believed to be herbicide resistant. In the US, cigarettes are made with GM tobacco with reduced nicotine content. Tobacco can grow well in poorer soils so a typical farmer can expect a good income from planting this crop.

Seeds and fertilizer are often provided by a large company called British American Tobacco. The seeds are so small that they must be protected in seedbeds for sixty days before transplanting to the field. Two weeks later, soil is carefully pruned around the seedlings to further establish them and help to develop a good root system. Finally, after a couple of months, the flowering plants and some of the upper leaves are cut to allow more growth in the remaining leaves. The crop gradually grows towards the harvesting stage.

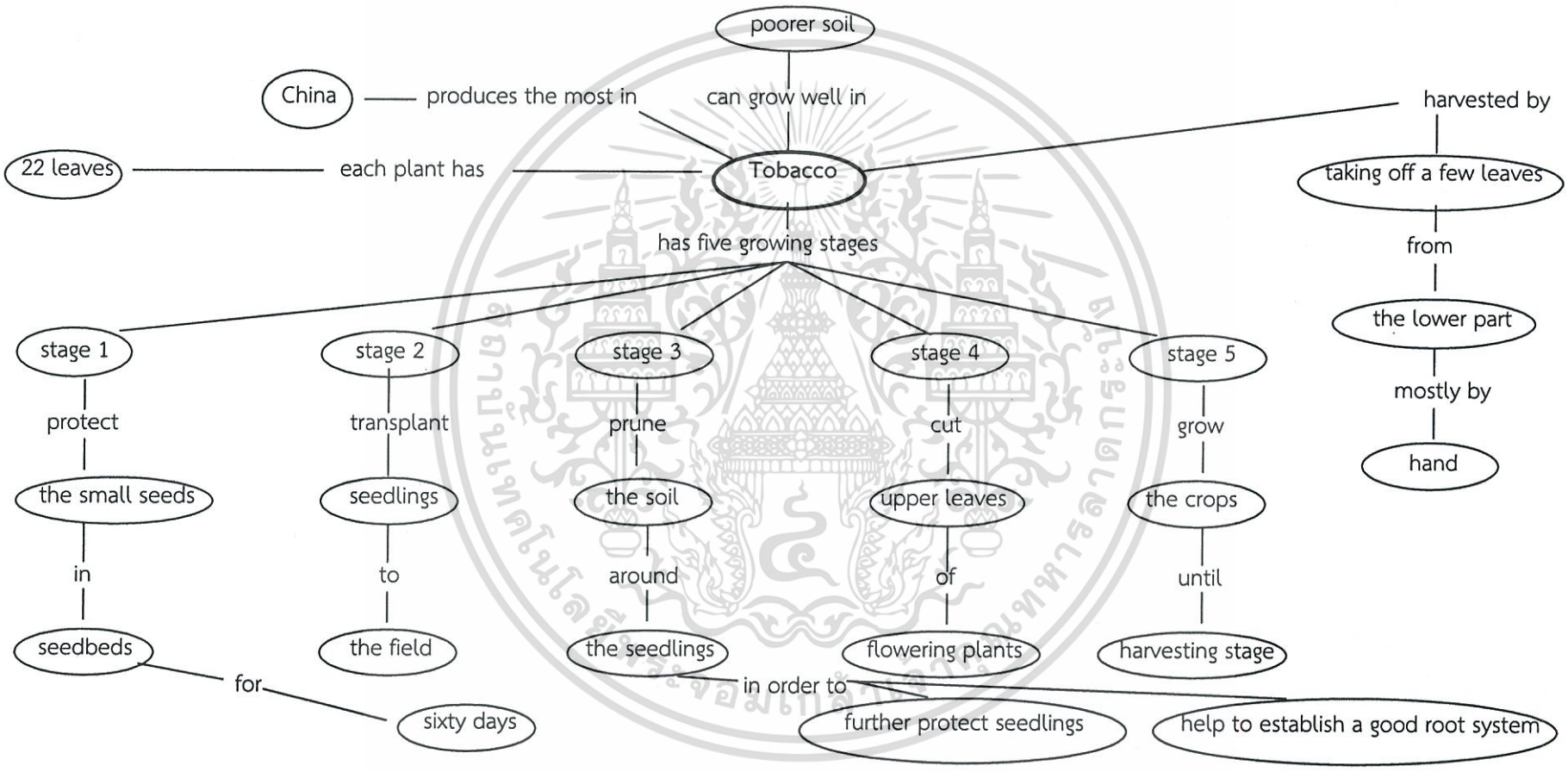
In most countries harvesting is done by hand. The farmer takes off a few leaves from the lower part of each plant. A typical farmer can expect to harvest about 15,000 plants. This is quite a lot considering each plant contains around 22 leaves.

(Extracted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 6-7)

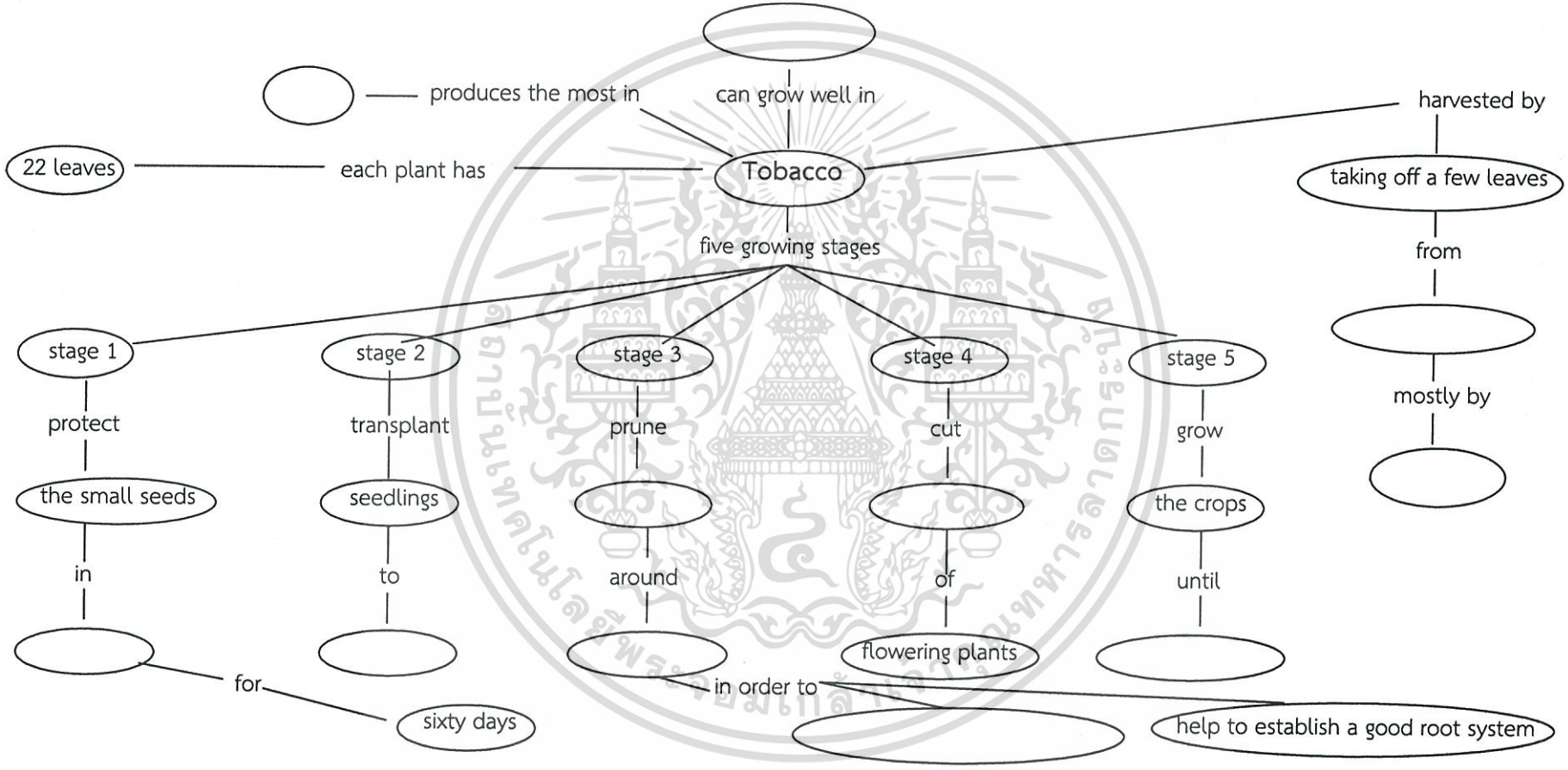
Vocabulary

1. typical (adj.) = showing the main signs and qualities of a particular group
2. to contain (v.) = to have sth. inside or as a part of it
3. nicotine (n.) = an addictive chemical contained in tobacco
4. producer (n.) = a person or company that produce goods, foods, or materials
5. income (n.) = money which a person earns from work
6. to protect (v.) = to keep a person or thing safe from sth.
7. transplanting (n.)= moving sth. from one place to another
8. upper (adj.) = at or near the top of sth.
9. lower (adj.) = at or near the bottom of sth.
10. remaining (adj.)= still needing to be done or dealt with

The Key of Concept Mapping Exercise: "Tobacco"



The incomplete concept mapping Exercise: "Tobacco"



Unit Test : Unit 5
"Tobacco"

Part I

Circle the correct answer based on the reading passage.

True	False	1. Tobacco contains nicotine.
True	False	2. A tobacco plant has around 22 leaves.
True	False	3. Growing tobacco needs a lot of care.
True	False	4. Tobacco leaves are usually gathered by hand.
True	False	5. Chinese cigarettes made with GM tobacco.
True	False	6. Tobacco seeds can grow well in every kind of soil.
True	False	7. Poor soil conditions in China can grow tobacco well.
True	False	8. Tobacco is a cash crop and processed from the roots of plants.
True	False	9. China produces tobacco, but not the most in the world.
True	False	10. Cigarettes made with GM tobacco have more nicotine content.

Part II

Directions: Answer these questions.

1. What kind of soil can tobacco grow in?
   .....
2. What parts of the tobacco plant are cigarettes made from?
   .....
3. How many stages are there for growing tobacco?
   .....
4. Which country produces the most tobacco?
   .....
5. Why do farmers prune the soil around the seedlings?
   .....
   .....
6. In stage 1, why must the small seeds of tobacco be protected?
   .....

7. In step 2 of growing tobacco, what do the farmers do?

.....

.....

8. How many days should the small tobacco seeds be grown in seedbeds?

.....

9. Why do farmers cut the flowering plants and some of the upper leaves?

.....

.....

10. How is tobacco harvested?

.....

.....

Answer key

Part I

Circle the correct answer based on the reading passage.

1. True	2. True	3. True	4. True	5. False
6. False	7. True	8. False	9. False	10. False

Part II

Directions: Answer these questions.

1. It can grow in all soils conditions.
2. Cigarettes are made from the tobacco leaves.
3. There are 5 stages for growing tobacco.
4. China produces the most tobacco.
5. To further protect the seedlings and help to develop a good root system.
6. They are put in seedbeds to grow them.
7. The farmers transplant the seedlings to the field.
8. They will take 60 days to grow.
9. To allow more growth in the remaining leaves.
10. They take off a few leaves from the lower part of each plant and mostly by hand.

Lesson Plan 5
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Tobacco
Assumption	:	Students have learned the meanings of these words: tobacco, cash crop, herbicide, resistant, soil, seed, crop, seed bed, seedling, root, and harvest.
Objectives	:	Students should be able to: 1. comprehend the passage 2. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 5: Tobacco 2. Word cards 3. Unit test

Procedures:

Presentation

1. Ask students to give the meaning of "Tobacco".
   -What is tobacco?
   -What parts of Thailand is tobacco grown?
2. Give students the Reading Sheet Unit 5: Tobacco
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English.

Vocabulary

1.	typical (adj.)	=	showing the main signs and qualities of a particular group
2.	to contain (v.)	=	to have sth. inside or as a part of it
3.	nicotine (n.)	=	an addictive chemical contained in tobacco
4.	producer (n.)	=	a person or company that produce goods, foods, or materials
5.	income (n.)	=	money which a person earns from work
6.	to protect (v.)	=	to keep a person or thing safe from sth.

7. transplanting (n.) = moving sth. from one place to another
8. upper (adj.) = at or near the top of sth.
9. lower (adj.) = at or near the bottom of sth.
10. remaining (adj.) = still needing to be done or dealt with

Practice

4. Tell students the meanings of unknown words in the passage.
5. Students get into groups of 3.
6. Students read each paragraph thoroughly.
7. Students discuss about the passage in their groups.
8. Ask students the details from the passage : "Tobacco."
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises.
(Unit Test: Unit 5 "Tobacco").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 5).

Reading Sheet Unit 5
"Tobacco"

Read this passage and do the following exercises.

Tobacco

Tobacco is an agricultural product processed from the leaves of plants. It is a valuable cash crop for countries such as Cuba, India, China, and the United States. China is the largest producer, closely followed by the USA. The Chinese tobacco is believed to be herbicide resistant. In the US, cigarettes are made with GM tobacco with reduced nicotine content. Tobacco can grow well in poorer soils so a typical farmer can expect a good income from planting this crop.

Seeds and fertilizer are often provided by a large company called British American Tobacco. The seeds are so small that they must be protected in seedbeds for sixty days before transplanting to the field. Two weeks later, soil is carefully pruned around the seedlings to further protect them and help to establish a good root system. Finally, after a couple of months, the flowering plants and some of the upper leaves are cut to allow more growth in the remaining leaves. The crop gradually grows towards the harvesting stage.

In most countries harvesting is done by hand. The farmer takes off a few leaves from the lower part of each plant. A typical farmer can expect to harvest about 15,000 plants. This is quite a lot considering each plant contains around 22 leaves.

(Extracted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 6-7)

Vocabulary

1. typical (adj.) = showing the main signs and qualities of a particular group
2. to contain (v.) = to have sth. inside or as a part of it
3. nicotine (n.) = an addictive chemical contained in tobacco
4. producer (n.) = a person or company that produce goods, foods, or materials
5. income (n.) = money which a person earns from work
6. to protect (v.) = to keep a person or thing safe from sth.
7. transplanting (n.)= moving sth. from one place to another
8. upper (adj.) = at or near the top of sth.
9. lower (adj.) = at or near the bottom of sth.
10. remaining (adj.)= still needing to be done or dealt with

Unit Test : Unit 5
"Tobacco"

Part I

Circle the correct answer based on the reading passage.

True	False	1. Tobacco contains nicotine.
True	False	2. A tobacco plant has around 22 leaves.
True	False	3. Growing tobacco needs a lot of care.
True	False	4. Tobacco leaves are usually gathered by hand.
True	False	5. Chinese cigarettes made with GM tobacco.
True	False	6. Tobacco seeds can grow well in every kind of soil.
True	False	7. Poor soil conditions in China can grow tobacco well.
True	False	8. Tobacco is a cash crop and processed from the roots of plants.
True	False	9. China produces tobacco, but not the most in the world.
True	False	10. Cigarettes made with GM tobacco have more nicotine content.

Part II

Directions: Answer these questions.

1. What kind of soil can tobacco grow in?

   .....

2. What parts of the tobacco plant are cigarettes made from?

   .....

3. How many stages are there for growing tobacco?

   .....

4. Which country produces the most tobacco?

   .....

5. Why do farmers prune the soil around the seedlings?

   .....

   .....

6. In stage 1, why must the small seeds of tobacco be protected?

.....

7. In step 2 of growing tobacco, what do the farmers do?

.....

.....

8. How many days should the small tobacco seeds be grown in seedbeds?

.....

9. Why do farmers cut the flowering plants and some of the upper leaves?

.....

.....

10. How is tobacco harvested?

.....

.....

Answer key

Part I

Circle the correct answer based on the reading passage.

1. True	2. True	3. True	4. True	5. False
6. False	7. True	8. False	9. False	10. False

Part II

Directions: Answer these questions.

1. It can grow in all soils conditions.
2. Cigarettes are made from the tobacco leaves.
3. There are 5 stages for growing tobacco.
4. China produces the most tobacco.
5. To further protect the seedlings and help to develop a good root system.
6. They are put in seedbeds to grow them.
7. The farmers transplant the seedlings to the field.
8. They will take 60 days to grow.
9. To allow more growth in the remaining leaves.
10. They take off a few leaves from the lower part of each plant and mostly by hand.

Lesson Plan 6

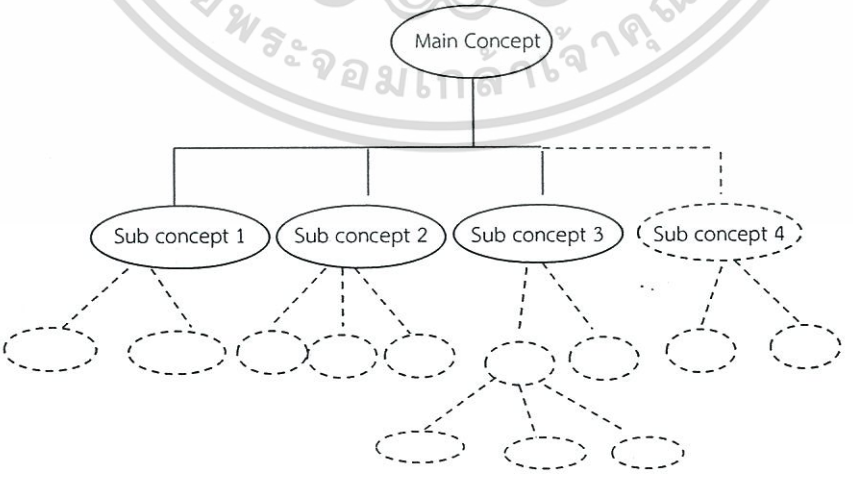
Lesson Plan Using Concept Mapping Instruction

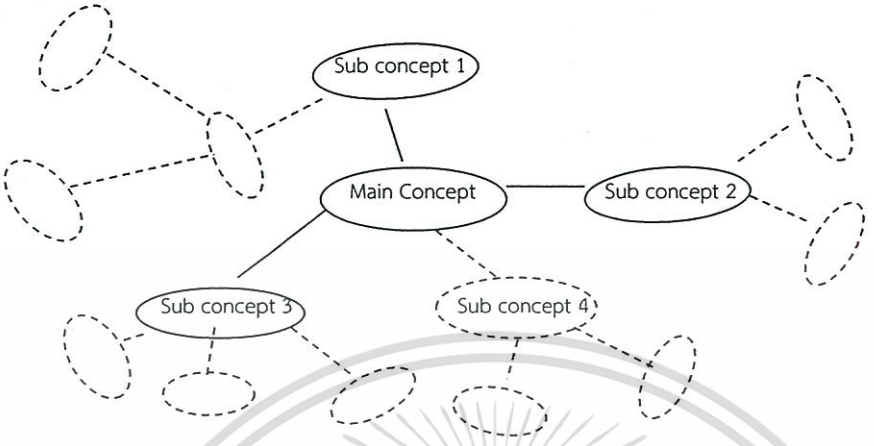
Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Cloning
Assumption	:	Students have learned the meanings of these words: hump, husbandry, breed/breeder, species, fur, cell, to raise, to improve and embryo
Objectives	:	Students should be able to: 1. comprehend the reading passage 2. draw a concept map after reading the passage 3. correctly answer the questions of the passage
Teaching materials	:	1. Reading Sheet Unit 6: Cloning 2. Worksheet (a concept map) 3. Word cards 4. Computer and over-head projector 5. Unit test

Procedures:

Presentation

1. Review students on the over-head projector what the concept mapping is.





Practice

2. Ask students to give the meaning of the word "Cloning."
   -What is cloning?
3. Give students the Reading Sheet Unit 6: Cloning. Explain to them how to predict the content and organization of ideas.
   -Look at the title, sub-title, illustrations, highlighted words and quickly skim or scan the content.
4. Students scan through the passage quickly.
5. Ask students a question:
   -From the title, sub-title, highlighted words and illustrations, what will the passage be about?
6. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English).

Vocabulary

1. to manipulate (v.) = to control or influence sb/sth
2. trait (n.) = a particular quality of sb or sth
3. clone (n.) = a group of organisms or cells reproduced nonsexual from a single plant or animal
4. to clone (v.) = to produce as a clone
5. science fiction (n.) = typically based on speculative scientific discoveries or developments
6. exotic (adj.) = unusual and exciting

7. endangered (adj.) = faced with the danger of extinction
8. gaur (n.) = a large, dark-coated wild ox of hilly area of southeast Asia
9. ethical (adj.) = relating to what you believe is right or wrong
10. moral (adj.) = concerning or based on what is considered right or wrong
11. to concern (v.) = to worry
12. concern (n.) = anxiety
13. herd (n.) = a group of cattle that live and feed together
14. replica (n.) = a very good or exact copy of sth.

7. Provide students some lists of words used for filling the incomplete concept mapping for students.
   -chickens
   -mice
   -Dolly
   -cow
   -Gregor Mendel
   -can create an exact copy
8. Each student completes a concept map (Concept Mapping Exercise).
9. Students read each paragraph carefully to determine the details.
   -To see if their prediction is correct or not.
10. Students form groups of 3 to discuss their concept maps.
11. Have students exclude irrelevant ideas and map out the hierarchical relationships among the ideas of the concept mapping.
12. Show students a concept map on the over-head projector (See the key of concept mapping exercise).
13. Students correct their maps.
14. Ask students questions about the passage.
15. Review what has been studied (either in Thai or English).
16. Encourage students to use the concept map to summarize what they have read.

Production

17. Students do the reading comprehension exercises (Unit Test: Unit 6).

Evaluation

1. From students' doing activities.
2. From students' concept maps;
   -How comprehensive the map is (Are all relationships shown?)
   -How clearly the concepts are linked (Are proper relationships between concepts shown? Are linkage terms used between all concepts?)
   -Overall clarity of presentation (Could the map be simpler? Is it redundant? Is it logically arranged? Are linkage terms used properly?)
3. From students' answers.
4. From students' reading comprehension test. (Unit Test: Unit 6)

Reading Sheet Unit 6
"Cloning"

Read this passage and do the following exercises.

Cloning

Ever since Gregor Mendel discovered how to manipulate traits in plants, people have been able to clone plant life relatively simply – even in their own gardens. However, cloning animals was only possible in the imagination of science fiction writers. Thus, the world was shocked in 1997 to learn that scientists at the Roslin Institue in Edinburgh, Scotland had cloned a Finn Dorset sheep named Dolly. The success of this experiment has opened the door to cloning other animal life. In the years following the cloning of Dolly, scientists successfully cloned mice, pigs, cows, chickens, and even more exotic animals such as the endangered gaur, a hump-backed relative of a cow from Southeast Asia. This type of research could bring great benefits to humans; but it also raises ethical and moral concerns.

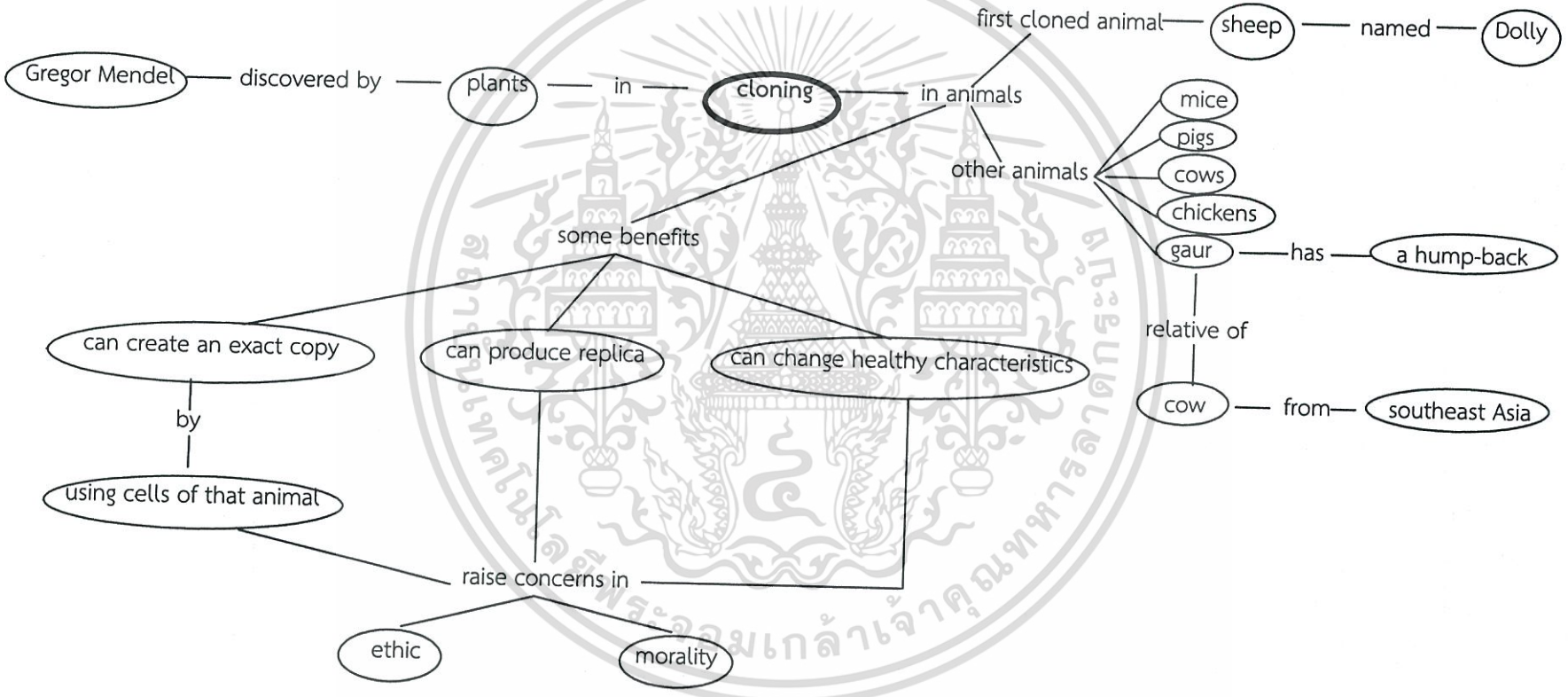
For years, specialists in animal husbandry have been able to breed characteristics in and out of animals, thereby creating improved animal breeds. For example, dog breeders have been able to control the genetic makeup of species to obtain certain physical characteristics such as eye or fur color, size, or special abilities such as speed. Breeding, however, is different from cloning in two ways. First, it can only be done with embryonic cell. Second, breeding does not produce an exact replica. Breeders can calculate the probability of obtaining a certain trait, but to actually obtain this trait they may have to try several times. With cloning, scientists can choose any healthy individual whose characteristics they wish to clone and create an exact copy by using cells from that animal.

(Extracted from: Thanu Teauratanagul. (2007). **English For Science & Technology:** A student-centered, content-based text: Chulalongkorn University Press. p. 175-176)

Vocabulary

1.	to manipulate (v.)	=	to control or influence sb./sth.
2.	trait (n.)	=	a particular quality of sb. or sth.
3.	clone (n.)	=	a group of organisms or cells reproduced nonsexual from a single plant or animal
4.	to clone (v.)	=	to produce as a clone
5.	science fiction (n.)	=	typically based on speculative scientific discoveries or developments
6.	exotic (adj.)	=	unusual and exciting
7.	endangered (adj.)	=	faced with the danger of extinction
8.	gaur (n.)	=	a large, dark-coated wild ox of hilly area of southeast Asia
9.	ethical (adj.)	=	relating to what you believe is right or wrong
10.	moral (adj.)	=	concerning or based on what is considered right or wrong
11.	to concern (v.)	=	to worry
12.	concern (n.)	=	anxiety
13.	herd (n.)	=	a group of cattle that live and feed together
14.	replica (n.)	=	a very good or exact copy of sth.

The Key of Concept Mapping Exercise: "Cloning"



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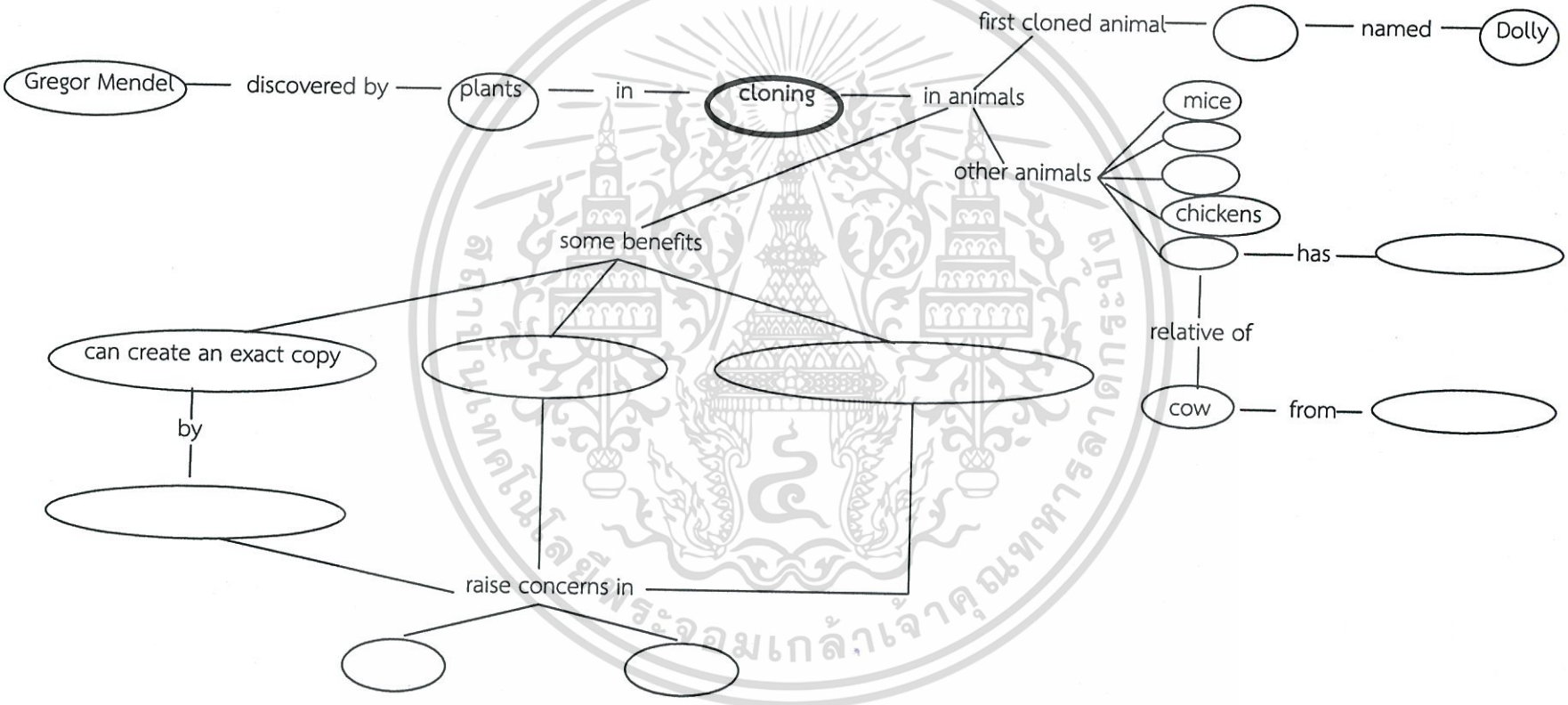
The incomplete concept mapping Exercise: "Cloning"



Unit Test : Unit 6
"Cloning"

Part I

Circle the correct answer based on the reading passage.

True False 1. Cloning was first carried out a few years ago.
True False 2. Dolly the sheep was the first success in cloning.
True False 3. Scientists could clone cows, chickens, pigs, mice, buffaloes and ducks.
True False 4. Gaur is an endangered exotic animal with a hump-back.
True False 5. Animal cloning raises moral and ethical considerations.
True False 6. Breeding produces an exact replica but cloning does not.
True False 7. Through cloning, scientists can choose the required characteristics.
True False 8. With breeding, scientists can create an exact copy by using cells from the animal.
True False 9. Breeding is a way to create improved animal breeds.
True False 10. Animal cloning might benefit human.

Part II

Directions: Answer these questions.

1. Who was the first person to discover a way to manipulate traits in plants?

   _____

2. What was the first cloned animal?

   _____

3. What was the name of the first cloned animal?

   _____

4. What were other cloned animals?

   _____

5. What is a gaur?

   _____

6. What are the differences between breeding and cloning?
   Breeding:

   _____
   _____
   _____

   Cloning:

   _____
   _____
   _____
   _____

Answer key

Part I

Circle the correct answer based on the reading passage.

1. False	2. True	3. False	4. True	5. True
6. False	7. True	8. False	9. True	10. True

Part II

Directions: Answer these questions.

1. Gregor Mendel.
2. The Fin Dorset sheep.
3. It was named Dolly.
4. They were mice, pigs, cows, chickens and gaur.
5. It is an endangered animal with a hump-back.
6. Breeding: It can only be done with embryonic cells and does not produce an exact replica.
   Cloning: It can choose any healthy individual characteristic it wishes to clone and create an exact copy by using cells from animals.

Lesson Plan 6
Lesson Plan Using Traditional Instruction

Subject	:	English for Agriculture and Technology (2000-1230)
Class	:	Second Year Certificate in Vocational Education
Time	:	2 hours
Content	:	Reading: Cloning
Assumption	:	Students have learned the meanings of these words: hump, husbandry, breed/breeder, species, fur, cell, to raise, to improve and embryo
Objectives	:	Students should be able to: 1. comprehend the passage 2. correctly answer the questions about the passage
Teaching materials	:	1. Reading Sheet Unit 6: Cloning 2. Word cards 3. Unit test

Procedures:

Presentation

1. Ask students to give the meaning of the word "Cloning".
   -What is cloning?
2. Give students the Reading Sheet Unit 6: Cloning
3. Present new words by showing the word cards and asks the students to pronounce, spell and tell the correct meanings (either in Thai or English

Vocabulary

1.	to manipulate (v.)	=	to control or influence sb/sth
2.	trait (n.)	=	a particular quality of sb or sth
3.	clone (n.)	=	a group of organisms or cells reproduced nonsexual from a single plant or animal
4.	to clone (v.)	=	to produce as a clone
5.	science fiction (n.)	=	typically based on speculative scientific discoveries or developments

6.	exotic (adj.)	=	unusual and exciting
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13.	herd (n.)	=	a group of cattle that live and feed together
14.	replica (n.)	=	a very good or exact copy of sth

Practice

4. Tell students the meanings of unknown words in the passage.
5. Students get into groups of 3.
6. Students read each paragraph thoroughly.
7. Students discuss about the passage in their groups.
8. Ask students the details from the passage : "Cloning."
9. Review what has been studied (either in Thai or English).

Production

10. Students do the reading comprehension exercises. (Unit Test: Unit 6 "Cloning").

Evaluation

1. From students' doing activities.
2. From students' answers.
3. From students' reading comprehension test (Unit Test: Unit 6).

Reading Sheet Unit 6
"Cloning"

Read this passage and do the following exercises.

Cloning

Ever since Gregor Mendel discovered how to manipulate traits in plants, people have been able to clone plant life relatively simply – even in their own gardens. However, cloning animals was only possible in the imagination of science fiction writers. Thus, the world was shocked in 1997 to learn that scientists at the Roslin Institue in Edinburgh, Scotland had cloned a Finn Dorset sheep named Dolly. The success of this experiment has opened the door to cloning other animal life. In the years following the cloning of Dolly, scientists successfully cloned mice, pigs, cows, chickens, and even more exotic animals such as the endangered gaur, a hump-backed relative of a cow from Southeast Asia. This type of research could bring great benefits to humans; but it also raises ethical and moral concerns.

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Vocabulary

1.	to manipulate (v.)	=	to control or influence sb/sth
2.	trait (n.)	=	a particular quality of sb or sth
3.	clone (n.)	=	a group of organisms or cells reproduced nonsexual from a single plant or animal
4.	to clone (v.)	=	to produce as a clone
5.	science fiction (n.)	=	typically based on speculative scientific discoveries or developments
6.	exotic (adj.)	=	unusual and exciting
7.	endangered (adj.)	=	faced with the danger of extinction
8.	gaur (n.)	=	a large, dark-coated wild ox of hilly area of southeast Asia
9.	ethical (adj.)	=	relating to what you believe is right or wrong
10.	moral (adj.)	=	concerning or based on what is considered right or wrong
11.	to concern (v.)	=	to worry
12.	concern (n.)	=	anxiety
13.	herd (n.)	=	a group of cattle that live and feed together
14.	replica (n.)	=	a very good or exact copy of sth.

Unit Test : Unit 6
"Cloning"

Part I

Circle the correct answer based on the reading passage.

True False 1. Cloning was first carried out a few years ago.
True False 2. Dolly the sheep was the first success in cloning.
True False 3. Scientists could clone cows, chickens, pigs, mice, buffaloes and ducks.
True False 4. Gaur is an endangered exotic animal with a hump-back.
True False 5. Animal cloning raises moral and ethical considerations.
True False 6. Breeding produces an exact replica but cloning does not.
True False 7. Through cloning, scientists can choose the required characteristics.
True False 8. With breeding, scientists can create an exact copy by using cells from the animal.
True False 9. Breeding is a way to create improved animal breeds.
True False 10. Animal cloning might benefit human.

Part II

Directions: Answer these questions.

1. Who was the first person to discover a way to manipulate traits in plants?
   _____
2. What was the first cloned animal?
   _____
3. What was the name of the first cloned animal?
   _____
4. What were other cloned animals?
   _____
5. What is a gaur?
   _____

6. What are the differences between breeding and cloning?
   Breeding:

   _____
   _____
   _____

   Cloning:

   _____
   _____
   _____

   _____

Answer key

Part I

Circle the correct answer based on the reading passage.

1. False	2. True	3. False	4. True	5. True
6. False	7. True	8. False	9. True	10. True

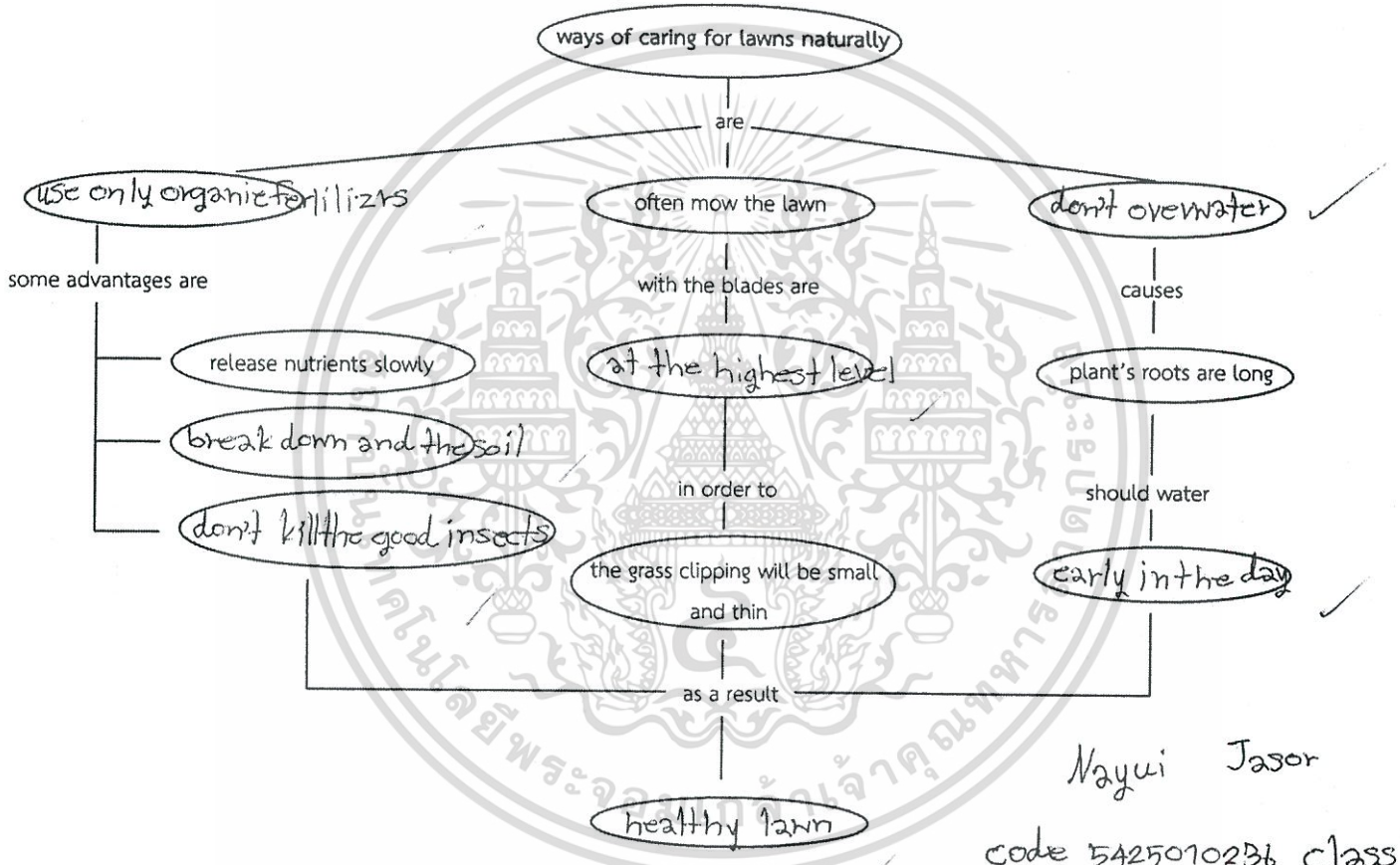
Part II

Directions: Answer these questions.

1. Gregor Mendel.
2. The Fin Dorset sheep.
3. It was named Dolly.
4. They were mice, pigs, cows, chickens and gaur.
5. It is an endangered animal with a hump-back.
6. Breeding: It can only be done with embryonic cells and does not produce an exact replica.
   Cloning: It can choose any healthy individual characteristic it wishes to clone and create an exact copy by using cells from animals.

Appendix D
Samples of Students' Concept Mapping Exercises

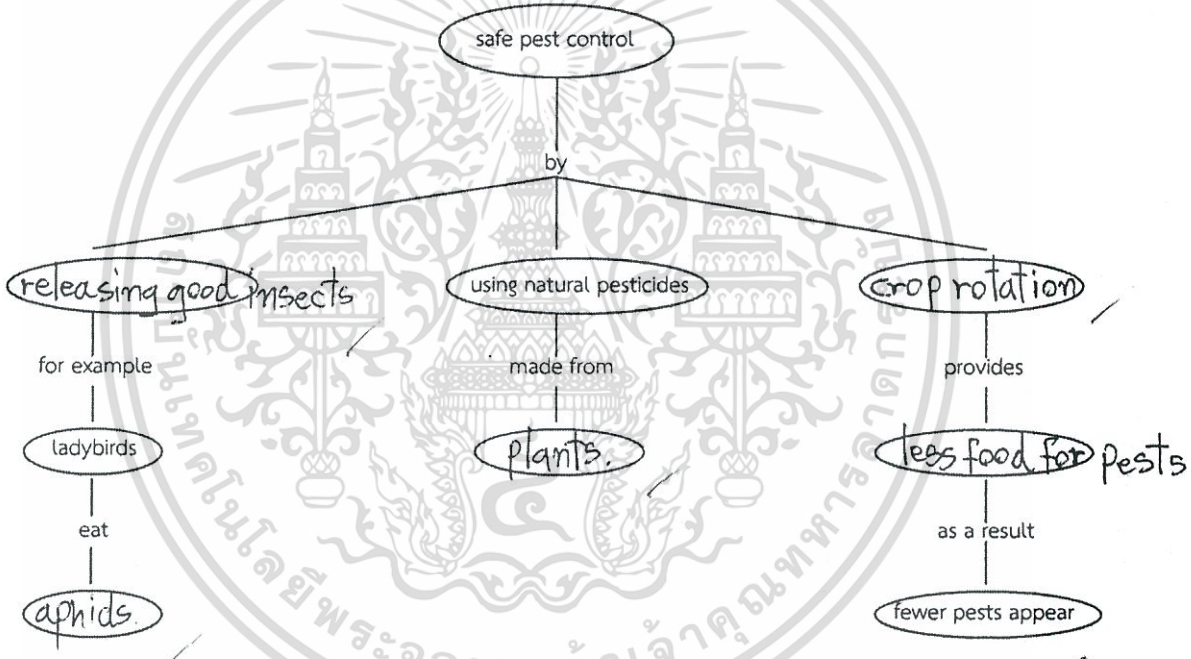
The incomplete concept mapping Exercise "A natural way of caring for lawns - Really!"



Nayui Jasor

code 5425010236 class 2/10

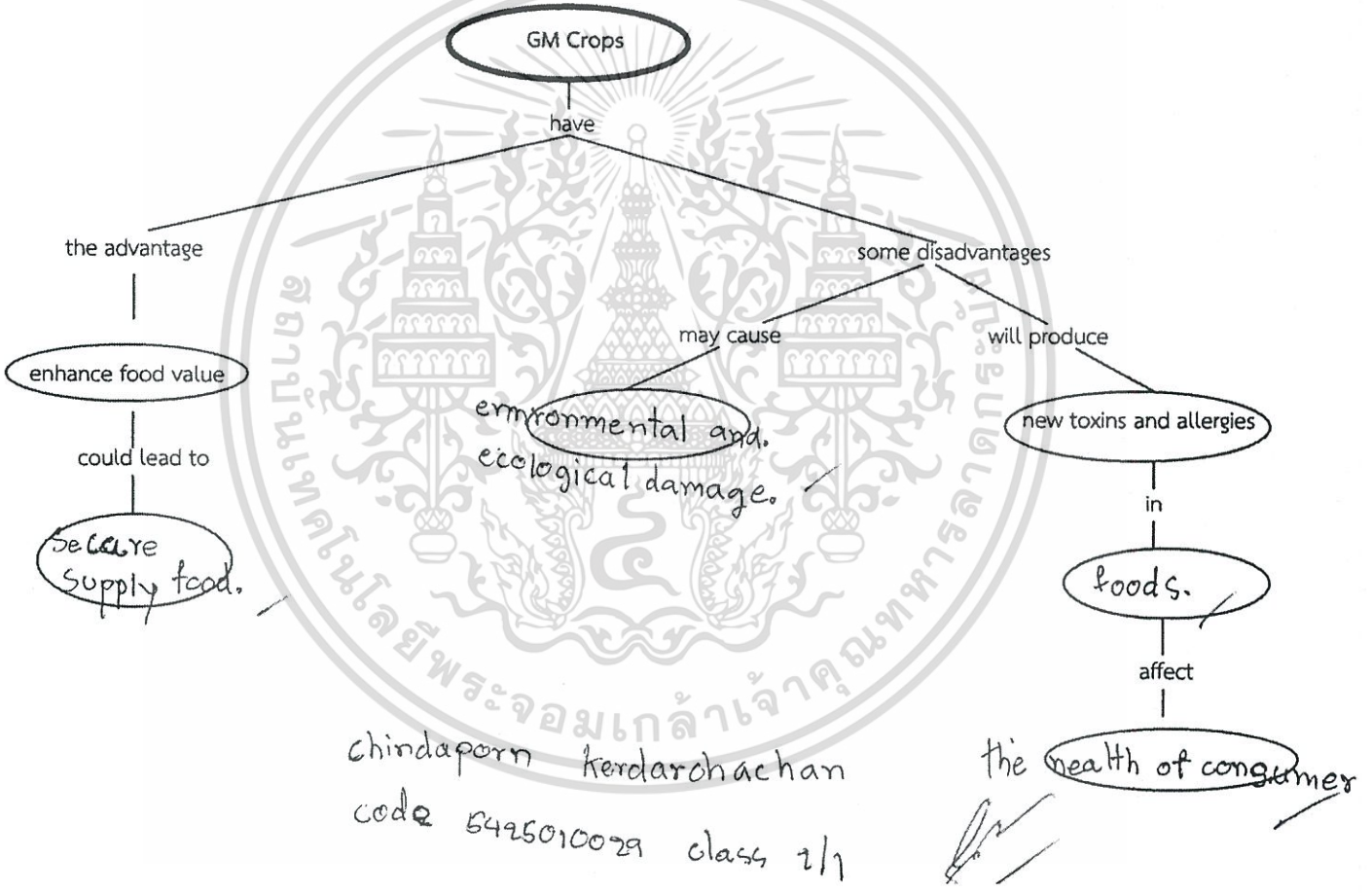
The incomplete concept mapping Exercise "Safe Pest Control: For Humans and the Land"



Mr. kridsada Laoter

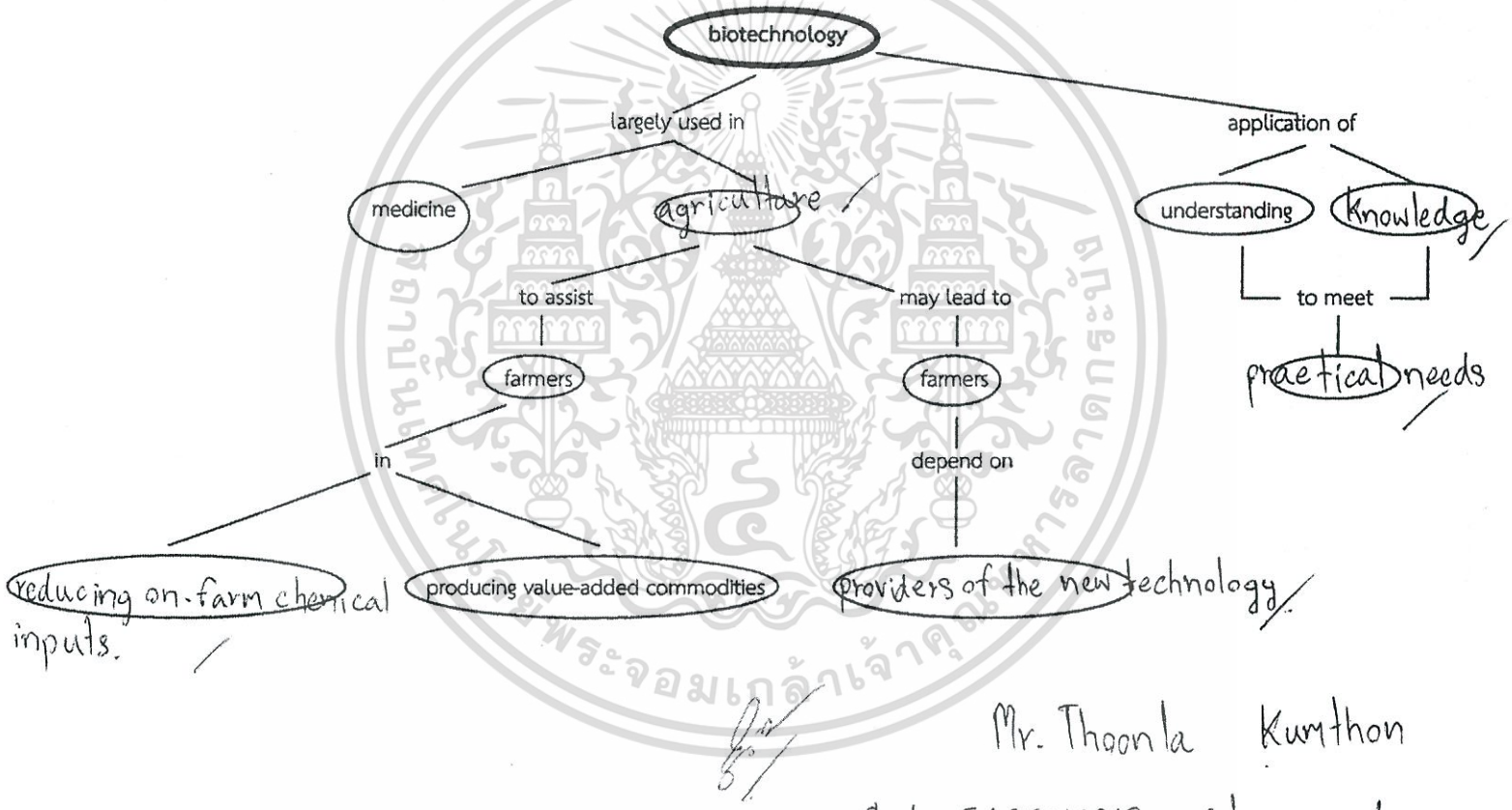
code 5425010015 class 2/1

The incomplete concept mapping Exercise "GM crops"



chindaporn kerdarchachan
code 5425010029 class 2/1

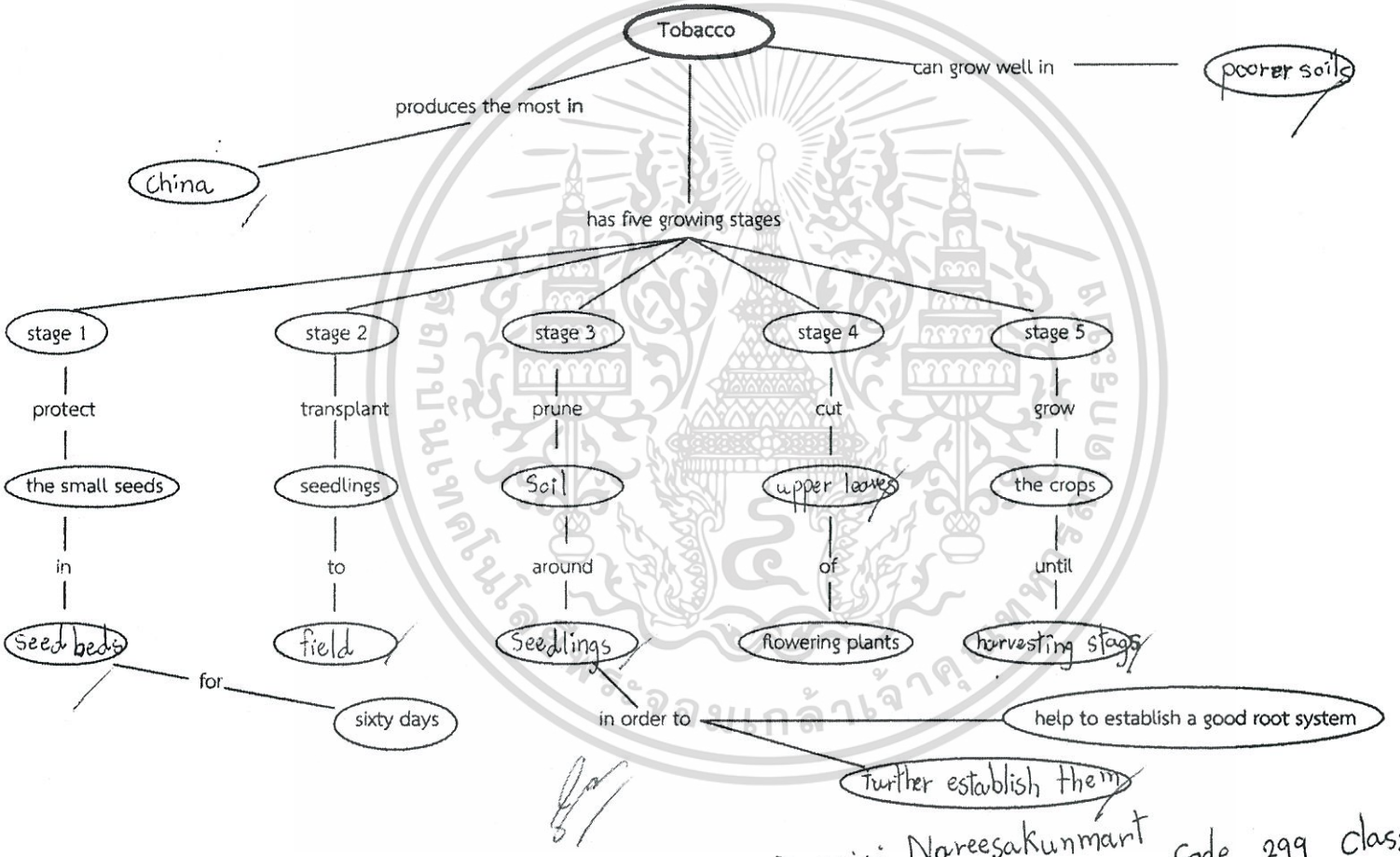
The incomplete concept mapping Exercise "Biotechnology"



Mr. Thoonla Kumthon

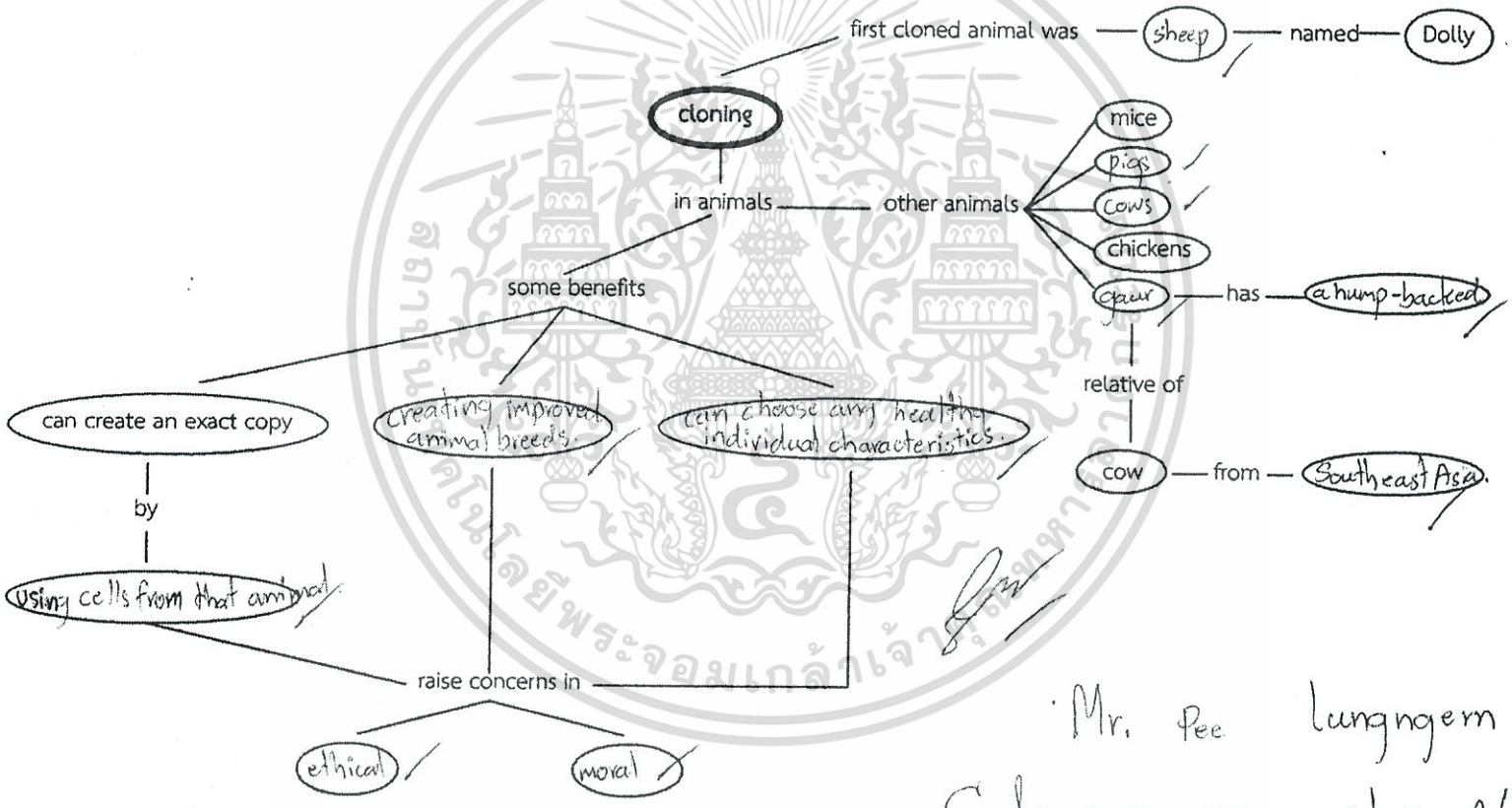
Code 5425010218 Class 2/9

The incomplete concept mapping Exercise "Tobacco"



Duangjai Nareesakunmart code 299 class 2/10

The incomplete concept mapping Exercise "Cloning animals"



Mr. Pee Lungngern

Code 5425010221 class 2/9

Appendix E

Pre-test for Experimental and Controlled Groups

Pre-test for Experimental and Controlled Groups

Multiple-choice questions. (Items: 20 Time: 90 minutes)

Directions:

1) Read 3 passages;
   - Passage I: The Pony and the Donkey
   - Passage II: How to Sell Your Produce- And More of It!
   - Passage III: Trouble-shooting your lawn mower
2) Choose the correct answer and put a mark (×) in a, b, c or d on the answer sheet provided.

Passage I: The Pony and the Donkey (Items 1-7)

The Pony and the Donkey

The pony and the donkey are smart and gentle. They belong to the same animal family---the horse family. The origin of the pony is in Asia and the donkey is in Africa.

A pony is a small horse. It looks the same as a horse. Like the horse, a pony is used for riding and for racing. People have used ponies as pack animal as well. Ponies have the strength to carry heavy loads over long distances. Ponies are smart animals, so they can be trained to obey commands. Pony owners describe their pets as charming, lively, trusting, and loving.

The donkey is smaller than the pony. A donkey has longer ears. It has a short mane that stands up on its neck. Its body is usually gray with a dark line across its back. Most donkey owners describe them as sweet and friendly.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge dult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 38)

1. The pony comes from ..... .
   a. Asia
   b. Africa
   c. China
   d. America

2. The donkey comes from ..... .
   a. Asia
   b. Africa

c. China
d. America

3. The pony and donkey are ..... than the horse.
   a. smaller
   c. bigger
   c. smarter
   d. stronger
4. Both pony and donkey are used for..... .
   a. riding
   b. drafting
   c. carrying packs
   d. a and c are correct
5. Donkeys and ponies make good friends for children because they are ..... .
   a. stubborn
   b. lovely
   c. friendly
   d. b and c are correct
6. Donkeys and ponies belong to ..... .
   a. the same family
   b. different families
   c. the horse family
   d. the lovely animal
7. The donkey and pony are names of ..... .
   a. different animals
   b. same kind animals
   c. animals with the same origins
   d. animals from the different family

Passage II: How to Sell Your Produce- And More of It! (Items 8-14)

How to Sell Your Produce- And More of It!

Customers like a friendly service. Sometimes all it takes for someone to stop at the booth is a friendly "Hi! How are you?" Always have a smile ready. Customers like a polite service. "Please." "Excuse me." "May I help you?" "Thank you." Customers know when these words are said sincerely.

Does your service show that you take pride in your products? Customers like that, too. Slice up some of the produce and give samples to the customers to taste. Showing enthusiasm about your products. If you have a chance, talk to your customers about how you grow things. You might give tips for storing fresh produce or suggest ways to prepare and cook the produce.

Customers like efficient service. Arrange the stall so that you can serve customers quickly and easily. Have the bags ready. And have enough small change handy. Always serve one customer at a time.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 12)

8. How many tips does the writer give for giving good service to the customers?
   a. 3 ways
   b. 4 ways
   c. 5 ways
   d. 6 ways
9. One more thing that the customers like to buy produce with ..... .
   a. polite service
   b. kind salespeople
   c. friendly service
   d. a, b and c are correct
10. Why do salespeople have to give good service to the customers?
    a. To sell more of their produce.
    b. To be a kind of salespersons.
    c. The customers will come back again.
    d. a, b and c are correct

Choose a, b, c or d below to be answer of items 11-14

a. give customers a recipe for cooking
b. let customers have a taste of the fruit
c. say hello to every customers who come to the booth
d. have coins ready to give customers their changes quickly

The ways to give good service by

11. being friendly.
12. being enthusiastic.
13. giving an efficient service.
14. taking pride in the fruit.

Passage III: Trouble-shooting your lawn mower (Items 15-20)

TROUBLE SHOOTING YOUR LAWN MOWER	
What's the problem?	**What to do?**
The lawn mower is hard to start.	- Check the carburetor. It may be dirty or clogged up. - Check the vent on the petrol cap. It may be clogged up. - Check the petrol hose. Fuel may not be reaching the engine.
The lawn mower does not start.	- Check the blades. They may have grass clippings stuck on them or string wrapped around them. - Check the blades. They may be damaged. - Check the starter. It may be broken.
The lawn mower lacks power.	- Check the petrol tank. The wrong fuel may have been used. - Check the air filter. It may be clogged up.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 82)

15. What is the problem of trouble-shooting?
    a. The lawn mower is noisy.
    b. The lawn mower lacks power.
    c. The lawn mower gets too hot.
    d. The lawn mower jumps forward.
16. what should you do If the lawn mower doesn't start?
    a. Change the starter.
    b. Change the engine.
    c. Check the spark plugs.
    d. Clean or change for the new blades.

17. What is the problem if the lawn mower is hard to start?
    a. The engine is broken.
    b. The air cleaner is plugged up.
    c. Fuel is not getting to the engine.
    d. a, b and c are correct
18. what is the problem if the lawn mower doesn't work well?
    a. The carburetor is dirty.
    b. The air filter is clogged up.
    c. The blades are damaged.
    d. The spark plug is clogged up.
19. Which of these things is on the trouble-shooting table?
    a. The parts to check for trouble
    b. Different causes for a problem
    c. Problems with a lawn mower
    d. a, b and c are correct
20. what could happen If put the wrong fuel in a lawn mower?
    a. The engine might not start.
    b. The engine might get too hot.
    c. The engine might get damaged.
    d. The engine might not have enough power.

.....

Answer Sheet of Pre-test for Experimental and Controlled Groups

Name .....Std. Code.....

Choose the correct answer and put a mark (x) in a, b, c or d on the answer sheet provided.

Items	a	b	c	d
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Answer Key of Pre-test for Experimental and Controlled Groups

1. d	2. b	3. a	4. d	5. d
6. c	7. a	8. c	9. d	10. d
11. c	12. a	13. d	14. b	15. b
16. c	17. d	18. d	19. d	20. a

Appendix F
Post-test for Experimental and Controlled Groups

Post-test for Experimental and Controlled Groups

Multiple-choice questions. (Items: 20 Time: 90 minutes)

Directions:

1) Read 3 passages;
   - Passage I: Chicken and Geese
   - Passage II: Make an eye-catching display
   - Passage III: String trimmer trouble-shooting
2) Choose the correct answer and put a mark (×) in a, b, c or d on the answer sheet provided.

Passage I: Chicken and Geese (Items 1-7)

Chicken and Geese

Chickens and geese are types of birds and have wings and feathers. Chickens and geese differ in what they eat and how they find food. Chickens are peckers. They scratch the ground for grains and seeds. Geese are grazers. They use their flat bills with tooth to eat grass. Geese will choose a partner and mate for life. Chickens are different: a rooster (the male) usually mates with more than one hen (the female) in its lifetime.

Both the goose (the female) and gander (the male) care for their young. The hen takes care of its chicks. Chicks can peck at food from the moment they are born, but the mother hen must give them food at first and teach them how to search for it.

Both types of birds move together as a flock. As a group, they find food and protect each other. Within a flock, one bird will become the boss.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 41)

1. Geese graze on ..... for food.
   a. seed
   b. grass
   c. grain
   d. a, b and c are correct

2. Chicken peck at ..... for food.
   a. seed
   b. grass
   c. grain
   d. a, and c are correct
3. The ..... takes care of young chicks.
   a. hen
   b. geese
   c. rooster
   d. gander
4. The ..... mates with several hens in its lifetime.
   a. hen
   b. geese
   c. rooster
   d. gander
5. Geese and chickens act the same in ..... .
   a. eating
   b. a flock
   c. mating
   d. raising their young
6. Chickens and geese belong to ..... .
   a. the bird family
   b. the same family
   c. different families
   d. the lovely animal
7. Chickens and geese both have ..... .
   a. wings
   b. feathers
   c. peckers
   d. a and b are correct

Passage II: Make an eye-catching display (Items 8-14)

Make an eye-catching display

Customers will go to the stall with neat and clean produce. To draw customers to the stall, make a neat, eye-catching display by making a display is neat and clean, colorful, bountiful and being easy to see.

To make a display that's neat and clean. Clean your produce before you put it out. Remove any produce that is damaged or spoiled. Making a display that's colorful! Mix greens, reds, yellows, whites, and so on. The colors of your produce will appeal to customers. To make a bountiful display! Make it look like you have a lot of produce. Customers are more likely to shop at a booth that has a big selection. If you have only a small amount of produce, space out them on the tables.

Furthermore, make a display that's easy to see. Slant them toward the customer. Put your produce at an elbow level. This lets customers see the produce.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 15)

8. The customers like to go to the stall that is ..... .
   a. neat and clean
   b. fresh and delicious
   c. bigger and clean
   d. b and c are correct
9. How many tips does the writer give to draw customers to the stall?
   a. 3
   b. 4
   c. 5
   d. 6
10. How to draw customers to the stall?
   a. By selling a lot of produce.
   b. By making a neat display.
   c. By making an eye-catching display.
   d. b and c are correct

Choose a, b, c or d below to be the answers of items 11-14

a. To mix all different colors.
b. To keep display well filled throughout the day
c. To prop up boxes and slant produce at an elbow level
d. To wash or wipe off dust or mud, and remove spoil or damaged produce

The ways to draw customers to the stall by making produce

11. bountiful
12. colorful
13. neat and clean
14. easy to see and touch

Passage III: String trimmer trouble-shooting (Items 15-20)

STRING TRIMMER TROUBLE SHOOTING	
What's the Problem?	**Possible Causes**
The engine starts up, and then dies right away.	The carburetor may be clogged up with dirt.
The engine starts up more slowly than usual.	1. Grass may be wrapped around the blades. 2. Mud may be struck on the blades. 3. The blades may be too blunt.
The engine gets too hot.	1. The engine may be overworked. 2. The engine fan may be dirty or clogged up.
Smoke comes out of the engine and petrol can be smelled.	The engine may have more petrol in than it will hold.
The cord doesn't slide back in after pulling.	The spring may be broken.

(Adapted from: Susan Echaore-Yoon, (n.d.). **Read To Work Agriculture**: Cambridge Adult Education, A Division of Simon & Schuster. Upper Saddle River : New Jersey. p. 85)

15. The engine on a string trimmer gets too hot, what should you do?
    a. Clean the blades.
    b. Put in a new spring.
    c. Check the carburetor.
    d. Stop the machine right away.
16. What happen if a string trimmer might not start up?
    a. The spring might be broken.
    b. The engine fan might be dirty.
    c. The blades might be too blunt.
    d. The engine might have too much fuel in it.
17. Which of these things is not on the trouble-shooting table?

a. To fix each problem.
b. The engine gets too hot.
c. The engine dies when starting up.
d. The cord does not slide back in after pulling.

18. what might happen if you put too much petrol in a string trimmer?
    a. Petrol will be smelled.
    b. The petrol will over flow.
    c. Smoke might come out of the engine.
    d. a, b and c are correct
19. What might happen if the cord does not slide back in after pulling?
    a. The spring may be broken.
    b. The blades may be too blunt.
    c. The engine has too much fuel.
    d. The carburetor is clogged up with dirt.
20. The engine stays on for a few seconds and then stops. What part of the machine should be checked?
    a. The engine fan.
    b. The carburetor.
    c. The spring and blades.
    d. a, b and c are correct

Answer Sheet of the Post-test for Experimental and Controlled Groups

Name .....Std. Code .....

Choose the correct answer and put a mark (x) in a, b, c or d on the answer sheet provided.

Items	a	b	c	d
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Answer Key of the Post-test for Experimental and Controlled Groups

1. b	2. d	3. a	4. c	5. b
6. a	7. d	8. a	9. b	10. c
11. b	12. a	13. d	14. c	15. d
16. c	17. a	18. d	19. a	20. d

Appendix G

The Difficulty, Reliability and Validity for Pre- and Post-tests

The Difficulty, Reliability and Validity for Pre-test by Using Technique 27% of the Statistical Program of the Item Analysis Table by Jung The Fan.

Difficulty and Discrimination Coefficient for Each Item of the Pre-test

Items	p	r	Delta	Zr
1	.91	.05	7.6	.05
2	.88	.61	8.2	.71
3	.77	.76	10.1	1.00
4	.52	.62	12.8	.73
5	.34	.33	14.6	.34
6	.40	.66	14.0	.79
7	.52	.62	12.8	.73
8	.63	.45	11.7	.48
9	.52	.62	12.8	.73
10	.52	.62	12.8	.73
11	.48	.37	13.2	.39
12	.52	.62	12.8	.73
13	.44	.29	13.6	.30
14	.36	-.08	14.4	.08
15	.47	.55	13.3	.62
16	.59	.18	12.1	.18
17	.30	.82	15.1	1.16
18	.45	.71	13.5	.89
19	.19	.72	16.5	.91
20	.28	.48	15.3	.52
Mean	.50	.54	12.9	.60

Results for Content Analysis of Pre-test

Numbers of test	20
Numbers of answer sheet	40
Mean	10.3250
Standard deviation	3.6769
KR-20 value	.7014
Standard Error	2.0091

The Difficulty, Reliability and Validity for Post-test by Using Technique 27% of the Statistical Program of the Item Analysis Table by Jung The Fan.

Difficulty and Discrimination Coefficient for Each Item of the Post-test

Items	p	r	Delta	Zr
1	.36	.60	14.4	.69
2	.45	.71	13.5	.89
3	.26	.79	15.5	1.07
4	.52	.79	12.8	1.07
5	.31	.26	15.0	.27
6	.58	.71	12.1	.89
7	.58	.71	12.1	.89
8	.53	.45	12.7	.48
9	.48	.37	13.2	.39
10	.63	.45	11.7	.48
11	.22	.07	16.0	.07
12	.73	.51	10.5	.56
13	.58	.36	12.2	.38
14	.47	.55	13.3	.62
15	.53	.45	12.7	.48
16	.54	.08	12.6	.08
17	.81	.72	9.5	.91
18	.81	.72	9.5	.91
19	.78	.43	9.9	.46
20	.07	.50	18.9	.55
Mean	.51	.54	12.9	.61

Results for Content Analysis of Post-test

Numbers of test	20
Numbers of answer sheet	40
Mean	10.4750
Standard deviation	3.6605
KR-20 value	.7048
Standard Error	1.9890

Appendix H

Pre- and Post-test Scores of Experimental and Controlled Groups of Students

Table 1: Scores showing the English reading comprehension ability of Pre-test and Post-test of individual student of the experimental group

Student no.	Pre-test (20 points)	Post-test (20 points)
1	9	13
2	8	14
3	11	18
4	13	19
5	8	15
6	11	18
7	9	14
8	12	18
9	11	17
10	9	15
11	10	15
12	12	19
13	13	18
14	9	16
15	12	16
16	9	14
17	8	14
18	10	15
19	9	13
20	8	13
21	9	14
22	9	15
23	11	16
24	14	18
25	8	13
26	10	15
27	10	14
28	9	14
29	11	17
30	8	14

Table 1: (continued)

Student no.	Pre-test (20 points)	Post-test (20 points)
31	10	15
32	9	13
33	9	14
34	8	12
35	11	16
36	11	15
37	10	15
38	9	14
39	9	14
40	10	15

Table2: Scores showing the English reading comprehension ability of Pre-test and Post-test of individual student of the controlled group

Student no.	Pre-test (20 points)	Post-test (20 points)
1	9	13
2	9	12
3	11	15
4	8	12
5	8	12
6	9	14
7	10	14
8	12	18
9	12	16
10	8	13
11	9	13
12	8	14
13	8	13
14	8	12
15	12	14
16	11	16
17	9	15
18	8	11
19	10	13
20	9	13
21	10	14
22	9	13
23	11	16
24	10	14
25	11	14
26	8	14
27	10	17
28	9	13
29	10	15
30	10	16

Table2: (continued)

Student no.	Pre-test (20 points)	Post-test (20 points)
31	11	15
32	9	12
33	9	12
34	10	16
35	9	13
36	10	15
37	7	12
38	10	14
39	8	12
40	11	13

Author Biography

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Educational Background:

1986	Mathayom 6 from LampangKanlayanee School, Lampang
1990	Bachelor's degree from Chiang Mai University, Chiang Mai

Work Experience:

1990 - 1992	Teacher at Bali Satid School, Muang district, Chiang Mai
1992 - 1994	Teacher at Mea Charim School, Mea charim district, Nan
1994 - 1999	Teacher at Chaiyaphum College of Agriculture and Technology, Muang district, Chiayaphum
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