Schema Theory Discussion and Application

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I. Instructional Content Introduction

New Horizon College English (NHCE) is an EFL (English as a Foreign Language) course book series specially developed for non-English major postsecondary students, especially college students in China. NHCE is made possible as part of the Online Course Development Initiative of the Ministry of Education in China. NHCE is designed to conform to the requirements set forth by the National College English Teaching Syllabus. The NHCE website is intended for online EFL courses where students are engaged primarily through self study and supplemented by instructor-led learning. It can also be used in a traditional classroom setting to assist both EFL instruction and learning.

The NHCE course book series are available in three media formats: printed books, CD-ROM and the website. Contents and services provided in the three formats have their own unique features that are complementary to each other. The mixed usage of the three media formats of the NHCE course book keeps the great advantage of the traditional classroom English teaching method, while it also immensely promotes and encourages the adoption of Computer Assisted Language Learning (CALL) in China’ English learning teaching and learning, especially in the field of college English education.

This lesson will mainly focus on the introduction and demonstration of the CD-ROM format of NHCE course book. With the great advancement of Information Technology and in response to the great initiatives of the online course development in China, this CD-ROM was designed to promote personalized and self-paced English learning, without many restrictions of the time and place. As a supplementary resource to students’ EFL class learning, this CD-ROM
serves as a self-guided learning tool to help students improve their English skills by going through a systematic process such as pre-reading activities, new words, background information, reading skills, text and recording, structure analysis, exercise, etc.

After intensive and systematic learning of the series of 4 books, users of the CD-ROM course book will be expected to reach an intermediate level in their English language skills by mastering a vocabulary of 6,000 words and phrases and using them accurately in reading, speaking, and writing; understanding social and academic language in conversations and presentations at nearly normal speed; using everyday language and expressing intentions in a variety of settings and topics with confidence and fluency; reading, scanning, skimming and inferring for specific purposes in various forms of literature; writing short, cohesive, well-organized paragraphs by employing a variety of writing techniques. Students will also be expected to recognize the different cultures in different major English-speaking countries and speak or behave properly in different cultural settings.

There are 10 units of reading at each CD-ROM of the 4 series of the course book and each unit has 3 sections (Section A, B and C) of reading passages. Each unit of the CD-ROM course book will begin with a brief preview of the unit content and topics and there is a theme throughout each unit. Each section of the unit will also be composed of several individual parts and activities including Pre-Reading Activities, New Words, Background Information, Reading Skills, Text and Recording, Learning and Understanding, Structure Analysis, and Exercise. These different parts and activities in each section will be accompanied and supplemented by embedding pictures, playing audios, providing external links, highlighting language points, filling blanks, offering hints, etc.
In each section of the CD-ROM units, a short passage of appropriately 700 words will be presented to students. In the Pre-Reading Activities, students will listen to a short passage and prepare to answer some questions. Some suggested answers are also provided after each question. Students will learn new words and listen to the pronunciation of them in the New Words part. Students will also learn the passage in great length by going through different parts including Text and Recording, Background Information, and Learning and Understanding. In Learning and Understanding, students will also be guided to new words, language points and translation of the current section. Writing techniques will also be introduced in Text Structure Analysis. Language points will be reviewed and practiced in Exercise part.

II. Theory Description

Though Piaget first used the term schema in 1926, R. C. Anderson, as an internationally well-known educational psychologist, developed the schema theory and expanded the meaning of it. A schema is a hypothetical mental structure for representing generic concepts stored in memory and it is an abstract framework for building knowledge and understanding different objects as well as relationships among them. Schema is invariably used to interpret and predict situation occurring in the environment. Schemata consist of generic and abstract knowledge and they are used to guide encoding, organization, and retrieval of knowledge and information. Schemata also grow and change as new knowledge and information is obtained and processed. Information or knowledge will not be understood or will be difficult to understand if the information they obtained does not fit their current schema (Widmayer, 2005).

According to the schema theory, people generally learn by building on their previous knowledge, experiencing with people, objects and events as well as the cognitive processes.
People’s schemata are built through their experience with the world. Schema theory states that all knowledge is organized into units. Information is stored within these units of knowledge, or schemata. So before each instruction begins, people generally have their existing schema in mind. By identifying students’ existing schema, organizing the materials or by using some methods such as comparative organizer, advanced organizer, cuing students through organization, analogies or comparisons, providing practice in recognizing problem types, instruction is to help students modify their schemata by making connections between new and previous knowledge.

Generally there are three different kinds of reactions that learners can obtain new formation. Schemata can mainly be modified and augmented through these three processes: accretion, tuning, restructuring (Driscoll, 1994). Accretion is the process in which new information is remembered within the existing schema without changing the overall schema. Tuning process happens when the new information or experience cannot satisfy the existing schema so schema needs to develop to be more consistent with the existing information and experience accordingly. When tuning cannot accommodate the new information, restructuring happens by creating an entirely new schema to address the gap and inconsistencies between the old and newly acquired information and knowledge.

Besides schema, mental models as dynamic models for problem solving based on learners’ existing schema are also of great necessity in obtaining and interpreting information (Driscoll, 1994). Mental models are the basic mental structures which represent the world that people can use to interpret and understand specific facts and phenomena. These models can greatly help people understand the interaction and drive people’s performance. Identifying existing mental models involves finding out students’ prior knowledge and their experiences. Ways to identify students’ mental models include observing them, asking them for an
explanation, asking them to make predications, or asking them to teach other students (Jih & Reeves, 1992). An entry test before the start of a program or a course or questions asked at the beginning of the lesson could help to identify learners’ existing mental models or schema.

In applying and facilitating schema theory in practical learning activities, several methods could be adopted such as identify existing mental models or schema, using comparative organizer, cuing students to appropriate schema through organization, adopting pedagogical or conceptual model, advanced organizer, etc. In order to activate students’ prior knowledge, meaningful materials such comparative organizers could be used for elaboration opportunities. In organizing comparative organizers, materials could be organized and activities could be arranged to explore the relationship between ideas and to discriminate the similarities and differences in a set of related ideas.

To cue students to appropriate schema through organization, materials or activities will be arranged to facilitate performance and guide students so that appropriate schema could be activated to help students achieve some specific goals. Through the organization and arrangement of various educational content and certain activities, the discontinuity between students’ existing schema or mental model and the new schema information could be greatly bridged to facilitate the achievement of the final goals.

In the learning process according to schema theory, pedagogical or conceptual models are usually built and specified to comprehend students’ performance. Conceptual models usually include many different instructional types such as task analysis for identifying components of preexisting theories (DiSessa, 1982), inquiry model of instruction (Stevens & Collins, 1980), adoption of computer simulations (Lewis, 1993), etc., and all these pedagogical or conceptual
models offer an important supplement to different teaching methods. Different conceptual models need to meet different criteria such as learnability, functionality, and usability in order to facilitate learning (Norman, 1983). As one of many types of conceptual models, concept map is a map of concepts and their relationships. It describes both the nature and the organization of elements.

As a term coined by David Ausubel (Ausubel, 1959), advanced organizer is one of the most commonly used strategies for activating prior information and knowledge. Advanced organizer is the organization or presentation of abstract and general information to learners before introducing the details of the learning materials. Since learners’ prior and existing knowledge is of great importance in their learning, advanced organizers will greatly help learners to access relevant information and knowledge efficiently.

III. Theory Application in Instruction

1. Goals and Assessments

Though the general goal of the CD-ROM of the course book is to help students to achieve the intermediate level of English skills in listening, speaking, reading, and writing, students are expected to learn new words, phrases, sentence usage, cultural background, reading skills, etc. in each section of reading.

For students who have some prior knowledge of those new words, phrases or sentence usage, they just need to change their existing schema and mental model of the words and phrases to fit the new setting of those words and phrases usage in the reading article. For those students who have no prior knowledge of those new words, phrases, cultural background, etc., they will be guided through the different steps in each section to set up their schema and mental model of
the meaning and usage of those words, phrases or sentences. Students’ schema of different words, phrases, or cultural background will greatly affect their comprehension process in language communication, so they are greatly expected to set up or enlarge their current schema or mental model of the language usage.

Since CD-ROM format of the course book mainly provides students with asynchronous, self-paced, and self-directed English learning, students will only be able to evaluate their study at the end of the lesson in Exercise. In the Exercise part, key words, phrases, cultural information, sentence usage will be tested. After checking again the suggested answers, students will know whether they have changed or set up the proper schema or mental model to include all the new knowledge such as words, phrase, sentence usage, culture information, etc.

2. Instructional Sequence

The CD-ROM format of the course book will provide students with a self-directed and asynchronous form of English learning, with an aim to help students reach an intermediate level in their language skills. There are 10 units in each CD and in each unit, students will be learning one article and conduct some related activities and practices through the lesson. There are altogether 7 activities in each unit: Pre-reading Activities, New Words, Background Information, Text & Recording, Learning & Understanding, Structure Analysis, and Exercise. The whole arrangement of the 10 units serves as an advanced organizer, so whenever students open and enter the CD, they can easily preview the whole organization and through the general organization of the units, students will also be cued to the appropriate schema so that they know what they will do in their following steps.
In the pre-reading activity, students will be directed to listen to a short passage which is similar in content to the article they are going learn. Then they will be asked to post their own experience regarding the passage they just listened to. For example, if the article they will learn is “Learning a Foreign Language” in which the writer introduced his successful English learning experience from middle school to online learning. Then the pre-reading activity questions would be around what problems they have in trying to learn English in Middle school or what do they think computers can help them learn English, etc. The pre-reading activity helps to identify students’ existing schema so that students can easily modify or build their new schema basing on their existing schema throughout the lesson.

After pre-reading activity, students will move to the New Words section, in which they will listen to the pronunciation of the new words and phrases and understand the meanings of them. Students learn new words basically through the process of accretion and tuning. Taking the word “reward” for example, it can be used as both noun and verb. In the accretion process, if
students meet this word in the new article, and the meaning is consist with the meaning they have learned before, they thus can remember the word better. In the tuning process, if students only know that the word “reward” can be used as a verb, but in the new article, it is used as a noun, the new information cannot be fully accommodated under an existing schema, so their schema evolves to include the noun meaning.

Then students will move onto the Background Information section, in which they will be introduced with the all the related information regarding the article they will learn. In this section, the identification of background information will help activate students’ schemata and allow them to comprehend.

In the Text and Recording, students will listen to the recording of the article and the use of audio can help activate students’ information and schema in another way besides text.

Then students will be guided to the Learning and Understanding section in which the article with detailed instructor’s explanation will be presented. The presentation of well-developed concepts and explanations make explicit the important relationship among ideas. In this way, students’ schema can be well organized so that they can comprehend and memorize better.

In the Structure Analysis section, the whole structure of the article as well as the different relationships among different paragraphs serve as a conceptual model and it will be identified so that the overall organization of the article will be explicit to students.

In the last section, Exercise, students will be provided with comprehension questions regarding their understanding of the article they just read. They will also have many practices such as fill-in-blanks, or multiple choices and the questions are all related to the language points
they just learned in the article. This section also serves as a self-assessment tool to test students of what they have learned and it provides practice in recognizing problem types. The problems are also well organized and presented so that they match students’ modified or new schema and students will also be accessed of their relevant schemata through the practice of different types of problems.

**System Theory**

A system is a set of objects together with the relationships between those objects and between their attributes (Hall & Fagen, 1975). The CD-ROM format of NHCE course book per se is a system comprised of different course units, materials and students with intersecting relationships. The target system is also the CD-ROM format of NHCE course book and the goal of the system is to help improve students’ listening, speaking, writing and reading skills.

An open system is one which can interact with its environment (Bertalanffy, 1975) and as a system, my New Horizon English course is definitely an open system because most of the components inside the system such as students and materials are all related to and interacting with the environment. As an open system, the inputs are the efforts from both teachers and designers of the CD-ROM format of the course book. They need to collect appropriate teaching materials from different outside sources and revise them according to certain instructional principles. Materials will also be well arranged in order to help students improve in proper sequence. The outputs of the system are students’ improvements of their comprehensive English skills in listening, speaking, writing and reading. The system will also go through a series of processes between the teachers and students. For examples, as a system, the CD-ROM format of the NHCE course book received well-prepared and arranged materials from the teachers and designers, and students will also be greatly involved in the system by intensely learning English
from the CD-ROM according to the course sequence. After a certain period of time, students will improve their English skills, which are exactly the outputs of the target system.

To be more specific, the environment of the CD-ROM course is the setting related to the course which may include teachers, students, the English learning atmosphere, outside materials, etc., and they all can exert influence on the course. The suprasystem within this context would be other larger English teaching units such as English teaching in all higher education and the subsystems could be each teaching lesson within the 10 teaching units.

As an open system, the English teaching course will also follow the principle of equifinality, English teaching can reach its final state or goal in a number of different ways because of the interaction with the surroundings. For example, students can also learn and improve their English skills from other English learning resources beyond the CD-ROM materials.

Another important component in the system of English teaching course is feedback, through which the system can stabilize itself. This means the course will go smoothly if feedback can be collected in time to revise the related components. The feedback could be students’ responses, colleague teachers’ comments, or any other information about the English teaching course. Both positive and negative feedback can contribute to the final achievement of the CD-ROM course. For example, complimentary words from students will give the teachers or designers more confidence and they may design the course in a much better way that suit students. At the same time, mistakes pointed out by other teachers or students will help prepare a quality course.

Reference


