

## THE SPECIALIZATION AND SEMANTICS INTERPRETATION OF TEACHER TALK OF CIVIL ENGINEERING ENGLISH MOOC IN CHINA: THE LEGITIMATION CODE THEORY PERSPECTIVE

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Article Info	Abstract
<b>Article History</b> Received: May 2023 Revised: June 2023 Published: July 2023	<i>With the economic development of China, the need for Civil Engineering talents with English language skills is continuously increasing. To meet this need, Civil Engineering English teaching plays a significant role. This paper takes the Civil Engineering English MOOC provided by a university located in eastern China, as an example, and takes two dimensions of the Legitimation Code Theory, specialization and semantics to investigate the following research questions: (RQ1) What are the textual semantic features, specialization and semantics characteristics of the selected Civil Engineering textbook? (RQ2) What "unpacking" strategies does the teacher adopt in the teaching process and what are the textual semantic features, specialization, and semantics characteristics of teacher talk in the MOOC? (RQ3) From the perspective of specialization and semantics dimensions, are there any deficiencies in this MOOC? The purpose is to analyze the "unpacking" strategies in teacher talk and the possible problems in the teaching process. The content analysis method is employed, and the data include two aspects: one is the textbook the MOOC adopted; the other is the teacher talk. Through the analysis, we draw the following conclusions: the teaching material shows the characteristics of high lexical difficulty and high semantic density; in the teaching process, the teacher, who works as an "intermediary", mainly adopts "unpacking" strategies such as transforming knowledge code into knower code, improving learners' knowledge code, and reducing semantic density. However, some defects such as the lack of knower code in teaching content, semantic wave fracture, and the weak comprehensibility of the input content make it difficult to achieve the teaching goal of mastering the elite code. Given these defects, this paper tentatively puts forward some suggestions based on the adopted theory.</i>
<b>Keywords</b> Semantic interpretation; English MOOC; Teacher talk;	
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### INTRODUCTION

In recent years, with the rapid development of China's social economy and the increasing number of international exchanges, the need for training application-oriented international talents has become increasingly prominent. As an English course designed to meet the specific needs and purposes of learners, English for specific purposes (hereinafter referred to as "ESP") plays an important role in this process. As an important branch of the ESP teaching system, Civil Engineering English is the special English used in the construction of various land engineering facilities and other related industries. With the continuous advancement of "the Belt and Road Initiative", foreign construction investment projects of China are gradually increasing. According to relevant data, in 2018, China signed 7721 new contracts with foreign countries, involving an amount of US \$125.78 billion,

accounting for 52% of the total amount in the same period ([https://news.gmw.cn/2019-05/13/content\\_32825945.htm](https://news.gmw.cn/2019-05/13/content_32825945.htm)). This means that China needs more high-quality and professional engineering talents. Besides, Civil Engineering graduates will also face opportunities and challenges in overseas and foreign-related work. As of February 2020, there are about 554 undergraduate colleges and universities established Civil Engineering majors across China (<https://m.dxsbb.com/news/10454.html?clicktime=1582351447>). The number of graduates of this major has remained in the top ten among all majors in China in recent years (<https://xw.qq.com/cmsid/20201005A06Y2W00>). Therefore, how to make the graduates of this major have the ability to work abroad is an important task of the current Civil Engineering English teaching.

In recent years, with the “Internet + education” entering the higher education in China and the impact of the COVID-2019 pandemic, online education has become a new focus of attention. Many colleges and universities across the country use online teaching platforms such as MOOCs to carry out teaching. As regards Civil Engineering English courses, most institutions choose to adopt Chinese as the teaching language or adopt a bilingual way just like offline teaching. Several universities, such as Nanjing Forestry University, try to adopt full English teaching.

Under this circumstance, a study about the features of textbook and teacher talk of Civil Engineering English is essential. In the following part, this study takes Legitimation Code Theory (hereinafter referred to as “LCT”) as the theoretical foundation and chooses the Civil Engineering English MOOC provided by a university located in eastern China and its related materials as the research material to investigate the specialization and semantics features of the teaching material and MOOC teacher talk. We first briefly introduced the LCT and its specialization and semantics principles and explained its applicability in Civil Engineering English research and reviewed the research status of Civil Engineering English to find out the research gap and propose our research questions. Then we analyzed the textual semantic features based on theories in Systemic Functional Grammar, and specialization and semantics characteristics in the LCT to figure out the features and deficiencies, and from the theoretical perspective, we tried to propose some suggestions.

## **Literature Review**

### ***The LCT and Its Specialization and Semantics Principles***

Karl Maton, an Australian sociologist, proposed the LCT (Maton 2014) by inheriting and developing the code theory (Bernstein 1971) and the knowledge structure theory (Bernstein 1999) promoted by the famous British educational sociologist Basil Bernstein. The LCT has been widely adopted in language and discourse analysis in many fields such as linguistics, education, etc. According to LCT, Maton (2014) proposed five dimensions for the analysis of actors’ social practices and dispositions, that is, autonomy, density, temporality, specialization, and semantics, in which the principles of specialization and semantics are closely related to language teaching.

The premise for the establishment of the specialization dimension is that practice is related to its subject or object. The relationship between practice and its object is the “epistemic relation” (ER), and the relationship between practice and its subject or actor is the “social relation” (SR). Both of these two relationships may become stronger (+) or weaker (-). Stronger epistemic relations refer to practices that place firm boundaries and control around what can legitimately constitute objects of study and what procedures may be used. Stronger social relations refer to the placement of strong boundaries and control around who may be recognized as legitimate knowers (Maton, 2014). Maton (2014) further argues the need to move beyond dichotomizing typologies in educational research, and so visualizes

epistemic relations and social relations as intersecting continua that generate a Cartesian plane. This produces a topological space comprising four specialization codes: knowledge, knower, elite and relativist. The knowledge code (ER+, SR-) emphasizes the professional knowledge related to specific learning objects and desalinates the attributes of participants. The knower code (ER-, SR+) emphasizes the attributes of participants, which is utilized as a measure, of whether they are born or later developed. The elite code (ER+, SR+) emphasizes both the mastery of professional knowledge and the attributes of participants. Relativist code (ER-, SR-) has no requirements for professional knowledge and participant attributes (Maton 2016).

The semantics dimension has two sub-dimensions: semantic gravity (SG) and semantic density (SD). According to Maton (2011), semantic gravity refers to the degree to which meaning depends on context. Maton (2014: 110) elaborates that “the semantic gravity may be relatively stronger or weaker along a continuum. When semantic gravity is stronger, meaning is more closely related to its social or symbolic context of acquisition or use; when it is weaker, meaning is less dependent on its context”. Semantic density refers to the degree of condensation of meaning within socio-cultural practices (Maton 2014). The stronger the density, the more meaning are condensed; the weaker the density, the less meaning are condensed. Summarize the abstract principle from the concrete context, the semantic gravity will be weakened (SG-) and semantic density will be strengthened (SD+). Moving from generalizations and abstractions toward specific examples will strengthen semantic gravity (SG+) and weaken semantic density (SD-). The fluctuation of semantic density and semantic gravity will produce semantic waves.

The LCT, as a sociological framework for exploring the deep organizational principles of knowledge structure and educational practice, can be adopted to analyze the semantic features of texts and teacher talk of ESP in depth. In short, the specialization dimension reflects the subject’s requirements for epistemic knowledge and social knowledge, while the semantics dimension reflects the relationship between style and context. To be more specific, in terms of Civil Engineering English, from the perspective of specialization, it is a knowledge code that requires high professional knowledge and language skills. From the semantics perspective, it has a greater degree of semantic compression and less contextual relevance. From the perspective of specialization and semantics, in the Civil Engineering English MOOC, teachers can “unpack” professional knowledge through teaching practice. It can be concluded that the LCT can not only provide a new research path for analyzing the textual semantic features of textbooks for Civil Engineering English and teacher talk in MOOC courses but also provide a new research method for exploring the “unpacking” strategies of online teacher talk.

### ***The Research Status of Civil Engineering English***

ESP is a course that designs specific materials to meet the actual needs of learners and is worth noting. According to Alsamadani (2017), ESP is considered a teaching method for English as a foreign language and second language, aimed at improving students’ skills in understanding specific fields. In addition, ESP is the foundation of learning as it helps college students become more proficient in their field of study (Xhaferi & Xhaferi 2011). Besides, Salazar (2011) also pointed out that ESP is a course that focuses on providing students with specific skills required to carry out activities related to unique professional tasks.

In terms of the study of English teaching of ESP, in the research of Civil Engineering English, scholars abroad mainly explore its language features including aspects such as syntactic features, and vocabulary load (Hsu 2014); and Civil Engineering learners’ needs (Wulanjani 2018; Thepseenu 2020). In China, researchers often paid attention to translation (Chen 2021; Wang & Yu 2019), bilingual teaching practices (Wei 2007; Ji et al. 2007), etc.

Teacher talk is also a research hotspot; however, the main focus is on teacher-learner interaction in the offline classroom. After searching the relevant documents, we find that so far there is still a lack of special research on the textual semantic features of the Civil Engineering English textbook and the teacher talk in which teachers “unpack” the text in the online teaching process.

Based on this, the article takes the teacher talk and the teaching materials used in the Civil Engineering English MOOC course of a university located in eastern China as an example. From the dimensions of specialization and semantics of the LCT, it first analyzes the textual semantic features of the teaching materials. Then, the “unpacking” strategies adopted by the teacher in the teaching process will be investigated. Last, based on the whole curriculum, we will explore the possible problems and propose some suggestions.

This article tries to answer the following research questions: RQ1: What are the textual semantic features, specialization, and semantics characteristics of the Civil Engineering textbook? RQ2: What “unpacking” strategies does the teacher adopt in the teaching process and what are the textual semantic features, specialization and semantics characteristics of teacher talk in the MOOC? RQ3: From the perspective of specialization, and semantics dimensions, are there any deficiencies in this MOOC?

## **RESEARCH METHOD**

The textbook adopted in the MOOC course analyzed in this paper is <Civil Engineering English>, edited by Li Mingyue and first published and printed by Foreign Language Teaching and Research Press in October 2017. The textbook consists of 8 units: Introduction to Civil Engineering, Civil Engineering materials, Civil Engineering structure, bridge and tunnel construction, Civil Engineering project management, geomatics technology application, water resources engineering, architectural environmental engineering, etc. Every unit is divided into two parts. Each part consists of one article. The selected MOOC in this paper is produced by a university located in eastern China. Its teaching objects are Civil Engineering majors with CET-4 (College English Test Band 4) and other people who are interested in this course. The teacher who teaches this course is from the School of Foreign Languages of this university. As of February 28, 2023, this MOOC has been held five times in total, with a total number of 7227 participants.

The research method used is a content analysis of the Civil Engineering textbook and the “unpacking” strategies of teacher talk, including the textual semantic features based on the theory of Systemic Functional Grammar and the specialization and semantics characteristics according to the LCT.

## **RESEARCH FINDINGS AND DISCUSSION**

In this part, we follow the guidance of research questions and report the research findings and discuss those findings. It is divided into three parts, and each part discusses one research question.

### **RQ1: What are the Textual Semantic Features, Specialization, and Semantics Characteristics of the Civil Engineering Textbook?**

#### ***Textual Semantic Features of the Civil Engineering English Textbook***

Vocabulary and grammar are the fundamental elements of discourse construction. Halliday (2014) pointed out that vocabulary and grammar can embody textual semantic features, that is to say, textual semantic features can be reflected through vocabulary and grammar. Therefore, when we analyze the textual semantic features of Civil Engineering

English, we can start from two aspects: vocabulary and grammar. The lexical features of Civil Engineering English are mainly reflected in the following three aspects:

(1) Technical terms and expressions are frequently used. For example:

*Example:* More significantly, the **overturning moment** and the **shear deflections** produced by **lateral forces** are much large and must be carefully provided for.

The extensive use of technical terms and expressions is a typical feature of scientific discourse (Halliday 2005). As shown in Example a, the “overturning moment”, the “shearing deflections” and the “lateral forces” are technical terms often used in Civil Engineering English, which is an essential feature to distinguish it from general English or other special English.

(2) Special expressions are often used. For example:

*Example:* A **DTM** is an ordered array of numbers representing the spatial distribution of terrain characteristics stored in a computer so as to enable determination of any quantitative data pertaining to terrain.

“DTM” in the above example is the abbreviation of “Digital Terrain Model”. The understanding of such special expressions as abbreviations needs professional knowledge of Civil Engineering. In scientific texts, this kind of expression belongs to “technical grammar”, which needs to be specifically elaborated (Halliday 2005).

(3) Grammatical metaphors are frequently used. For example:

*Example:* **Monitoring of structural deformation** requires the highest possible **accuracy of measurements**.

As shown in the above example, the “monitoring of structural deformation” is a noun phrase, and “accuracy” and “measurement” are the nominalization of “accurate” and “measure”. Noun phrases and nominalization are the main ways to generate grammatical metaphors, which are the commonly used language expressions in scientific discourse (Halliday 2005).

The grammatical feature of the textbook is grammatical complexity, which is mainly reflected in the following three aspects:

(1) The lexical density of clauses is high. For example:

*Example:* Being able to provide a high accuracy positioning in a cost-effective manner, GPS has found its way into the civil engineering industry, replacing the conventional methods in the most cases.

High lexical density is one of the basic means of blending information in scientific discourse (Halliday 2005). According to Halliday (2014), the calculation method for lexical density of clauses is the ratio of the number of notional words to the number of clauses. The underline words in the above example are notional words. It includes 1 clause and 19 notional words. Therefore, the lexical density of this clause is 19.

(2) Passive voice is frequently used. For example:

*Example:* Civil engineering works **are often done** in a complex and unfriendly environment, making it difficult for personnel to operate efficiently.

(3) Frequently use subordinate clauses and participle phrases as attributive or adverbial. For example:

*Example:* The effectiveness in accomplishing the construction mission is based on mission time reliability **assessed using the probability of interference between load measured in the number of days required for the project**, and the capacity **which is taken as the available allotted resources**.

As shown in the above two examples, the three portions in bold show the utilization of passive voice, subordinate clauses, and participle clauses, which can increase the length of clauses and integrate more information. Ultimately, the complexity of grammar and the difficulty of understanding will both increase.

### ***Specialization Features of the Civil Engineering English Textbook***

Based on the above analysis, we can find out that Civil Engineering English discourses contain complex syntactic and lexical applications. The mastery of this kind of discourse not only requires learners to master the relevant professional knowledge, but also requires the learners to have language skills. According to the specialization dimension in the LCT, this kind of discourse belongs to the knowledge code. Learners have unique characteristics in their cognitive level of knowledge and language skills, which belongs to the knower code. Following the Guide and the MOOC teaching team's interpretation of teaching objectives, the purpose of Civil Engineering English teaching is to cultivate learners' language application ability and professional quality based on improving learners' professional knowledge and language skills, to use English for communication in cross-cultural contexts.

To achieve this goal, not only the language skills and professional knowledge required, but the corresponding cultural literacy is also prominent. Hence, the teaching goal typically belongs to the elite code, which is the sum of the knowledge code and knower code. On the contrary, learners' daily discourse has lower requirements for language skills and professional knowledge. Therefore, it belongs to the relativist code. After professional training, teachers have mastered relevant professional knowledge and language skills and can interpret texts in various ways in the classroom. Therefore, teachers can play the role of "intermediaries" between knowledge code and knower code in the teaching process. To sum up, classroom teaching is a process in which the teacher, as the "intermediary", transforms the knowledge code, which refers to the textbook, into the knower code, which is equal to the learners' knowledge, so that the learners can learn and master the knowledge code, and ultimately master the elite code, to meet the requirements of the syllabus and work practice.

### ***Semantics Features of Civil Engineering English Textbook***

From the semantics dimension, compared with the general English learners learned earlier, the Civil Engineering English discourse frequently uses power words, which refers to the professional terms which have a strong semantic density in specific disciplines (Martin 2013), such as special terms, nominalization, noun phrases, and power grammar, which is closely related to grammar metaphor, such as special expressions, complex sentence patterns, and high lexical density clauses. Halliday (1985) proposed the classical model of grammatical metaphor. He divided it into conceptual grammatical metaphor and interpersonal grammatical metaphor according to the meta-function realized. The core of power grammar is a conceptual grammatical metaphor, which is mainly embodied in transitivity. One of the important manifestations is nominalization, which usually refers to the transformation of consistent verbs and adjectives into metaphorical nouns, that is, the transformation of processes and attributes in the original clause into the central word in the noun phrase. He then pointed out in his analysis of grammatical metaphor in scientific discourse that nominalization is a

process of reinterpreting schema, and the widespread use of nominalization is an important feature of scientific discourse (Halliday 2004).

Martin (2013), from the perspective of LCT, holds a similar view that nominalization can improve the semantic density of discourse through its technical and abstract characteristics and promote the construction of non-cognitive knowledge. Halliday (1998) emphasized the role of noun phrases, which are the basic means for grammar to package words to achieve high lexical density, and are powerful resources for expressing meaning. The frequent use of the power words and power grammar such as noun phrases and nominalization can integrate more information and make the text more abstract and refine, which ultimately strengthens the semantic density and weakens the semantic gravity of the text and improves the specialization and abstraction of the discourse.

## **RQ2: What “Unpacking” Strategies does the Teacher Adopt in the Teaching Process and What are the Textual Semantic Features, Specialization and Semantics Characteristics of Teacher Talk in the MOOC?**

During the teaching process, the teacher divided each chapter into four parts to carry out teaching: pre-reading, terms and expression, text study and critical thinking. After the overall analysis of the selected material, we find that the “unpacking” strategies adopted by the teacher can be analyzed and explained from two aspects: vocabulary and grammar. The following part will first analyze the “unpacking” strategies for vocabulary and sentence patterns, and then explains them from the perspective of specialization and semantics dimensions.

### ***The “Unpacking” Strategies IN Teacher Talk***

Through the analysis of the whole curriculum, it is found that the “unpacking” strategies adopted in Chapter 6 “GPS applications in Civil Engineering” is the most typical. Therefore, this paper takes Chapter 6 as an example to analyze the text content, teacher talk, and PPT materials. The statistical results are shown in Table 1. The number of clauses in the table is calculated according to the basic standard of grammar. The average sentence length is calculated by dividing the total number of characters by the total number of clauses, with two decimal places reserved. Since the PPT materials contain a lot of content presented in terms of nouns and verb phrases, the average sentence length is not calculated. The number presented in the table is the number of the presented PPTs.

Table 1  
Text, Teacher Talk and PPT Material Content in the Selected Corpus

	Text	Teacher Talk	PPT Material
Total Character	1232	1073	548
Total Number of Clauses/PPTs	59	79	13
Average Sentence Length	20.88	13.58	

According to Kang and Chen (2011), the functions of teacher talk in foreign language teaching classrooms in China can be classified into four categories: language input, teaching implementation, classroom management, and social communication. Due to the lack of interaction in online teaching, the teacher of the selected course only carries two functions: language input and teaching implementation. The former refers to presenting the pronunciation or usage of language in the way of demonstration and providing language examples. The latter refers to explaining language knowledge or providing other relevant information in the way of a direct explanation. We view the teaching implementation as the

process of the teacher unpacking the text content. The PPT materials play an auxiliary role to unpack both the text content and teacher talk. In the language input part, namely, the Pre-reading part and the Words and Expressions part, the text content in the textbook can be regarded as a part of the vocabulary unpacking method since it shows the written version of the related vocabulary. The Critical Thinking part is to let learners solve problems in imagined scenes, which aims to cultivate learners' creative thinking. It belongs to the simulation practice part with no "unpacking" activities carried out. Through the analysis of the vocabulary and grammar, it is found that the MOOC teacher has adopted one vocabulary "unpacking" strategy and two grammar "unpacking" strategies, and the PPT content assists the "unpacking" process.

#### (1) Vocabulary "unpacking" strategy

In the vocabulary teaching process, the MOOC teacher mainly utilizes demonstration as the language input method. The teacher selects complex words to illustrate in the Word and Expression section and compares the general meaning with the special meaning in Civil Engineering. For example, in general English, the word "coordinate" means "to organize the different parts of an activity and the people involved in it so that it works well" or "to make the different parts of your body work well together", and in Civil Engineering English, it means "either of two numbers or letters used to fix the position of a point on a map or graph". In the Pre-reading section, the professional terms and special expressions that appear in the text are explained in detail, such as the full name of the professional abbreviations RTK (Real-time Kinematic), INS (Inertial Navigation System), etc.

#### (2) Grammar "unpacking" strategies

The MOOC teacher mainly adopts strategies such as unpacking complex sentence patterns into simple ones, reducing gerund phrases into clauses connected by conjunctions, etc. As mentioned above, Civil Engineering discourse has the characteristics of grammatical complexity, among which the frequent use of passive voice is one of its important features (as shown in 1a). In the unpacking process, the teacher talk transforms the passive voice into the active voice (as shown in 1b), making the sentence subject and meaning clearer and easier for learners to understand.

(1a) In these applications, the operators will be guided through an on-board computer display, eliminating the need for the old conventional methods.

(1b) GPS can guide operators through an on-board computer display, eliminating the need for the old conventional methods.

In addition, when the teacher unpacks sentence patterns in which the verb phrase is used as an attribute or adverbial, the corresponding components are usually converted into the logical semantic relationship between clauses. For example:

(2a) Being able to provide a high accuracy positioning in a cost-effective manner, GPS has found its way into the civil engineering industry, replacing the conventional methods in the most cases.

(2b) GPS has found its way into the civil engineering industry, because it can provide a high accuracy positioning. And it can replace the conventional methods in the most cases.

Utilizing the lexical density calculation method, Example 2a contains two verb phrases with a lexical density of 20. In the process of explanation, as shown in 2b, the teacher

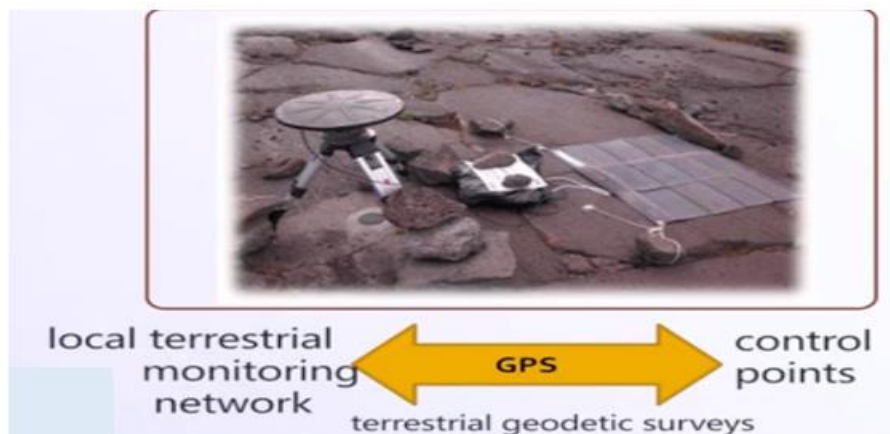


transforms the first verb phrase that indicates the reason into a clause guided by “because” to make its logical meaning clearer. The second verb phrase is converted into a clause with a simpler grammatical structure. The lexical density is reduced to 5.33, which lowers the difficulty of understanding.

### (3) PPT assisted “unpacking” strategies

The teacher adopts PPT materials to present the main points of the text content and complex clauses and illustrate the meaning of emphasized words. In this process, PPT materials and text content as well as teacher talk are abstract and concrete relationships. The teacher utilizes pictures and teacher talk to provide specific information so that learners can understand the content more clearly. In the text teaching part, the teacher presented 13 PPTs to illustrate the text content. For example, when explaining the connection mode established during GPS application, the teacher first unpacks the text content (as shown in Example 3a and 3b), and then use pictures (as shown in Figure 1) to illustrate it:

- (3a) In the applications, GPS is usually combined with terrestrial geodetic surveys providing a connection between the local terrestrial monitoring network and control points established outside the area affected by mining.
- (3b) GPS is also not adopted alone. It is combined with terrestrial geodetic survey. As can be seen in this picture, GPS combined with terrestrial geodetic surveys provides the connection between the local terrestrial monitoring network and control points to help mining.

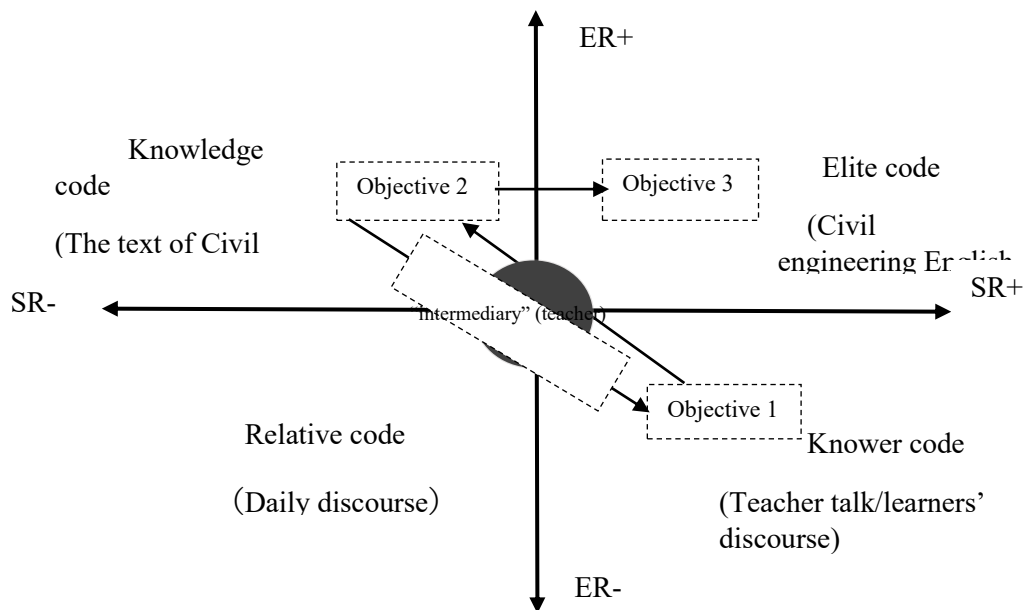


**Figure 1.** The diagram of GPS connection in MOOC in Civil Engineering

### ***Specialization Interpretation of the “Unpacking” Strategies of Teacher Talk***

As mentioned earlier, one of the important reasons for the obscurity of the Civil Engineering English textbook is the complexity of the vocabulary, which is embodied in the use of technical terms, special expressions, nominalization, and noun phrases. In order to solve this problem, the research finds that the teacher mainly takes the form of demonstration and provides language examples for language input. From the specialization dimension in LCT, the content of the text in Civil Engineering textbooks belongs to the knowledge code, and the technical terms and special expressions are the typical representatives. The teacher, as the “intermediary”, utilizes the teacher talk with basically the same language level as the learners’, namely the knower code, to explain the professional knowledge (Objective 1). This process is the process of improving learners’ knower code so that learners’ knower code can be gradually transformed into knowledge code consistent with the text content (Objective 2),

laying the foundation for the later text “unpacking”. Figure 2 shows the types of discourse represented by different codes and the path to achieving the teaching objectives.



**Figure 2.** Specialization features of MOOC teacher talk in Civil Engineering English and the path to achieve the teaching objective

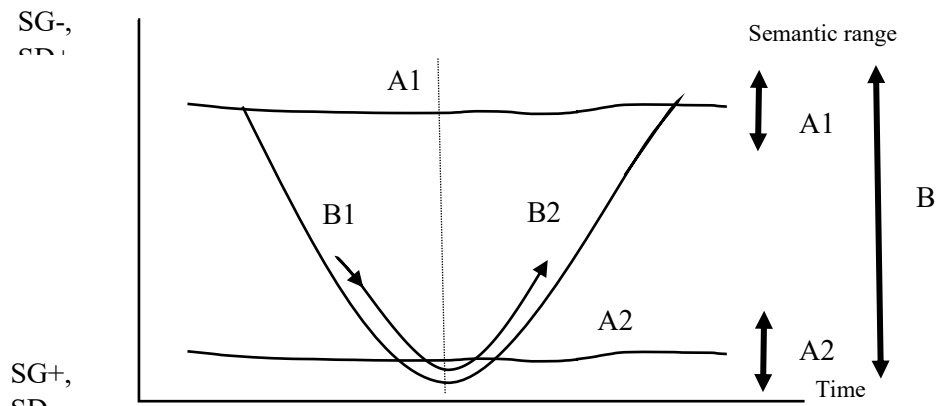
### *Semantics Interpretation of the “Unpacking” Strategies of Teacher Talk*

As mentioned earlier, at the lexical level, high lexical density is one of the basic means of combining semantic information in Civil Engineering English texts. The higher the lexical density, the more difficult the clause is to be understood. At the grammatical level, in order to express a more complex experience, the sentence patterns of Civil Engineering English are basically elegant, that is, it has completed the process of “packing” from simple clauses into phrases or “packing” from two or three clauses into one clause. Generally speaking, such texts are characterized by higher semantic density and lower semantic gravity. In the teaching process, reducing semantic density is the main strategy adopted by the teacher, such as transforming complex sentence patterns into simple ones, simplifying semantic information, reducing the difficulty of understanding the texts as a whole, etc.

In addition, most of the semantic concepts in Civil Engineering English texts are abstract. Therefore, in the teaching process, the interpretation of abstract concepts with concrete and contextualized discourses, that is, to strengthen the semantic gravity of the text content, is also an important means to promote learners’ understanding. Besides, the teacher usually utilizes intuitive pictures to explain the complex content. From the semantic dimension, the strategies adopted by the teachers can enhance the connection between the text content and the context and can strengthen the semantic gravity.

Represented by the semantic profile proposed by Maton (2013), as shown in Figure 3, the text content of Civil Engineering English is complex and abstract, with high semantic density and low semantic gravity, which can be represented by the kinked line A1. The discourse that learners learn and use in the general English class is easier and closely related to the context, which can be expressed as A2. The “unpacking” process carried out by the

teacher in the teaching process is the process of transforming the A1 semantic profile into the A2 semantic profile, which can be viewed as B.



**Figure 3.** Semantic profile of the MOOC teacher talk in Civil Engineering English

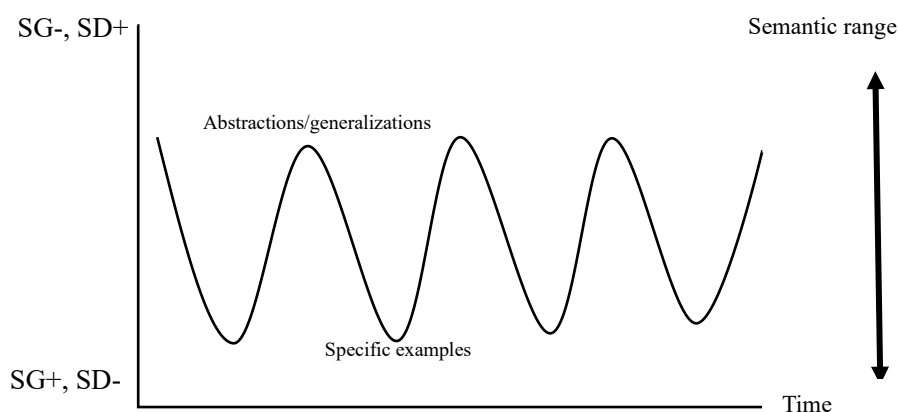
### **RQ3: From the Perspective of Specialization, and Semantics Dimensions, are There Any Deficiencies in This MOOC?**

From the specialization dimension of LCT, in order to achieve the ultimate teaching objective, that is, to let learners master the elite code (Objective 3), this course still has certain deficiencies. As mentioned above, the goal of Civil Engineering English teaching is to enable learners to use professional English to carry out work in cross-cultural contexts. To achieve this goal, learners are required to have both solid professional knowledge and excellent language skills as well as corresponding cross-cultural communication skills. This requires teachers to carry out cross-cultural teaching while imparting professional knowledge and language skills. However, in the MOOC selected in this research, the teacher mainly focuses on unpacking the vocabulary and grammar in the text. Although the critical thinking section includes simulation practice, it does not involve professional application in cross-cultural communication. Therefore, in the process of teaching, specific contextualized teaching of cross-cultural communication can be added to enhance learners' cross-cultural awareness and intercultural communication ability, so as to improve learners' practical ability of professional English.

From the semantics dimension, the teacher talk of this MOOC course has some difficulties in constructing a complete semantic wave. In the process of teaching, the textbook induces knowledge from the specific context through power vocabulary and power grammar and constructs a professional knowledge network structure at a more abstract level. Its strong semantic density and weak semantic gravity create conditions for the following "unpacking" process. The teacher utilizes power vocabulary and power grammar to "repack" knowledge, so that it can be returned to the knowledge network structure constructed by the textbooks, promote the cumulative construction of knowledge, and form a complete semantic wave of teacher talk (Maton 2013), as shown in B1-B2 semantic profile in Figure 3. In this process, deduction and induction are indispensable. Otherwise, knowledge construction behavior without "legitimation" will be formed, which will eventually lead to the failure of cumulative knowledge construction. In the MOOC, the teacher unpacks the abstract and complex knowledge in the textbook, reduces the semantic density of the discourse in the textbook, and makes the complex discourse and sentence patterns clearer. However, the teacher stayed on the interpretation of the difficult and abstract concepts and did not rise from the specific

details to the abstract level, resulting in the semantic wave breaking, and finally presenting the semantic profile shown in B1 in Figure 3, which is not conducive to the gradual deepening of learners' knowledge.

In addition, in the MOOC, part of the teaching content is completely consistent with the teaching material, and its semantic profile stays in the form of A1 in Figure 3, which does not realize the “unpacking” of the teaching material, that is, the teacher talk only reaches a certain amount of input, and does not meet the essential requirement of comprehensibility. Meanwhile, the teacher omitted part of the teaching content which leads to the lack of input content, which is also the reason why the number of clauses in the teacher talk is less than the number of clauses in the textbook. Broken semantic waves, texts without “unpacking” and missing content are difficult to achieve the established teaching objectives. The ideal semantic profile in teaching process is shown in Figure 4:



**Figure 4.** The ideal semantic profile of the MOOC teacher talk in Civil Engineering English

Moreover, from the perspective of teachers, “with particular characteristics, ESP calls for the interdisciplinary knowledge to meet the needs of learners. Accordingly, teachers’ role changes dramatically from the traditional language lecturer to multiple roles” (Luo & Garner 2017: 81). However, the teacher in charge of this course is a teacher for English majors. The teaching object is Civil Engineering majors. The lack of professional knowledge about Civil Engineering affects the realization of the teaching objectives. The teaching of Civil Engineering needs professional teachers who have both high English language skills and professional knowledge to carry out teaching and realize the transformation from special English to general English.

## CONCLUSION AND IMPLICATIONS

MOOC is a revolution of teaching and learning and is an important engine to promote the reform of higher education. Applying the LCT dimensions of Specialization and Semantics to analyze this MOOC course enables nuanced illumination of aspects of its underlying structures and processes and reveals the deep characteristics of Civil Engineering English discourse and the teacher talk, as well as penetrates its shortcomings from a theoretical perspective, which can promote the realization of the teaching objective, thus promoting the development of all-English teaching of ESP, the teaching of complex texts, the construction of online courses and the internationalization of Chinese colleges and universities.

In recent years, the COVID-19 pandemic has had a profound impact on the development of education practitioners and the online teaching field. During this period, MOOC was used more widely and frequently. In the post-epidemic era, education in China has entered a new stage of high-quality development. Giving full play to the advantages of online education has an important role in achieving the goal of building a high-quality education system. This study can provide a new theoretical basis and perspective for the curriculum design and discipline development of ESP to a certain extent.

Further research is suggested to adopt more research perspectives to conduct in-depth research on other subject areas, curriculum types, and audience groups, focusing on “unpacking” and other teaching strategies used to improve learners’ professional language skills. These can be schematized in forms enabling comparison with other courses, within ESP and other disciplines. Further research is suggested to build an increasingly refined picture of variations in the forms of specialization and semantic coding within the practice of individual ESP teachers, and between disciplines in varying pedagogic contexts, across different aspects of the subject, and through time. Comparisons of variations in forms of specialization and semantic coding with other home language subjects taught in China would also be instructive in identifying how different communities of learners are being inducted into practices.

## REFERENCES

- Alsamadani, H. A. Needs analysis in ESP context: Saudi engineering students as a case study. *Advances in Language and Literary Studies*. 2017, 6: 58-68.
- Bernstein, B. *Class, Codes and Control: Theoretical Studies towards a Sociology of Language*. London: Routledge and Kegan Paul. 1971.
- Bernstein, B. Vertical and horizontal discourse: An essay. *British Journal of Sociology of Education*. 1999, 2: 266-279.
- Chen, T. Z. On language system characteristics and translation of Civil Engineering English [土木工程英语的语体特征及翻译]. *Chinese Science & Technology Translators Journal*. 2014, 4: 1-3.
- Halliday, M. A. K. *An Introduction to Functional Grammar*. London: Edward and Arnold. 1985.
- Halliday, M. A. K. Things and relations: Regrammaticizing experience as technical knowledge. In: Martin, J. R. & Veel, R. (eds). *Reading Science: Critical and Functional Perspectives on Discourses of Science* (pp. 49-101). Athens: University of Athens Press; 1998.
- Halliday, M. A. K. *The Language of Science*. London: Continuum. 2004.
- Halliday, M. A. K. *Halliday's Introduction to Functional Grammar* (4th ed). Revised by Matthiessen, C. M. I. M. London: Routledge. 2014.
- Halliday, M. A. K. & Martin, J. R. *Writing Science: Literacy and Discursive Power*. London: Falmer Press. 2005.
- Hsu, W. 2014. Measuring the vocabulary load of engineering textbooks for EFL undergraduates. *English for Specific Purposes*. 2014, 33: 54-65.
- Ji, J., Zhou, X. W. & Han, X. L. Reflection and exploration on implementing bilingual teaching in Civil Engineering courses [对土木工程专业课程实施双语教学的思考和探索]. *Theory and Practice of Education*. 2007, S1: 139-140.

- Kang, Y. & Cheng, X. T. A new framework of the functions of foreign language teachers' classroom discourse [外语教师课堂话语功能新框架.外语教学理论与实践]. *Foreign Language Learning Theory and Practice*. 2011, 3: 7-14.
- Luo, J. & Garner, M. The challenges and opportunities for English teachers in teaching ESP in China. *Journal of Language Teaching and Research*. 2017, 8: 81-86.
- Maton, K. Theories and things: The semantics of disciplinarity. In Christie, F. & Maton, K. (eds). *Disciplinarity: Functional Linguistic and Sociological Perspective* (pp. 62-84.). London: Continuum. 2011.
- Maton, K. Making semantic waves: A key to cumulative knowledge-building. *Linguistics and Education*. 2013, 24: 8-22.
- Maton, K. *Knowledge and Knowers: Towards a Realist Sociology of Education*. London: Routledge. 2014.
- Maton, K. Legitimation code theory: Building knowledge about knowledge-building. In Maton, K., Hood, S. & Shay, S. (eds). *Knowledge-building: Educational Studies in Legitimation Code Theory* (pp. 1-23.). London: Routledge; 2016.
- Martin, J. R. Embedded literacy: Knowledge as meaning. *Linguistics and Education*. 2013, 10: 23-37.
- Otto, P. Choosing specialized vocabulary to teach with data-driven learning: An example from civil engineering. *English for Specific Purposes*. 2021, 61: 32-46.
- Salazar, A. S. Designing an EGBP Course: Needs analysis as a key determinant. *Memorias de Las Jornadas de Lenguas En Contacto*. 2011: 133-142.
- Thepseenu, B. Needs analysis for ESP course development: Thai Civil Engineering students' perspectives. *Asian Journal of Education and Training*. 2020, 3: 433- 442.
- Wang, T. Y. & Yu, G. F. The lexical features and translation strategies for English for Civil Engineering [论土木工程英语的词汇特征及翻译]. *Chinese Science & Technology Translators Journal*. 2019, 1: 9-11.
- Wei, D. M. Practice and reflection on bilingual teaching of Civil Engineering courses [土木工程专业课程双语教学的实践与思考]. *Theory and Practice of Education*. 2007, S1: 138+140.
- Wulanjani, A. N. Exploring students' need for developing material of English for Civil Engineering. *Journal of English Language, Literature, and Teaching*, 2018, 1: 1-11.
- Xhaferi, B., & Xhaferi, G. The English language skills in ESP for law course. *LFE: Revista de Lenguas Para Fines Especificos*. 2011, 17: 431-448.