

Strategies for Structured Knowledge Construction in Secondary English Reading Teaching Guided by Schema Theory

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Abstract: Many drawbacks in traditional English reading teaching, such as fragmentation of information and superficiality of thinking level, have seriously hindered the development of students' deep understanding and critical thinking ability. To address these problems, this paper explores the intrinsic connection between cognitive schema and structured knowledge based on schema theory, and puts forward the following suggestions: "Do a good job of pre-course introduction, link students' background knowledge"; "Integrate classroom key points, present a clear mind map" and "Enhance information literacy, AI boost structured knowledge generation" and other construction strategies, aiming at improving students' English reading ability, realizing the transformation from knowledge to literacy, and providing teachers with certain ideas and methods for the construction of structured knowledge in reading teaching.

Keywords: Schema Theory, Reading Instruction, Structured Knowledge, Knowledge Construction Strategies.

1. Introduction

English reading teaching is the main way to implement the core literacy of the new standard, and it has always been the type of class that English teachers focus on, and it is also the type of class that has the most amount of class time in the curriculum arrangement, however, at present, there are still numerous problems in the teaching of English reading, such as fragmentation of textual information, superficiality of thinking level, fragmentation of the structure of the text, rigidity of the teaching mode, and utilitarianism of following the examination questions closely, etc. These pain points affect the students' the cultivation of reading ability, reducing the efficiency of reading teaching, and also not conducive to the achievement of the core literacy goals of the English discipline^[1]. Fragmented and fragmented knowledge makes it difficult for students to build a systematic cognitive structure, weakens their overall understanding of the reading materials, prevents them from building a coherent knowledge framework, and also affects the ability of in-depth comprehension and comprehensive application, limiting the development of their critical and creative thinking. The English Curriculum Standards for General Senior Secondary Schools (2017 Edition Revised in 2020) states that structured knowledge is constructed for the purpose of solving problems, transferring and applying the structured knowledge framework to new contexts, creatively solving problems in unfamiliar situations, realizing in-depth learning, and facilitating the transformation of competence into literacy^[2]. The purpose of English reading teaching does not lie in the simple learning of language knowledge and skills, but should pay more attention to guiding the improvement of students' thinking quality and the cultivation of problem solving ability, and structured knowledge with hierarchy, logic and coherence can effectively improve the mechanical memorization caused by fragmented teaching and build the meta-knowledge framework needed for problem solving in real life. How to "design language practice activities such as experience, imitation, comprehension, application and other logically

related activities around the theme in teaching and relying on the parts of speech to help students construct structured knowledge based on the theme"^[3] is a topic that teachers need to continue to work on.

Constructing structured knowledge around themes helps deepen and expand students' cognition, realizes the deep integration of knowledge structure and theme meaning, and promotes the enhancement of students' core literacy^[4]. Based on the concept of English curriculum standards, we explore the intrinsic connection between schema theory and structured knowledge in English, and propose strategies for constructing structured knowledge in English reading teaching, which takes up a relatively high proportion of secondary school hours, with a view to providing a little help and inspiration for English teachers who are interested in how to construct structured knowledge.

2. Schema Theory and Structured Knowledge of English

2.1. Schema Theory

Different scholars have different understandings of schema, but it is generally believed that it was the British psycholinguist Bartlett (Bartlett) who first applied this concept in 1932^[5], and later Piaget inherited and developed the schema theory, he believed that, schema refers to the individual's way of perceiving, understanding, and thinking about the world, and it is the framework or organizational structure of human mental activities, and it is human's It is the framework or organizational structure of human mental activities and the basis of human cognition. Schema is the knowledge structure of known things or information stored in the human brain, it is a kind of abstract knowledge structure in which human beings store their existing knowledge and life experience, and the stored knowledge determines the way human beings understand and observe things^[6]. It plays an intermediary role in connecting new and old knowledge, and is the basis for understanding things, with the characteristics of structure, coherence, dynamics and wholeness^[4].

Illustrations can be divided into three types: linguistic schema, content schema and formal schema. Linguistic schema refers to the reader's mastery of the language of the original text, such as phonological, lexical and grammatical knowledge. Content schema refer to an individual's understanding of knowledge structures and concepts within a particular topic or field, including traditional practices and values within a particular cultural context, terminology, theories and practices within a discipline or field, etc. Formal schema refers to an individual's understanding and knowledge of the structure, organization, and presentation of a particular type of text, which requires the reader's mastery and understanding of the entire chapter structure^[7].

2.2. Structured Knowledge of English

Bruner, a pioneer of the Western school of structuralism, emphasized that "comprehension of basic principles and concepts is the gateway to appropriate "training transfer". To understand things as special cases of something more general - and herein lies the point of understanding more fundamental principles or structures - is to have to learn not only particular things, but also a pattern that helps to make sense of other similar things that one might encounter^[8]. It can be argued that the essence of such a pattern is the structured knowledge emphasized in the new standards, which helps students to transfer their knowledge structures and solve problems creatively in new situations. When teaching any subject, it is important to guide students to understand its core framework, which not only reflects the systematic nature of knowledge, but also maps the universal connection between things. Only with a deep grasp of the root structure of the discipline can students gain insight into the intrinsic connection between the knowledge of the discipline and similar things in new contexts^[9].

English structured knowledge, as an integrated form of knowledge that blends language, thinking and culture, is shaped by the internal logic and cultural elements of the text as well as by the readers' pre-existing knowledge and cognitive patterns in the process of its formation. This kind of knowledge is crucial to an in-depth understanding of textual themes, without which the deeper meaning of the text is difficult to be captured and comprehended^[10]. However, domestic scholars' research on structured knowledge in English has only increased year by year since the 2017 version of the General High School English Curriculum Standard, which was promulgated and implemented in January 2018, with the keywords "knowledge construction" and "structured", "structured new knowledge", "knowledge constructor" and so on gradually entered the vision of scholars and teachers. However, research on structured knowledge construction strategies is still limited, and many secondary school teachers are still at a loss as to how to construct structured knowledge.

2.3. The Relationship between Schema Theory and Structured Knowledge in English

As mentioned above, schema theory and structured knowledge are similar in nature. Together they facilitate the organization and understanding of knowledge, enabling individuals to integrate new information with existing knowledge to form a richer and more systematic cognitive structure. Schema support the learning of new knowledge by activating an individual's background knowledge, while structured knowledge organizes information through logical

relationships between concepts, enhancing memory effects and depth of understanding. Both contribute to learning transfer, enabling knowledge to be recombined and applied in different contexts. In the field of education, both schema and structured knowledge are important pedagogical tools that teachers can use to improve teaching and learning by activating students' schema and providing structured knowledge. With the constant input of new information, illustrations and structured knowledge can also demonstrate adaptability, constantly adjusting and updating to keep knowledge current and relevant.

3. Strategies for Structured Knowledge Construction in Secondary English Reading Teaching Guided by Schema Theory

The more commonly used reading modes guided by schema theory are "top-down" and "bottom-up". Among them, "top-down" emphasizes the strategy of reading from the whole to the parts, starting from the existing knowledge experiences (schema) in the mind, making overall predictions, and gradually advancing downward to learn the knowledge structure of the lower levels. On the other hand, the "bottom-up" mode of reading emphasizes starting from the smallest units of the text (e.g., words and phrases), gradually constructing an understanding of the whole text, and continuously enriching, adjusting and even reconstructing the original knowledge structure in the mind to achieve cognitive refinement and renewal. Regardless of the model, how to effectively construct structured knowledge, overcome the fragmentation and fragmentation of reading teaching, and improve the quality and efficiency of reading teaching is what teachers and students should pay attention to and explore.

3.1. Make a Good Pre-class Introduction and Link to Student Background Illustrations

In English reading teaching, the pre-lesson introduction is crucial, which not only provides a bridge for students to transition to the new learning content, but also lays a solid foundation for subsequent in-depth reading by activating the original knowledge structure in students' minds. An effective pre-reading induction can stimulate students' curiosity and motivation, help them establish the connection between old and new knowledge, and thus improve learning efficiency and depth of understanding.

Effective introductions include the KWL sheet and the first organizer. Teachers can use the KWL chart as a strategy to guide students through the first two steps of filling out the KWL chart, i.e., thinking about and expressing what they know and what they want to know. In the Know section, students review and share their knowledge about the topic they are about to learn, activating their background schema and preparing them for new knowledge. In the "Want to know" section, students ask questions about the topic and their interests, which helps the teacher to understand their learning needs, focuses the instruction, and stimulates their desire to explore and develop learning expectations. Teachers can also provide prior organizers, which present general information prior to formal instruction, to help students make connections between new and old knowledge. With prior organizers, teachers can provide an overview of key concepts or topics, or use stories or examples that are more likely to capture students' attention. This information serves as an

"anchor" for learning and helps students connect new knowledge to their existing knowledge structures and experiences. For the lower grades of secondary school, such as the first year students, because of educational differences, or age differences, some students may not have the basic activated structured knowledge in their minds, for these students, it is more effective to require them to do a good job of preview. In the context of highly developed modern information technology and multimedia technology, English reading teaching can also make full use of tools such as video, animation, VR, AR, etc. to create intuitive and vivid introductory links to activate the existing knowledge structure in the minds of the students, and to lay a good foundation for the subsequent in-depth reading and the quantitative change of structured knowledge.

3.2. Integrate Classroom Essentials and Present Clear Mind Maps

Mind Map is a graphical tool for thinking and organizing information, introduced by British psychologist Tony Buzan in the 1960s. It demonstrates the relevance of concepts, vocabulary, tasks, or other items through a radial structure of central ideas or themes. Specifically, it is a visual representation of the internal cognitive structure, which visualizes the tacit knowledge in the human brain in the form of a diagram, orienting and guiding the new content currently being learned, directing the learner to find relevant or common points of contact between the old and new knowledge, integrating the new information into the existing knowledge system so as to promote the integration of knowledge, and realizing the internalization of the new knowledge and the construction of meaning^[11]. In English reading teaching, teachers should carefully design the board to present the main points of the class on the blackboard in the form of a mind map. Such visual presentation not only helps students to follow the teacher's thoughts in class, but also to recall and review the classroom content through the mind map after class, so as to deepen their understanding and memorization of the knowledge points. Teachers should choose key vocabulary, concepts or themes as the nodes of the mind map and clearly mark the connections between them with lines to ensure that students can grasp the core content and knowledge structure of the class at a glance.

[Case 1]

"A Material World" is a character story centered on the theme of "Wealth and Happiness". The text begins with a story about a college professor, Charles Gray, who donated millions of his family's money to charity, and describes the changes in the professor's material and spiritual life before and after the donation. The text begins with a report on the story of a college professor, Charles Gray, who donated his millions to charity, and a description of the changes in his material and spiritual life before and after the donation. The teacher first puts students in the thematic context of "wealth and happiness" and asks them to think about how they would solve a similar problem, so as to activate students' background knowledge of the values of happiness and wealth; then she leads students to sort out and integrate the factual information in the text, and to discover that the main character, Charles Gray, went from being rich to being poor but his emotions went from being unhappy to being happy. The fact that his emotions change from unhappiness to happiness. Teachers can first encourage students to draw their own information structure charts before and after the main character's donation,

and then present the complete and accurate structure charts on the blackboard. Because there are four states in the text, namely, the past and the present, as well as the material and spiritual states of life, the combination of two and two can form four spaces, namely, "material life in the past", "spiritual life in the past", "material life in the present" and "material life in the present". Each space is supported by corresponding subordinate information, so that the basic mind map in Figure 1 can be drawn. By linking the detailed information in each section to the theme, we can further summarize the keywords in the higher level to form the mind map in Figure 2.

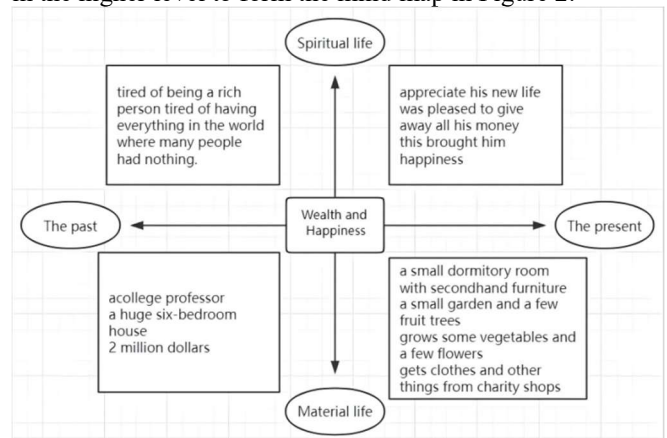


Figure 1. Mind map of basic information on Charles Gray's life statuses

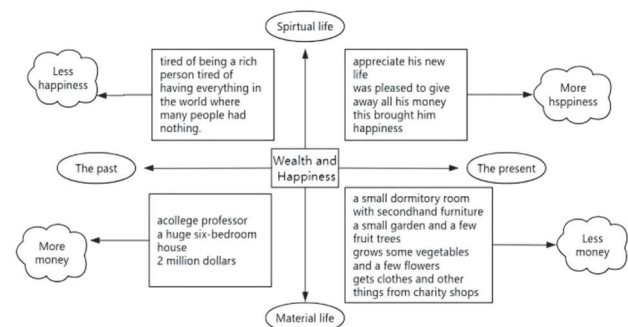


Figure 2. Mind map of the relationship between wealth and happiness for Charles Gray

3.3. Enhancing Information Literacy, with AI Facilitating the Generation of Structured Knowledge

The advent of the information age marks that human society has entered a brand-new stage of development, exerting a profound impact on the ways of human production and life. In the field of education, informatization has facilitated the rapid dissemination and sharing of knowledge, and the Internet and digital media have made the acquisition of information within reach, greatly enriched people's knowledge reserves and horizons, and improved the efficiency and quality of teachers' teaching. Especially since the introduction of ChatGPT (an artificial intelligence dialog system based on language models), it can be said that every aspect of people's lives has been affected. Functions such as, information retrieval, writing coaching, content creation, automatic translation, and data analysis have greatly reduced teachers' workload. The new English standard for the 22nd edition of compulsory education emphasizes that teachers

should be aware of the diverse means and resources that information technology brings to English teaching and the key role it plays in promoting educational innovation and pedagogical change. They should keep abreast of the progress in the application of information technology in English language teaching, actively build an information-based teaching environment, and use online platforms to develop personalized, high-quality courses to support students' independent learning. At the same time, teachers should integrate the concept of "Internet Plus", deepen the combination of technology and curriculum, promote blended learning, and enhance the efficiency of English learning^[3]. Therefore, under the dual instructions of feasibility and policy requirements, we suggest that teachers should improve information literacy and use AI tools to help construct structured knowledge in the process of English reading teaching. The following is a case study of using IT to map structured knowledge:

[Case 2]

The main text "Longji Rice Terraces" of Unit 6 At one with nature of the English Compulsory Study in high school introduces the natural landscape of Longji Rice Terraces in Guangxi, China, and the human stories behind it. The theme focuses on the rice terraces, which were built by the Zhuang and Yao people over hundreds of years. The content not only depicts the spectacular scenery of the terraces, but also delves

into the reasons for their construction, the wisdom of their design, and the agricultural practice of living in harmony with nature. The generation of structured knowledge for this article can be carried out in the following steps: first, the teacher chooses an efficient and stable AI intelligent website, such as tongyi tongyi and Kimi, and familiarizes himself with the basic operations, such as the way of asking questions, and the entrance of attachment delivery. Second, the teacher sets an identity for the AI: an ordinary high school English teacher, and informs the AI system of the basic concepts and requirements of English discourse analysis, so as to limit the scope of the AI's answers and make the answers more accurate. Third, the original text of "Longji Rice Terraces" was uploaded and the instruction "Please analyze Longji Rice Terraces according to the discourse analysis requirements provided" was issued. Fourth, to ensure the accuracy of the final structured knowledge, the AI can be used to dig deeper into the relationship between the title of the text "Longji Rice Terraces" and the title of the unit "At one with nature" to deepen the main idea of the text. Main Idea. Finally, provide the definition of structured knowledge in the standard and the elaboration of structured knowledge in the high-quality papers, and ask them to map out the structured knowledge of the text according to the definition. Figure 3 shows the final result of the above process:

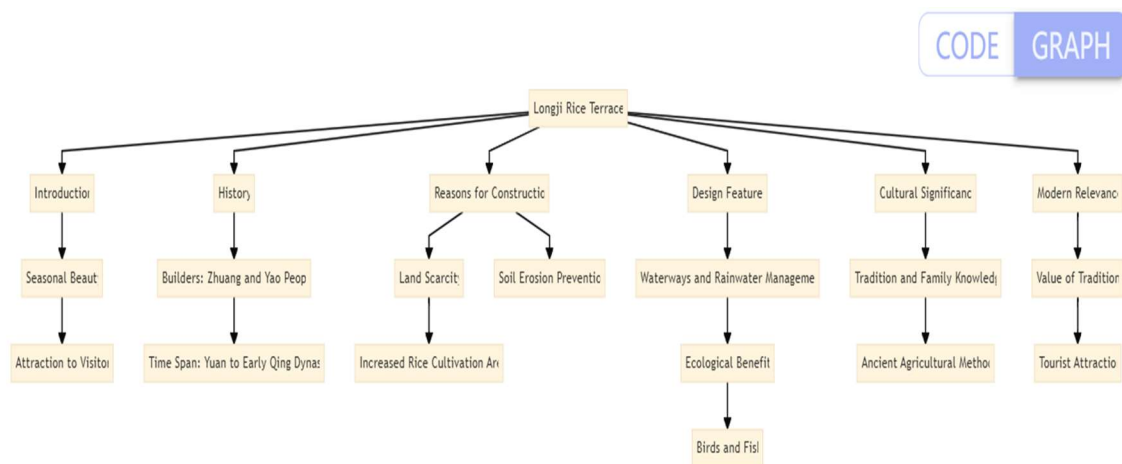


Figure 3. Mind map of Structured Knowledge for the text *Longji Rice Terraces*

We can see that the center node is "Longji Rice Terraces", which represents the core theme of the article. The first level of nodes represents the main sections of the article, including the opening introduction, history and scale, reasons for construction, design and ecology, cultural and traditional significance, modern significance and tourism. The second level nodes further refine the key concepts of each major section, such as "Seasonal Description" and "Attraction to Visitors" in the opening introduction, "Builders" in the history and scale, and "Tourism" in the history and scale. "Builders" and "Timeline" in History and Scale. Tier 3 nodes provide more specific details, such as "Waterways System" and "Ecological Benefits" in Design and Ecology.

Through such a structured representation, students can clearly see the logical framework of the text and understand the connection between different concepts, thus grasping and memorizing the content of the text more effectively.

4. Conclusion

In the current educational context, the construction of structured knowledge has become an important part of English teaching. Through specific teaching cases, this paper shows how to guide students to gradually construct a systematic knowledge system in English reading teaching and continuously enrich their original cognitive structure. Structured knowledge is not only the key to understanding the text and exploring the meaning of the theme, but also an important tool to promote students to realize deep learning and improve the quality of thinking. For primary and secondary English teachers, this is both a challenge and an opportunity. Teachers should actively explore ways and means to effectively build structured knowledge, and overcome the drawbacks of fragmented knowledge, superficial interpretation and fragmented discourse in reading teaching.

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