

Connotations and Strategies of the “Chain of Questions” in High School English Reading Instruction from the Perspective of Deep Learning

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Abstract: Currently, a number of issues persist within the process of high school English reading instruction. Certain teachers concentrate solely on imparting fragmented linguistic knowledge, neglecting the cultivation of students’ thinking skills and the promotion of deep learning. However, deep learning offers a novel perspective for high school English reading pedagogy. The design and execution of the “question chain” present an innovative approach to facilitating deep learning in high school English reading instruction. Distinguished from the conventional, formulaic reading teaching methodology, the “question chain” guides students to engage in in-depth textual processing, characterized by its targeted, hierarchical, and logical nature, thereby fostering profound comprehension and deep learning outcomes. This paper endeavors to analyze the connotations of deep learning, elucidate the implications of the “question chain”, and investigate specific design strategies for the “question chain” within the context of high school English reading instruction.

Keywords: Deep-learning; “Question Chain”; English Reading Teaching in High School.

1. Introduction

The “English Curriculum Standards for General Senior High Schools (2017 Edition)” stipulates that the content of the English curriculum encompasses six key elements: themes, discourses, linguistic knowledge, language skills, cultural knowledge, and learning strategies. Among these, language skills comprise listening, speaking, reading, writing, and viewing, which serve as avenues for students to acquire and form contextualized, structured linguistic knowledge from discourses, appreciate rich cultural connotations, comprehend and express meanings, analyze and discern intentions, explore emotional attitudes and values, and develop their thinking qualities and autonomous learning abilities through the application of learning strategies[1]. Reading instruction stands as an effective approach and primary battleground for cultivating students’ core competencies in the English discipline. It serves as a foundation for students to develop cultural awareness, thinking qualities, and learning abilities. Effective reading instruction can enhance students’ proficiency in applying basic linguistic knowledge, foster their thinking qualities, broaden their cultural horizons, and improve their intercultural awareness and intercultural communicative competence.

Since the initiation of the new curriculum reform in senior high school English education, the issue of teachers’ “cramming” teaching approach has been alleviated to a certain extent, providing students with more opportunities for participation and engagement. However, problems of fragmentation, superficiality, and labeling still persist in English reading instruction. Teachers often overlook the cultivation of students’ critical thinking and the inculcation of correct values[2]. With the implementation of the new senior high school English curriculum standards, the question of how to effectively cultivate students’ higher-order thinking and develop their autonomous learning abilities in senior high school English reading classes has garnered widespread attention from numerous scholars and frontline teachers. The

proposition of deep learning offers a fresh perspective for addressing the issues in senior high school English reading instruction and nurturing students’ core competencies in the English discipline. Deep learning refers to a meaningful learning process where students, under the guidance of teachers, actively and deeply process the information provided, engage in highly immersive thinking, and continuously expand and extend their learning.

Based on the concept of deep learning, this paper explores the instructional design of the “chain of questions” in senior high school English reading instruction, aiming to guide students in deep thinking, autonomous questioning, and collaborative learning, thereby cultivating their higher-order thinking and autonomous learning abilities oriented towards the core competencies in the English discipline.

2. Connotation of Deep Learning

The concept of deep learning originates from research in computer science, artificial neural networks, and artificial intelligence. Deep learning research can be primarily categorized into two domains: deep learning within machine learning and deep learning within educational research. This paper focuses on deep learning in the educational context. In 1956, Bloom, in his work “Taxonomy of Educational Objectives,” implicitly introduced the idea of deep learning through his discussion of cognitive objectives. He proposed that learning could be divided into deep and surface levels, with educational objectives progressing from shallow to deep, encompassing six hierarchical levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. In recent years, many scholars have argued that the first two levels pertain to surface learning, while the latter four levels correspond to deep learning. Surface learning emphasizes understanding and memorization of knowledge, whereas deep learning emphasizes the application of knowledge, the development of higher-order thinking skills, and the cultivation of problem-solving abilities. Deep learning is a process of active knowledge construction,

transfer, and application to solve problems based on comprehension[3].

In the domestic educational landscape, He Ling and Li Jiahou were among the first to define the concept of deep learning. They described deep learning as a process where learners critically engage with new ideas and knowledge, integrating them into their existing cognitive structures to establish interconnections among various concepts. Learners are able to transfer their existing knowledge to new contexts, make decisions, and solve problems[4]. Deep learning is characterized by five features: activity and experience; association and structure; essence and variation; transfer and creation; and value and evaluation[5]. Despite differing perspectives in defining deep learning, its commonality lies in its orientation towards the development of higher-order thinking. It requires learners to actively construct structured knowledge based on comprehension and to creatively analyze and express through the involvement of higher-order thinking. Furthermore, it involves the meaningful learning process of transferring internalized knowledge to real-world contexts. Deep learning in the English language emphasizes the application of critical thinking to solve complex problems in the real world.

In summary, deep learning underscores student-centeredness, guiding students to construct structured knowledge based on comprehension, promoting deep thinking and processing, and grasping the essence of learning content. Through output activities such as communication and interaction, students internalize external knowledge, effectively integrating old and new concepts, and creatively transferring new knowledge to real-world contexts to solve novel problems. This facilitates the transformation of knowledge into abilities and abilities into competencies, fostering students' higher-order thinking, autonomous learning abilities, and cultivating their core competencies in the discipline, ultimately achieving educational goals.

3. Interpretation of the “Chain of Questions” in High School English Reading Instruction from the Perspective of Deep Learning

The “chain of questions” refers to a sequence of interconnected questions. It is a teaching strategy derived from classroom instruction and represents a novel approach to designing questions for classroom activities. Effective classroom questioning can fully mobilize students' enthusiasm, guide them to concentrate, actively participate in classroom activities, and engage wholeheartedly in learning.

(1) Connotation and value of the “chain of questions”

The chain of questions comprises a series of related sub-questions that are interconnected around a specific theme and core question, following a logical sequence. These questions are not scattered, isolated, or inefficient; rather, they are interrelated, structural, and hierarchical, centered around a particular theme. By solving each sub-question within the chain, the ultimate goal of addressing the core question is achieved. This approach allows for a holistic and systematic consideration of all aspects involved in the questions, thereby enabling a more comprehensive resolution.

The questions within the chain fall into two categories. The first category includes questions aimed at confirming facts, assessing comprehension, or verifying information. These questions typically have a lower cognitive level and can be

classified as recall questions, display questions, or classroom management questions. The second category of questions primarily aims to encourage student communication and enhance their critical thinking skills. These high-level questions are also referred to as referential questions or creative questions without a single correct answer.

The chain of questions plays a crucial role in high school English reading instruction within the framework of deep learning. One method to improve students' English reading abilities is through questioning. Effective questioning enables students to gain a deep understanding and internalization of the text by contemplating questions, attempting to answer them, and engaging in internalized communication. Furthermore, it allows students to transcend the text, applying internalized linguistic and cultural knowledge to real-world contexts around specific themes to solve authentic problems, better preparing them for practical skills required in their future aspirations.

In English reading instruction, the chain of questions typically refers to a series of contextual, structural, and hierarchical question scaffolds proposed by teachers based on in-depth text analysis and thorough understanding of students' learning conditions. These scaffolds are centered around the thematic significance of the text to help students perceive and comprehend the content and structure of the text, construct structural knowledge, analyze and evaluate the deeper meaning of the text, internalize structural knowledge, correctly grasp the text's values, apply structural knowledge, and achieve transfer and innovation.

According to the teaching functions of the chain of questions, it can be categorized into introductory chains, exploratory chains, progressive chains, summative chains, and transfer chains in English reading classrooms[6]. The questions within the chain pertain to the reading text itself, covering aspects such as the text's theme, genre, structure, details, inferences, values, author's attitude, and background knowledge. They also involve students' existing knowledge, cognitive levels, emotional attitudes, as well as knowledge and skills they have yet to master. The chain of questions links students' learning levels, the relevant content of the reading text, teaching objectives, and learning objectives, forming a coherent and progressive sequence. Each sub-question serves as a catalyst for students' cognitive development, guiding them from superficial to in-depth understanding of the text's content and structure, constructing and internalizing structured knowledge, expressing themselves creatively, and enhancing their abilities to identify, analyze, and solve problems. This approach facilitates deep learning at a higher cognitive level, thereby developing students' essential qualities and key competencies in the English discipline.

In summary, the chain of questions in English reading instruction is an effective reading strategy that helps students better comprehend the content, structure, and meaning of the text, promoting the occurrence of deep learning.

(2) “Chain of questions” linking deep learning

The instructional design centered around the “chain of questions” serves as a means and approach to achieving deep learning in high school English reading instruction. The concept of deep learning provides directional guidance for the design of the chain of questions in this context, with the two being interconnected and mutually reinforcing, jointly promoting the development of students' core competencies in the English discipline.

The teaching of the chain of questions, grounded in

problem situations, offers an external field for guiding students towards deep learning. By situating the chain of questions within specific problem contexts, it transforms traditional reading instruction, which primarily focuses on vocabulary and grammar knowledge, into a problem-solving-oriented approach. This enables students to delve deeper into the understanding of reading texts and themes through the process of analyzing and solving problems.

The teaching of the chain of questions, with an emphasis on transfer and thinking, provides an internal impetus for promoting students' deep learning. The chain of questions, structured around core problems, offers a possible framework for realizing deep learning.

The chain of questions drives students to think deeply and construct knowledge through a series of interconnected yet independent questions. It guides students from the level of information extraction to the levels of text evaluation and cognitive enhancement, thereby facilitating the resolution of the dilemmas currently faced in high school English reading instruction. Some existing studies have indicated that English teachers generally pay attention to the application of the chain of questions in English reading classes and recognize its significant role. However, there are still problems in the current practice of high school English reading instruction, mainly involving four aspects: the rigid design methods of the chain of questions, excessive difficulty of the questions, superficial understanding of the text, and the difficulty in cultivating higher-order thinking[7].

The factors influencing the design of the chain of questions in high school English reading instruction not only include students' cognitive levels, prior experiences, and emotional attitudes but also encompass multiple factors such as teachers' correct understanding and scientific application of the essence and characteristics of the chain of questions. In view of this, the design of the chain of questions guided by the concept of deep learning offers a new pathway to address such issues.

4. Strategies of the “Chain of Questions” Approach in High School English Reading Instruction from the Perspective of Deep Learning

(1) Understanding students' learning conditions, analyzing texts, setting teaching objectives, and identifying core questions

The primary task in designing a chain of questions is to understand students' learning conditions, including their existing cognitive levels and knowledge experiences. Only by fully comprehending students' reading abilities, thinking capacities, and knowledge reserves can teachers provide appropriate scaffolding, design suitable problem contexts, and activate students' prior schemata. Secondly, teachers should conduct in-depth text analysis to clarify the themes and topics covered in the reading text, grasp its main content and details, understand its writing characteristics and language style, discern the values and emotional attitudes conveyed, and grasp the author's writing intentions and style. Based on the analysis of students' learning conditions and text analysis, teachers should determine the teaching objectives for the reading lesson, specifying what learning outcomes students should achieve. Considering students' existing cognitive levels and the difficulty of the reading text, teachers should identify core tasks, distinguish between teaching priorities and difficulties, and lay the groundwork for the

subsequent design of the chain of questions.

(2) Designing the chain of questions based on learning conditions and text analysis, and initiating problem exploration

The fundamental feature of deep learning is “activity and experience,” emphasizing students' active participation in activities and their genuine experiences and feelings, with students always placed at the center of teaching and learning. Therefore, based on learning conditions analysis and text analysis, teachers should design questions that provide students with thinking space, avoiding simple “yes or no” questions. Teachers should closely adhere to the essential characteristics of deep learning, focus on students' activities and experiences, and design a chain of interconnected and progressive questions that align with teaching objectives, considering the development process of students' thinking. In designing the chain of questions, teachers should adhere to the principles of goal-orientation, hierarchy, and logicity. Firstly, the design of the chain of questions should closely revolve around teaching objectives, avoiding the proposal of ineffective questions and ensuring that the questions contribute to the achievement of teaching objectives. Secondly, the chain of questions should be hierarchical, progressing from simple to complex, from basic to advanced, gradually guiding students towards deeper thinking. Finally, the chain of questions should be logical, with each question in the chain possessing a certain logical sequence that guides students to think and explore in a logical manner. On this basis, teachers should guide students to actively participate in the classroom, think critically about problems, and express their viewpoints enthusiastically, with the chain of questions serving as the main thread. Teachers and students should jointly explore the thematic meaning centered around the thematic context of the reading text. According to the three main stages of a reading lesson, the chain of questions can be roughly divided into three levels, each of which unfolds around the characteristics of deep learning.

In the pre-reading stage, students are guided to prepare for formal reading, with a focus on surface learning. The design of the chain of questions in this stage is based on students' existing cognitive experiences, bridging old and new knowledge, and stimulating students' interest and attention in the text. The chain of questions in this stage aims to provide students with a preliminary perception and awareness of the text's topic and background knowledge. In the while-reading stage, through the guidance of the chain of questions, students sort out, summarize, and integrate the thematic content and details in the text; form structured knowledge based on the text; and flexibly apply it in specific language contexts. In the process of group cooperation and communication, students assimilate or accommodate the structured external knowledge with their prior schemata, thereby forming new schemata, internalizing external knowledge, and actively expressing their viewpoints. The post-reading stage emphasizes transfer and innovation. Therefore, the design of the chain of questions in this stage focuses on guiding students to infer, demonstrate, analyze, and evaluate the difficult content in the text. On this basis, centered around the theme and transcending the text, new authentic language contexts are created to guide students to imagine and create based on their existing and new knowledge experiences, solve practical problems in real contexts, and conduct self-evaluation and peer evaluation. Through this step-by-step and progressive approach, students' higher-order thinking and autonomous

learning abilities are cultivated, enabling them to achieve deep thinking, deep understanding, and deep learning of the text.

(3) Evaluating activities based on classroom effects, revisiting the chain of questions, and reflecting on question validity

Teaching evaluation and reflection are crucial components of high school English reading instruction, and diligent reflection is an important quality for teachers' professional development. Therefore, after class, teachers should analyze classroom activities based on the classroom effects of reading instruction, students' classroom performances, self-evaluation by students, peer evaluation, and teachers' classroom observations and evaluations. Teachers should evaluate whether the design and implementation of the chain of questions have achieved the pre-set effects. They should reflect on whether the chain of questions can effectively help students deeply understand the text, guide them to think deeply from multiple perspectives, inspire them to creatively solve real problems, and achieve deep learning. Teachers should analyze whether there are questions at the same cognitive level in the chain of questions, whether there are too many low-level thinking activities, and whether the training of high-level thinking activities is focused. Based on the analysis and evaluation of classroom performances and the implementation of the chain of questions, teachers should identify problems and make improvements, providing references for later teaching.

5. Example Construction of the “Chain of Questions” in High School English Reading Instruction from the Perspective of Deep Learning

The following takes the first reading text “The Monarch’s Journey” from Unit 5 “Into the Wild” in Book 1 of the compulsory high school textbook English (New Standard) published by Foreign Language Teaching and Research Press as an example to elaborate on the specific strategies for designing the chain of questions in high school English reading instruction from the perspective of deep learning.

(1) Text analysis

“The Monarch’s Journey” narrates the migration journey of monarch butterflies, elaborating on aspects such as the timing of migration, distance traveled, destination, and reasons for migration. It also describes the survival challenges faced by monarch butterflies and the conservation measures in place, highlighting the theme of harmonious coexistence between humans and nature. This text is an expository essay of a popular science nature. It employs descriptive methods to define concepts, provide examples, and convey scientific content in accessible, vivid language with clear causal logical relationships. It combines the informative and accurate characteristics of popular science expository writing with literary language features.

(2) Teaching objectives design

The teaching objectives for this reading text are as follows: Students should be able to clarify detailed information related to the migration of monarch butterflies, correctly analyze the reasons for the decline in the monarch butterfly population, and articulate specific measures for their conservation in their own words. The teaching difficulties lie in analyzing the stylistic features of the article, discerning the author’s writing intentions, and contemplating from multiple perspectives how

to achieve harmonious coexistence between humans and nature.

(3) Design of the chain of questions

Pre-reading stage: initial perception

Question 1): What do you know about the monarch butterflies?

Question 2): Do you believe that monarch butterflies migrate from one place to another?

These questions aim to draw students’ attention to the theme of the text, providing them with an initial perception of the characteristics and appearance of monarch butterflies. They activate students’ prior knowledge about monarch butterflies and migration, guiding them to consider whether the butterflies’ physical traits enable them to migrate, thereby stimulating their reading interest.

While-reading stage: in-depth understanding

Question 3): What is the specific information about the monarch’s migration?

Question 4): How did monarch butterflies successfully migrate?

Question 5): Why is the number of monarch butterflies declining?

Question 6): How can we prevent the number of monarch butterflies from falling?

These questions revolve around the theme of monarch butterflies in the text. They are interconnected and progressively increase in difficulty, delving deeper into the text. Students are guided to analyze and summarize the detailed information about monarch butterfly migration in the text, explore the reasons behind their long-distance and long-duration migrations despite their small size, and clarify the intrinsic logical relationship between the decline in their numbers and human activities. They are encouraged to think deeply about the underlying causes of this phenomenon and, based on their knowledge of monarch butterflies, articulate in their own words how to address the complex issue of their declining numbers, considering various measures for their protection. The first two questions focus on summarizing and generalizing factual information in the text, helping students understand the details and overall context of monarch butterfly migration. The latter two questions extend beyond the textual information, aiming to inspire students to think critically about the essence of the problem, exploring the root causes of the decline in monarch butterfly numbers and conservation measures, thereby achieving an in-depth understanding of the text.

Post-reading stage: deep thinking

Question 7): What can people do to help protect endangered animals?

Question 8): How can we achieve harmony between man and nature?

Based on the analysis and understanding of monarch butterfly migration in the text, students have formed a structured understanding of their migration, survival challenges, and conservation measures. On this basis, Question 7 extends from protecting monarch butterflies to safeguarding other endangered animals, encouraging students to consider conservation measures for various species and fostering an awareness of animal care and protection. Question 8 escalates in difficulty, addressing the broader theme of harmony between humans and nature, echoing the thematic significance of the unit “Into the Wild”. It inspires students to think and discuss how to achieve harmonious coexistence between humans and nature, encouraging them to

express their views boldly based on what they have learned, contemplated, and felt. The questions in the post-reading stage aim to transcend the text, connecting with reality, guiding students to think deeply, engage in discussions, and train their thinking abilities. They cultivate students' capacity for deep thinking, develop their higher-order thinking skills, and facilitate deep learning of the text and its themes.

(4) Teaching reflection

Based on students' classroom performances in each segment of the lesson, teachers analyze students' varying responses to different questions at various cognitive levels. They evaluate whether the chain of questions aligns with students' learning levels and assess whether the chain of questions can prompt students to engage in deep processing of the text and think critically about the issues, thereby achieving in-depth learning of the text. On this basis, teachers revise and refine the chain of questions to improve their teaching.

6. Conclusion

The design of the chain of questions from the perspective of deep learning offers a novel approach to teaching and learning, addressing the prevalent issues in high school English reading instruction, such as an overemphasis on linguistic knowledge at the expense of cultivating thinking abilities, a focus on superficial learning rather than deep thinking, and fragmented, superficial, and formulaic teaching practices. Teachers should correctly grasp the essence of deep learning, explore the value and connotations inherent in the design of the chain of questions, conduct in-depth text analysis, clarify core issues, and focus on higher-order thinking. They should design chains of questions that are aligned with teaching objectives, contextualized, hierarchical, and logical. These chains of questions should guide students to actively think, explore, and engage in cooperative communication centered around the thematic meaning of the text. They should assist students in transitioning from

superficial to deep learning, thereby achieving genuine deep learning of the reading text. Furthermore, teachers should engage in teaching reflection and evaluation, continuously exploring and making improvements in their practice.

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