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Framework and Application of Question Chains for High School Eng-lish Reading Instruction Based on Thinking Capacity

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Abstract

This study explores the design and application of question chains in high school English reading instruction to enhance students' thinking capacities in line with the New English Curriculum Standards (2020). Question chains are hierarchical, logical, and systematic tools that guide students from comprehension to high-er-order thinking. The research develops a framework to address challenges such as coherence, question quality, and learner diversity. A case study de-mon-strates the implementation of question chains in pre-, while-, and post-reading phases. Results show that question chains effectively boost student engagement and cognitive development, though challenges like time constraints and teacher expertise persist. The study concludes with recommendations for cross-disciplinary integration, technology use, and teacher training. This re-search offers both theoretical insights and practical strategies to improve Eng-lish read-ing instruction and foster critical and creative thinking skills.

Keywords

Question Chain; Thinking Capacity; English Reading Instruction

1. Introduction

As China's social development progresses, the need for comprehensive and diverse talent cultivation has increased. The educational philosophy of "subject-based edu-cation" has gained more emphasis, especially in integrating subject knowledge with students' core competencies. In English education, four key competencies are high-lighted: language ability, cultural awareness, thinking capacity, and learning ability. Among them, thinking capacity, defined by the New English Curriculum Standards (2020) as the logicality, criticality, and innovativeness of students' thinking, is cru-cial for enhancing students' English proficiency.

However, current classroom practice often prioritizes language knowledge and skills over thinking capacity development. Teachers tend to focus on linguistic

competencies, neglecting effective strategies for cultivating thinking skills. This imbalance is particularly evident in high school English reading instruction, where question-and-answer interactions are common but often lack coherence and depth. As a result, students may acquire information without engaging in meaningful analysis or critical thinking, limiting their thinking capacity development.

To address this issue, designing question chains—logically connected and hierarchical questions—can guide students toward deeper comprehension and thinking capacity development. However, many teachers face challenges in creating such question chains due to a lack of practical experience.

This study aims to develop a comprehensive design perspective and framework for question chains in high school English reading teaching to enhance students' thinking capacities. The objectives include: Establishing design principles for effective question chains; Classifying and defining components of question chains; Providing practical examples and case studies of the proposed framework. By focusing on question chain design, this study seeks to provide theoretical and practical guidance for teachers, integrating thinking capacity development into English reading instruction and improving the overall quality of high school English education.

2. Theoretical Framework

2.1. Thinking Capacity

In 2017, "thinking quality" was introduced as a core component of the English subject competencies in the General Senior High School Curriculum Standards, emphasizing logical, critical, and creative thinking. Chen et al. (2019) noted that developing thinking quality enhances problem-solving skills, cross-cultural understanding, value judgment, and deep learning. This study adopts this definition, aiming to cultivate students' logical thinking (assessing and reasoning about rules and concepts), critical thinking (questioning and verifying viewpoints), and innovative thinking (breaking traditions and generating new ideas). The English Curriculum Standards (Ministry of Education, 2018) specify that thinking capacity includes logicality, criticality, and innovativeness, with behaviors such as observation, comparison, analysis, inference, generalization, conceptual construction, challenge, evaluation, association, imagination, imitation, and innovation. The goals for high school students involve understanding and analyzing language and cultural phenomena, organizing and summarizing information, constructing new concepts, inferring logic, evaluating ideas, and expressing creative viewpoints. This study investigates question-chain teaching in high school English reading classes to enhance thinking capacity based on these standards.

2.2. Question Chains

Question chains are essential in high school English teaching, serving as a critical tool for implementing in-depth instruction and developing students' core compe-

tencies (Cheng & Chen, 2022). A question chain is a series of related, hierarchical, and systematic teaching questions designed by teachers based on teaching objectives and students' existing knowledge or experience. It guides students' thinking step-by-step, with each question building on the previous one to achieve specific goals. Scholars have defined question chains as a sequence of questions that transform textual content into a logical, hierarchical structure, targeting students' cognitive development (Wang Houxiong, 2010; Pei Song, 2011). This study defines question chains as "a series of related, hierarchical, and systematic teaching questions created by teachers based on teaching objectives, students' current learning level, and their zone of proximal development." The structure includes main questions, sub-questions, and additional questions derived from teacher-student interactions, forming a coherent framework to promote deeper thinking and learning.

3. Framework for Designing Question Chains in High School English Reading

3.1. Design Principles for Question Chains

The design of question chains is crucial for promoting meaningful engagement and deep cognitive processing in high school English reading instruction. Effective question chains should be meticulously aligned with learning objectives to ensure each question serves a specific purpose in advancing students' understanding and cognitive skills. For example, questions aimed at enhancing critical thinking should prompt analysis, evaluation, and synthesis rather than mere recall. Additionally, question chains should be hierarchically structured to guide students from lower-order to higher-order thinking skills, following Bloom's Taxonomy. This progression helps break down complex tasks into manageable steps, fostering holistic understanding and preventing cognitive overload.

Moreover, question chains must exhibit logical flow and coherence, with each question building on the previous one. This not only aids in maintaining student engagement but also ensures that students can make connections between different aspects of the text. Questions should also be relevant to the text and students' real-world experiences, ideally relating to current societal issues or their own lives, to enhance engagement and make learning more meaningful. Flexibility is another key principle, allowing educators to adapt questions based on classroom dynamics and individual student needs, ensuring that all students can benefit from the questioning process.

Effective question chains should also encourage metacognitive strategies, prompting students to reflect on their thinking processes and evaluate their understanding. This fosters self-regulation and independent learning skills. Inclusivity and accessibility are essential, ensuring that questions are free from cultural biases and phrased in clear language to accommodate all learners, including those with diverse linguistic backgrounds and varying levels of proficiency. Finally, question chain de-

sign should be evidence-based, grounded in educational research and best practices to ensure effectiveness in achieving cognitive outcomes. By integrating these principles, educators can create question chains that support students' cognitive development and enhance their engagement in English reading instruction.

3.2. Classification and Components of Question Chains

Understanding the classification and components of question chains is essential for their effective implementation. Question chains can be categorized into three primary types based on their cognitive demands: comprehension-based, analytical, and evaluative/creative question chains. Comprehension-based chains focus on ensuring students understand the text through questions that assess recall, explanation, and basic interpretation. Analytical chains encourage deeper examination of relationships, patterns, and text structure, promoting critical thinking. Evaluative and creative chains aim to foster higher-order thinking by asking students to evaluate, critique, and generate new ideas or perspectives. These classifications guide the development of question chains to meet different cognitive objectives.

A well-constructed question chain comprises several key components: base questions, bridging questions, probing questions, and extension questions. Base questions ensure students grasp essential text elements, while bridging questions connect foundational understanding to deeper analysis. Probing questions push students to explore implications and assumptions, and extension questions invite application of knowledge in new contexts and creative thinking. The effectiveness of question chains also depends on structural elements such as sequencing, interconnectivity, clarity, and relevance to learning goals. Effective sequencing gradually increases cognitive demand, while interconnectivity ensures a cohesive learning experience. Clear and precise wording avoids confusion, and relevance to learning goals maintains instructional focus.

3.3. Sample Frameworks for Question Chain Design

To demonstrate the practical application of the principles and classifications discussed, this subsection presents a detailed example of a question chain design framework for a high school English reading class. The selected text is an argumentative essay titled "The Importance of Environmental Protection and Individual Responsibility." The framework is visualized through a model diagram to provide a clear understanding of the question chain design process.

A. Comprehension-Based Questions (Base Questions)

Purpose: Ensure students understand the fundamental content and arguments.

Question 1: What is the main argument presented by the author?

Question 2: Identify three key points the author uses to support their argument.

B. Analytical Questions (Bridging Questions)

Purpose: Encourage students to dissect the author’s arguments and examine the structure.

Question 3: How does the author use statistical evidence to reinforce their points?
Question 4: Analyze the essay's structure and how it contributes to the argument's effectiveness.
C. Evaluative Questions (Probing Questions)
Purpose: Promote critical evaluation of the author's arguments and strategies.
Question 5: What assumptions does the author make, and are they justified?
Question 6: Evaluate the effectiveness of the author's emotional appeals.
D. Creative Questions (Extension Questions)
Purpose: Foster creative and independent thinking by encouraging new ideas or alternative perspectives.
Question 7: Propose an alternative solution to the environmental issues discussed.
Question 8: Imagine a counter-argument to the author's position and refute it

4. Practical Application of Question Chain Design in High School English Reading Instruction

4.1. Challenges in Designing Question Chains

Designing effective question chains for high school English reading instruction presents several challenges. First, ensuring alignment with learning objectives is crucial but can be difficult, as unclear objectives may lead to misaligned questions that fail to drive students toward desired educational goals. Teachers must deeply understand curriculum standards and meticulously plan each question to create a cohesive learning experience. Time management is another challenge, as tight schedules and varying student paces require balancing depth and breadth of questions without overwhelming students. Adapting to diverse cognitive levels and learning abilities is essential to engage all students without disengaging advanced learners or frustrating those who need more support. Maintaining question quality and effectiveness demands expertise, clear and relevant question design, and continuous refinement based on evolving standards and research. Addressing student diversity and cultural differences is vital for inclusivity, requiring culturally sensitive questions and consideration of language proficiency. Avoiding cognitive overload by balancing question complexity and number is key to maintaining student engagement. Finally, integrating diverse teaching resources and technologies requires both technical skills and thoughtful planning to ensure they complement rather than complicate the question chain, while ongoing professional development is necessary to keep pace with advancements.

4.2. Application Strategies for Question Chains

To maximize the effectiveness of question chains in high school English reading instruction, teachers should employ a structured approach that addresses key challenges and enhances learning outcomes. First, clear learning objectives should guide the design of question chains, ensuring alignment with curriculum standards and

student needs. Using a hierarchical structure based on Bloom's Taxonomy, teachers can progress from basic comprehension to higher-order thinking skills, scaffolding student learning step by step. Incorporating a variety of question types, including open-ended and close-ended questions, caters to different learning styles and maintains engagement. Balancing depth and breadth of the material ensures comprehensive coverage without overwhelming students. Scaffolding student thinking through prompts and gradual support withdrawal helps build confidence and independence. Promoting collaborative learning through group discussions and activities enhances understanding and communication skills. Formative assessment allows teachers to monitor progress and adjust instruction in real-time. Leveraging technology and resources can provide interactive and engaging ways for students to explore the text. Finally, ongoing reflection and revision of question chains based on student feedback and learning outcomes ensure continuous improvement and effectiveness.

5. Conclusion

Question chains effectively promote higher-order thinking by guiding students from basic comprehension to critical analysis, logical reasoning, and creativity, following Bloom's Taxonomy. They enhance classroom engagement by linking academic tasks to real-world contexts, making learning more relevant and inclusive for diverse learners. However, implementation challenges include time constraints, the need for teacher expertise in crafting effective questions, student readiness, and limited generalizability to other subjects. Assessing the long-term impact on cognitive development also requires sophisticated tools.

Future research should explore cross-disciplinary applications, integrate technology for interactivity and personalized feedback, and conduct longitudinal studies to evaluate long-term effects. Developing teacher training programs and practical assessment tools would further support the adoption of question chains in diverse contexts. Despite limitations, question chains are a promising tool for advancing educational goals, fostering critical thinking, and preparing students for a rapidly evolving world.

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