

Design and Implementation Strategies of "Problem Chain" in Senior English Class

— Taking The Listening Lesson of " Why Do We Need Humor?" as an Example

Yingqiqi Yuan^{1,*}

¹ Ningxia University

*Yingqiqi Yuan. Email: qq2043932417@163.com

ABSTRACT

Currently, there are widespread problems such as fragmentation, superficiality and labeling in senior English class. Therefore, in this paper, a listening lesson was taken as an example to discuss how to scientifically and effectively design and implement the "problem chain", in order to solve a series of English teaching problems in senior high, including the disregard of students' principal position, their inability of deep learning, and their difficulty in substantial improvement of key competences in English subject, etc. For the majority of English teachers in senior high, there exist theoretical guidance and practical significance in this paper, which can help them create a student-centered "problem chain" in English class, and therefore promote students' key competences in English subject.

Keywords: Senior high English teaching, Problem chain, Implementation strategies.

1. INTRODUCTION

The English Curriculum Standards for Senior High Schools (Edition 2017) (hereinafter referred to as the New Curriculum Standards) emphasizes the cultivation of students' core competences in English subject, namely language ability, cultural awareness, thinking quality and learning ability, and encourages students to use their knowledge to solve practical problems in deep learning. Deep learning emphasizes the meaningful learning process in which students participate fully and actively, experience success and achieve development. In that process, students are regarded as the main body of classroom teaching. Teachers pay attention to whether students' learning really happens, and strive to associate the knowledge with students' psychological development and spiritual realm [18]. It can be seen that, students under deep learning can profoundly realize the organic connection between external knowledge and personal development, which is more conducive to the overall improvement of their comprehensive quality. However, there are widespread problems such as fragmentation, superficiality and labeling in senior English classes [14], which are mainly reflected in the deficiency of openness and logic in the teaching

problems put forward by teachers. Therefore, it is difficult for students to consolidate the structure of new knowledge in cognitive schema, so that they do not understand how to use the content learned to guide their own practice in life. From this point of view, how to create a hierarchical problem chain is an urgent issue for teachers to consider, so as to help students deeply absorb knowledge and apply what they have learned. However, the majority of English teachers have not achieved consensus about teaching strategies of designing an effective "problem chain". Therefore, taking listening teaching as an example, this paper aims to explore how teachers design a "problem chain" in senior English class, in order to promote students' deep learning and cultivate their high-order thinking ability.

2. THE CONNOTATION AND CHARACTERISTICS OF THE PROBLEM CHAIN

"Problem chain" refers to a series of independent and related problems, with which teachers transform knowledge of learning materials, in combination with instructional objectives, into systematic and hierarchical one [20]. During the teaching, "problem" is the carrier, "chain" is the link, and "learning" is the core [7]. First of

all, following the teaching objectives, teachers present the learning contents in the way of questions as the carrier, and guide students to ponder. Secondly, teachers arrange the questions in a progressive sequence, and the logical connection is the link, between the previous and subsequent questions. Therefore, it becomes simple for learners to grasp the regularity of knowledge from easy to difficult, so that their own knowledge construction is improved. Finally, after solving a series of problems, students can also realize the practical value of textbook knowledge, flexibly apply it to their own social practice, which ultimately achieves the core purpose of promoting learning by asking and achieving application by learning. Generally speaking, the scientific and effective problem chain focuses on students' current cognitive level, follows the thinking order from easy to difficult, and encourage students to analyze, absorb and apply what they have learned. Overall, there are three characteristics of the problem chain as followed:

2.1. Openness

Through the "problem chain", teachers and students can realize open interaction in class. First, the "problem chain" presents the topic in the way of questions, so that teachers and students can communicate with each other about the communal theme. Second, the "problem chain" often does not entail answers that are either black or white, thus students possess enough thinking space to give reasonable answers under the topic. According to students' response and feedback, teachers create new questions and offer appropriate evaluation and guidance. Eventually, when the problem is complicated or only needs to be connected with personal reality, students' perception, emotion, willpower and values are all involved in solving the problem again. Meanwhile, this process is not an individual psychological action, but a social collaboration among students^[4]. Thanks to its cooperativeness, students have a collision of thinking, which facilitates their multi-angle cognition and profound understanding of the issue.

2.2. Hierarchy

Through the "problem chain", students can improve their cognition from simple to difficult, and from shallow to deep. The whole "problem chain" has a clear order and hierarchy, with breadth, difficulty and profundity, so that students at different levels can master textbook knowledge in their zone of proximal development^[15]. In this process, the "problem chain" follows the forward or reverse thinking order, laying a "step" between students' current and target level. Moreover, the "step" is established based on different degrees of knowledge difficulty, so that the hierarchical "problem chain" can prevent students from getting "stuck" in the procedures of understanding and smoothly enhance their in-depth thinking quality.

2.3. Competence Orientation

The "problem chain" demonstrates the tendency of cultivating students' language ability, cultural awareness, thinking quality and learning ability, which can comprehensively improve students' core competences of English subject. In the "problem chain", when students analyze the problems in the first step, their thinking consciousness itself is placed in the state of operation. Besides, while students are organizing utterances to express their opinions, the language ability is naturally strengthened, during which students' emotion and cognition are also integrated^[6]; Secondly, in terms of topics with cultural significance, the "problem chain" can also involve the similarities and differences between Chinese and Western cultures, which enables students to form correct emotional attitudes and cultural values. Moreover, compared with the traditional teaching totally manipulated by instructors, the "problem chain" encourages students to dedicate themselves to teaching procedures, with classroom atmosphere activated, which makes it possible for students to form an optimistic attitude towards English learning.

3. SIGNIFICANCE OF DESIGNING AND IMPLEMENTING THE "PROBLEM CHAIN"

In light of the connotation and characteristics above, "problem chain" teaching can not only make students internalize their knowledge and improve their comprehensive quality, but also encourage teachers to examine their own teaching level. Generally speaking, there are four aspects of significance for students and teachers in "problem chain":

First, it is beneficial for students to change their learning style. In the senior English class at present, teachers' questions exert a negative influence on shaping students' learning habits to process information. Mechanically answering superficial questions^[5] can easily mislead students' thinking inertia, which contributes to their blind reception of external messages and their incompetence to perform profound thinking. Fortunately, "problem chain" teaching can effectively address that problem, because it makes students perceive the subtle regularity of new knowledge through autonomous learning and cooperative communication, so that the core knowledge structure is established. Meanwhile, learners can also develop their own critical and innovative thoughts in this process. In general, the "problem chain" teaching changes students' understanding from passive to proactive, which implies the reshaping of their thinking pattern.

Second, it is helpful for students to obtain the sense of learning significance. The "problem chain" is an important carrier to cause confusion, stimulate interests and produce learning significance^[11]. In the face of

challenging problems, cognitive conflicts may occur to students, and thus their thirst for new knowledge is stimulated. While students are seeking for the answer, teachers instantly put forward new questions to offer inspiring guidance, which allows students to have faith in their potential to solve problems. Finally, after employing new information to solve practical problems, students perceive the practical value and significance of knowledge. In conclusion, the "problem chain" teaching can strengthen the students' learning efficiency and realize their sense of learning significance.

Third, it is conducive for teachers to refine their teaching methods. Regarding the senior listening class for now, the majority of instructors underestimate the role of listening in promoting students' comprehensive ability. Instead, they only spend a tremendous amount of time on the monotonous questions of listening tests, which popularizes the misconception that the mere purpose of listening consists in finishing examinations. Helping eliminate this opinion that may generate the vicious circle of passive listening class, the "problem chain" first requires teachers to analyze learning circumstances of complexity and teaching materials^[16], and second to select the targeted listening materials. Only in that way can students contemplate on and communicate about thematic problems. In short, teaching preparations and activities included in the "problem chain" differ from the traditional listening class, which suggests the "problem chain" renders the teaching methods more diverse and appealing.

Fourth, it is instrumental in teachers' acquiring instructional efficiency. Learner's cognition, attitudes and motivation are among the subjective factors affecting the listening level. However, teachers often do not take those psychological elements into consideration, who only imbue students with direct answers. Gradually, when it turns out that learners' listening performance is not substantially improved, teachers' confidence in improving their listening level will be undermined. Helping avoid the dilemma above, "problem chain" compels teachers to show concerns for students' personal understanding, values and knowledge application^[13]: the language points of difficulty, the ideological value of materials and the practical usage of new information are all encompassed in the "problem chain". In a word, the "problem chain" teaching dovetails with students' psychological requests, so that they will be actively engaged with the class activities, and in turn teachers will be motivated to promote teaching implementation.

In a nutshell, the "problem chain" teaching model plays a vital role in facilitating senior English teaching. One the one hand, when answering questions, students quit accepting rigidly unknown information. Conversely, they will construe the relevance of knowledge, and enhance their competence to grapple with actual

problems. On the other hand, when designing problems, teachers are compelled to improve their teaching capability and literacy, to consider students as an individual in pursuit of personal development, and to shape a humanistic atmosphere during the entire teaching process.

4. DESIGN PRINCIPLES OF THE "PROBLEM CHAIN"

The "problem chain" is of great importance in teaching activities. If teachers strive to maximize the advantages brought by this teaching method, they are bound to follow a series of design principles of the "problem chain". Taking senior listening class as an example, this paper has studied five design principles of "problem chain" as followed.

4.1. Stimulate Students' Experience, and Introduce the New from the Old.

Before class, students are not familiar with the specific theme of the listening materials. Thereby, teachers are supposed to accomplish the natural transition among topics before and in class, by designing questions about the background information of the original text, which also lays the foundation for the in-class teaching^[19]. Furthermore, according to the constructivist learning theory, in the face of specific problems, individuals develop their own understanding on the evidence of their prior knowledge. Therefore, when planing teaching problems, instructors should associate the text with students' life, which makes it possible for them to actively explore the theme^[8]. Only by eliciting thematic significance of listening content from the personal experience, can learners establish a meaningful connection between the previous knowledge and the new language materials. In order to make it happen, instructors should explicitly reveal that connection by getting acquainted with students' existing conception of relevant sphere and planing the question to introduce the lesson. As a consequence, it is also instrumental in psychological construction for the subsequent comprehension of listening.

4.2. Understand the Current Ability of the Students and Promote Their Development

According to zone of proximal development theory, the "problem chain" should bear some extent of thinking intensity, which implies that only by pondering meticulously, are students capable to solve it. Teachers should take into account the students' existing listening level, judged from the knowledge content and teaching objectives, and design a challenging but appropriate "problem chain". If the problem is too difficult and exceeds students' psychological expectations, they will not only feel frustrated, but also lose confidence in their

potentials to further explore and address problems. If the problem is too simple, students will show no interests in answering, and their listening competence cannot be substantially boosted. Besides, each question should be concentrated on bringing students' thinking to a higher level^[8]. Therefore, after the first and second time of listening, teachers should only pose questions related to the purport of the original text. After the materials are repeated more than three times, questions of the details can be asked. During the whole process, the students' thinking development can be promoted from the whole to the local, and therefore their understanding of the listening text will be deepened.

4.3. Refine Students' Cognitive Gradients and Proceed Step by Step

While changing new language points into old ones, students' minds need to experience a series of mechanisms such as transformation, assimilation and internalization. The prerequisite of it is the breakthrough in the zone of proximal development^[17]. Therefore, teachers should refine students' cognitive gradient, select the materials closest to their current listening and cognitive ability, and finally arrange the problem chain systematically. In that case, students are able to understand the text from the outside to the inside. In the listening class, after students absorb the main idea of the theme, teachers need to pose the questions that encourage learners to locate the details in the text, so that they can master the listening strategy of grasping detailed information by listening to keywords. After students can restate the key information, it means that they have become familiar with the language knowledge of the original text. At this time, teachers can raise the learning requirements according to the specific situation. To put it another way, questions about the pragmatic knowledge of the original language can be asked, which encourage students to summarize the language form of communicative significance.

4.4. Give Students Time to Reflect, and Inspire Them Step by Step

In the listening class, students' answers cannot always satisfy the instructor's ideal expectations. It's understandable that there are always slightly inappropriate answers. In that case, teachers ought to shape students' thinking and help them locate the blind spots, so that they can overcome problems in the learning process^[10]. To the degree that teachers want to play a role in this aspect, they should combine students' cognitive confusion with the key information of the question, which helps instructors pose a series of inspiring questions immediately. Students are able to adjust their fashion of independent thinking if enlightened by those questions. At the same time, teachers should allow students enough time to think.

When students fail to answer instantly, teachers should not frown, shake their heads, or use other body languages to urge students to leap to the answer, because it will only make them more too anxious to give a feedback, which decreases the possibility of producing their outcome. If the learners pause for more than three minutes, teachers can consider reorganizing the language form of the question to inspire them in a more accessible way.

4.5. Guide Students to Obtain the Ability of Practical Application, Transfer and Innovation

Based on the solution of the problems above, in theory, students have realized the ideal listening input. Nonetheless, to substantially boost students' capability in English use, teachers should not only pay attention to listening input and absorption, but also to speaking output and expression. Thereby, students are encouraged to ruminate and communicate about listening materials, to strengthen the absorption and consolidation of knowledge, and to reconstruct language points on the basis of personal understanding^[2]. Finally, students are able to retell the relevant contents in combination with their individualized reflection. However, teachers can not simply ask, "what is the main idea and pragmatic knowledge of this material?" Instead, they should design a "problem chain" with practical implication by associating the theme and context of listening materials with students' daily life, so that students are conscious of the practical value of the knowledge. After completing the tasks of oral output, students are also expected to translate the ability of solving class problems into that of solving actual ones, in order to apply what they have mastered to personal situations in an innovative way.

5. DESIGN AND IMPLEMENTATION STRATEGIES OF THE "PROBLEM CHAIN"

Based on the design principle of "problem chain", the unit 4 "Why do We Need Humour?" in senior English textbook of Beijing Normal University Edition is taken as an example to elaborate on how to carry out the "problem chain" teaching in senior listening class.

5.1. Read the Text Carefully and Create the Main Line of the "Problem Chain"

The "problem chain" is related to students' life, and basically to the teaching content, which makes it imperative for teachers to analyze the language points in the text before class. The quality of text interpretation affects the rationality of the "problem chain". The following is the reading result of the listening text.

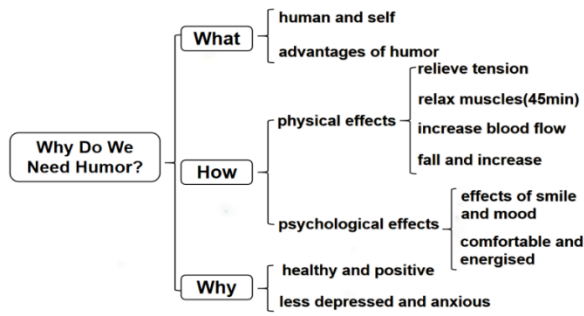


Figure 1 Text Reading Result of "Humor"

First, "What". The material focuses on human and self, and introduces the the positive effects of humor on human body both physically and psychologically.

Second, "How". This article is an explanatory text. Concerning physiological merits, the words "firstly", "also" and "finally" are interpreted as signal words. First, humor relaxes human muscles and reduces stress, according to the sentence " it relaxes the muscles in our body, and the effects can be felt for as long as 45 minutes after a good laugh." Therein, the use of data "45 minutes" can have the audience form a concrete concept of time, and enhance the knowledge of the expository text. Next, humor can increase blood flow, improve vascular function and avoid cardiovascular disease. Finally, humor can better protect humans from infections, judged from the explanation" the level of stress chemicals in our body falls, and the number of immune cells in our body increases." The sentences before and after the word "and" create a parallel structure, and render the audience deeply impressed on the concept that" humor can enhance immunity ". Regarding psychological benefits, first, humor can improve one's emotional state, which is concluded by scientists. To be specific, there is a benign two-way relationship between smile and emotion: when people are happy because of humor, they will naturally laugh. When people laugh because of humor, they will become happy in turn. Second, humor can even perfect interpersonal relationships. By means of comparison, the author illustrates that people's opposite moods will have a distinct effect on personal attitude and interpersonal communication, which indicates humor makes a man funny and optimistic, so that the people around are willing to accompany him. So the use of antithesis can enhance the persuasion of the explanatory style and deeply impress the listeners.

Third,"Why". Judged by the second sentence of the last paragraph" I hope you'll benefit from humour in your lives", the author wishes listeners believed in the function of humor to keep healthy and optimistic, and calls on them to cultivate their humorous character, which helps resolve pessimism and anxiety in the face of low peaks and troughs in life.

Based on the analysis above, the main line of the "problem chain" in this class is to help students explore the positive meaning of humor and the language characteristics of expository texts, and finally shape an optimistic attitude before setbacks.

5.2. Establish Teaching Objectives and Emphasize Problem Solving

Text reading also provides a basis for the establishment of teaching objectives, around which the "problem chain" is designed.

The following are four teaching objectives of this class:

First, summarize the physiological and psychological functions of humor by drawing a mind map.

Second, infer the style of listening materials, and discuss about the structural characteristics of English expository text by listening to the text repeatedly.

Third, in the context of "the lecture of health knowledge", describe and explain the physiological and psychological meaning of humor by referring to the mind map and discussion results, and learn how to comprehensively and rigorously publicize the health knowledge of humor.

Fourth, make an oral summary about what kind of attitude one should take to confront the difficulties of life in the future, discuss with desk mates about how to cultivate humorous character, and write down two or three methods.

5.3. Explore the main line of the meaning, and design an open "problem chain"

Based on the preparations, teachers commence to design the "problem chain" by following the six paths. The related questions are shown below:

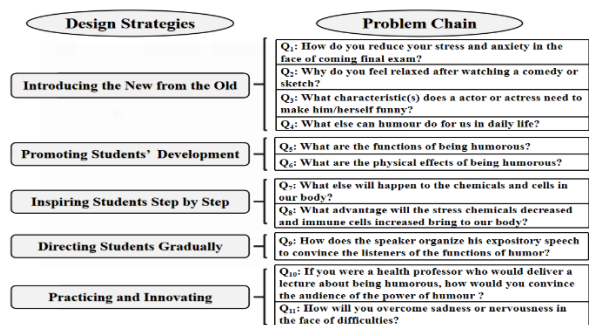


Figure 2 The Problem Chain in the Listening Lesson

"Introducing the new from the old" is the starting point of designing a "problem chain". In the introduction of new lesson, not only should the "problem chain" concentrate on creating the context with realistic experience^[17], but also on ensuring the cohesion between students' prior experience and the new

knowledge. Q1 takes the final exam as an opportunity and students are assumed to give similar answers such as "watch a comedy". Q2 requires students to think about the reasons why they feel relaxed after watching a comedy, and the students are assumed to answer the keywords such as "interesting", "fun" and "ridiculous". Q3 asks the universal personality of funny comedians, and the answer is assumed to include the key word "humor". At the same time, students have realized the transition from old experience to the new theme. Q4 further encourages students to think about the positive meaning of humor in life, laying the foundation for helping them understand the main idea and details of the materials.

"Promoting students' development" is the principal consideration of designing a "problem chain". The "problem chain" should be appropriately difficult and in line with the teaching situation^[1], so as to have students make progress based on the current cognitive level. Q5 aims to master the general idea of the theme from the first to the second listening. After understanding the physiological and psychological significance of humor as a whole, Q6 aims to encourage students to understand more details and to summarize the specific physiological functions of humor according to the three signal words "first", "also" and "finally".

"Inspiring students step by step" is the provision for inappropriate answers. It is impossible for students to answer every question perfectly. At this time, new questions should be posed in time to encourage students to think positively, so that they can truly understand the connotation of the text^[9]. Assuming that the students missed the third physiological function in Q6, Q7 will induce them to answer the detailed information of "decrease of chemicals" and "increase of immune cells" with the scaffolding of the two words "chemicals" and "cells". Q8 uses "advantage" as another hint to help students recall and finally come to the physiological meaning: our body is better able to fight infection.

"Directing students gradually" is the transitional way of designing a "problem chain". Following the teaching objectives and contents, teachers should take into account the developmental characteristics of students, and design the "problem chain" from simple to complex, from understanding and application to analysis and evaluation^[12]. From Q5 to Q8, theoretically, students have grasped the language knowledge of physical and psychological significance. Next, Q9 turns to the pragmatic knowledge of the speech, enabling students to independently analyze and evaluate how the speech popularizes the knowledge and enhances preciseness of the expository text.

"Practicing and innovating" is the realistic orientation of designing a "problem chain". The "problem chain" teaching guides students to use learned knowledge, methods and perspectives to solve new and

complex problems in reality through correlation^[3]. Q10 is the context of a health lecture, enabling students to utilize the linguistic and pragmatic knowledge to solve the problem in this situation. Finally, Q11 changes from hypothetical situation to actual encounter, directing students to explore the practical significance of humor. During the whole process, students experience understanding, application and innovation in English learning activities.

Through the implementation strategies above, in senior listening class, the "problem chain" teaching starts from activating students' existing experience, next promotes their development on the basis of the existing ability, and then induces students to recall the listening content, emphasizes the cognitive law from shallow to deep, and eventually develops learners' ability of application, transfer and innovation in the real situation. Generally speaking, the whole process does realize the comprehensive cultivation of language ability, cultural awareness, thinking quality and learning ability within a meaningful theme of a listening material.

6. CONCLUSION

As an important means to cultivate English core competences, the "problem chain" teaching plays a pivotal role in senior English class. In any type of class, instructors should implement their teaching through a "problem chain" with logic, enlightenment and practice, which shapes students' in-depth thinking pattern. The reason is that an interaction mechanism is created between teachers and students through the "problem chain", so that the latter will actively participate in the process of knowledge acquirement. If students are exposed to unfamiliar language information, their interests in English learning cannot be maintained. As a consequence, there is no way for students to enhance the deep learning while participating in the teaching procedures. Furthermore, it should be noted that the "problem chain" is not designed arbitrarily, but complies with the corresponding design principles, by connecting the theme of learning materials to students' current needs of development. Additionally, after each class, teachers are supposed to evaluate whether the "problem chain" has achieved the established teaching objectives, which nevertheless is not included in this paper and entails further investigations. Ultimately, it's also suggested that teachers utilize such teaching method and promote the innovative practice of the "problem chain" teaching in the future.

AUTHORS' CONTRIBUTIONS

In this paper, immense effort is made to investigate theoretical contributions of "problem chain" in senior English class. During the research, it's found that the class type of reading, as the research subject, predominates in most of those dissertations. Therefore,

to bridge the gap of "problem chain" teaching in other class types, this paper takes a listening lesson as an example. In search of appropriate principles and strategies of designing "problem chain" in listening class, current study of "problem chain" in both literal arts and science is comprehensively analyzed, which boosts inspirations. Moreover, the present obstacles in senior listening class are also considered in this paper, so that the theoretical guidance, of "problem chain" unique to listening class, could go a long way to tackling teaching predicaments in senior English class.

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REFERENCES

- [1] Chen Qifeng. Application of "problem chain" in advanced English deep reading in junior middle school [J]. *Foreign Language Teaching in primary and secondary schools (middle school)*, 2021, 44 (08): 61-65.
- [2] Chen Fenglan. The view on college listening and speaking teaching from the perspective of input-output theory [J]. *Educational Review*, 2017 (09): 128-133.
- [3] Ding Fujun, Zhang Weizhong, Tang Hengjun. Teaching design of "problem chain" pointing to the core competences of mathematics [J]. *Educational Science Research*, 2021 (09): 62-66.
- [4] Guo Hua. Deep learning and classroom teaching improvement [J]. *Basic Education courses*, 2019 (Z1): 10-15.
- [5] Gu Xiaodong. Design strategies of problem group for promoting deep learning [J]. *Basic Education Curriculum*, 2021 (21): 36-41.
- [6] Guo Baoxian, Zhang Jianzhong. How to cultivate the core competences of English subject in classroom teaching [J]. *curriculum.teaching material.Teaching*
- Law, 2019, 39 (04): 66-71. DOI:10.19877/j.cnki.kcjcj.2019.04.011.
- [7] Lv Song. Practical research on "problem chain" teaching in chemistry review class of grade three in the junior middle school [J]. *Chemistry Teaching*, 2014 (09): 37-40.
- [8] Li Jing. Cultivating students' thinking quality from teachers' questions in English classroom [J]. *China Journal of Education*, 2019 (S1): 110-112.
- [9] Li Mingyuan, Zhao Qian. Teaching questions of English reading in junior middle school focusing on the thinking quality [J]. *Teaching and Management*, 2020 (31): 65-67.
- [10] Liang Yu. Problems and countermeasures of heuristic teaching in mathematics teaching [J]. *Teaching and Management*, 2016 (15): 101-103.
- [11] Tang Hengjun, Zhang Weizhong, Chen Bifen. "Problem chain" teaching based on deep understanding [J]. *Research on Education Development*, 2020, 40 (04): 53-57. DOI:10.14121/j.cnki.1008-3855.2020.04.011.
- [12] Wu Qiang. Flexible use of the "problem chain" [J]. *Ideological and political course teaching*, 2022 (01): 55-56.
- [13] Wu Chuan. An effective way to promote students' deep learning——taking "In the face of economic globalization" as an example [J]. *Middle school politics teaching reference*, 2020 (35): 19-21.
- [14] Wang Qiang, Sun Weiwei, Cai Mingke, Wang Jing. Overall teaching design of senior high school English units pointing to deep learning [J]. *Frontier of Foreign Language Education Research*, 2021,4 (01): 17-25 + 87-88.
- [15] Wang Jianqiang. Design, practice and thinking of the problem chain in classroom [J]. *Shanghai Education and Scientific Research*, 2015 (04): 71-73. DOI:10.16194/j.cnki.31-1059/g4.2015.04.020.
- [16] Xin Ze, Chen Yanhua. Discussion on the construction of teaching logic based on "problem chain"—— taking the "focus" teaching of physics in senior high school as an example [J]. *Physics teacher*, 2020, 41 (06): 24-28.
- [17] Yang Fenglou. Research on the strategy of "problem chain" to promote the deep learning of physics in senior high school [J]. *Physics teacher*, 2021, 42 (06): 34-37.
- [18] Yu Mengmeng. Classroom teaching towards deep learning—— an interview with Professor Guo Hua, Department of Education, Beijing Normal

University [J]. *New Course Reviews*, 2020 (12): 11-18.

- [19] Zhang Huimin. Design of "problem chain" in English reading teaching in junior middle school [J]. *Foreign Language Teaching in primary and secondary schools (middle school)*, 2018, 41 (01): 33-37.
- [20] Zhang Liping. Research on the design of "problem chain" in English reading teaching in junior middle school pointing to the improvement of speculative ability——taking section B part "He studies harder than he used to" in Unit 4 "I used to be afraid of the dark" as an example [J]. *English teacher*, 2021, 21 (12): 139-142.