Academic Education Publishing House

Occupation and Professional Education Vol. 2 No. 6, 2025

Research on the Design and Practice of AI-Enabled Hierarchical Homework for Senior High School English Writing under the Background of "Double Reduction"

Lili Zhang*

The Middle School Attached to Ningxia University, Yinchuan, Ningxia, China

**Corresponding Author*

Abstract: This study aims to explore effective paths for designing and practicing AI-enabled hierarchical homework for senior high school English writing under the background of the "Double Reduction" policy, so as to solve the problems existing in current senior high school English writing homework, such as homogenization, heavy burden, and lack of pertinence, and improve the quality of homework and students' writing ability. The research adopts literature research method, action research method and data analysis method. Firstly, through literature review, it clarifies the requirements of the "Double Reduction" policy, the application status of AI technology in education, and the theoretical basis of hierarchical homework design. Then, combined with the actual situation of senior high school English writing teaching, it designs hierarchical homework objectives, contents and evaluation systems based on AI technology, and carries out a one-semester practice in selected senior high school classes. During the period, through classroom observation, homework analysis, student interviews and score data collection, the homework design scheme is dynamically adjusted, and finally the practice data is statistically analyzed. The study finds that AI-enabled hierarchical homework for senior high school English writing can effectively reduce students' homework burden, improve homework completion and pertinence, and promote the improvement of writing ability of students at different levels, providing practical reference for the reform of senior high school English writing homework under the background of "Double Reduction".

Keywords: Double Reduction; AI Empowerment; Senior High School English Writing; Hierarchical Homework; Homework Design

1. Introduction

1.1 Research Background and Significance

In recent years, reforms in the field of basic education have continued to deepen, and the full implementation of the "Double Reduction" policy has become an important measure to promote the optimization of the educational ecology. The core essence of this policy is to effectively reduce the excessive academic burden and off-campus training burden of students by standardizing school education and teaching behaviors, and to promote education to return to the essence of educating people. In the field of senior high school English teaching, writing, as a key link of language output, the scientificity and effectiveness of its homework design directly affect the quality of students' language ability training. However, there are still many problems in the current practice of senior high school English writing homework that are not compatible with the orientation of the "Double Reduction" policy. The writing homework in some schools is still dominated by unified and stereotyped tasks, ignoring the differences in students' individual language foundations, learning abilities, and interest needs. As a result, students with weak foundations develop a fear of difficulty due to the high difficulty of tasks, while students with strong abilities find it difficult to make further progress because the tasks lack challenges. This homogeneous homework model not only increases students' ineffective learning burden but also makes it difficult to achieve the policy goal of "reducing quantity and improving quality".

With the rapid development of artificial intelligence technology, its application in the field of education provides new possibilities for solving the above dilemmas. AI technology has functions such as data processing, intelligent

analysis, and personalized push, which can accurately capture students' learning characteristics and provide technical support for hierarchical homework design. Combining AI technology with hierarchical homework for senior high school English writing can not only realize the dynamic adjustment of homework content through intelligent systems to meet the development needs of students at different levels but also improve the efficiency of feedback with the help of automatic evaluation functions and reduce the burden of teachers' correction. This is highly consistent with the requirements of "improving the quality of homework design" and "strengthening homework feedback" in the "Double Reduction" policy.

In this context, carrying out research on the design and practice of AI-enabled hierarchical homework for senior high school English writing under the background of "Double Reduction" has important theoretical and practical significance. At the theoretical level, this study can enrich the theoretical system of the integration of educational technology and subject teaching and provide theoretical reference for homework reform under the "Double Reduction" policy. At the practical level, the research results can provide operable hierarchical homework design schemes for senior high school English teachers, promote the effective application of AI technology in writing teaching, and ultimately promote the personalized development of students' writing ability, realizing the synergistic effect of reducing burden and improving quality.

1.2 Review of Domestic and Foreign Research Status

Domestic research on "Double Reduction" and homework design has shown a rapid growth trend since the implementation of the policy. Researchers generally believe that homework reform under the background of "Double Reduction" needs to focus on the pertinence, hierarchy, and practicality of homework, emphasizing the realization of "teaching students in accordance with their aptitude" through hierarchical design. In the field of English writing, existing studies have explored hierarchical homework models based on students' levels and proposed gradient task design ideas from vocabulary and sentence patterns to discourses. However, most studies still stay within the traditional teaching framework and pay insufficient attention to technical empowerment. Although some scholars have mentioned the application of information technology in homework design, they have not deeply analyzed the integration path of AI technology and hierarchical homework, lacking systematic practical verification.

Foreign research on AI-enabled education started earlier and has accumulated rich results in intelligent writing evaluation and the development of personalized learning systems. Intelligent writing evaluation tools can realize functions such as grammar error detection, discourse structure analysis, and writing quality scoring. Relevant studies have confirmed their positive role in improving feedback efficiency and promoting students' autonomous learning. At the same time, foreign research on the theory and practice of Differentiated Instruction is relatively mature, emphasizing the design of teaching tasks according to students' learning readiness, interests, and learning styles. However, foreign research is mostly based on their local education system, and pays little attention to homework design under the policy background with Chinese characteristics such as "Double Reduction", so its results are difficult to be directly applied to domestic educational scenarios.

Overall, domestic and foreign studies have formed certain accumulations in homework hierarchical design and AI education application, but there are still the following deficiencies: First, there is a lack of systematic research combining the "Double Reduction" policy, AI technology, and senior high school English writing homework. Second, the exploration of the specific mechanism and practical path of AI-enabled hierarchical homework is not in-depth enough. Third, there is a lack of large-sample and long-term practical verification, and the universality of research conclusions needs to be improved. This study aims to fill the above research gaps, construct an AI-enabled hierarchical homework system for senior high school English writing, and provide a new perspective for relevant theoretical research and practical exploration.

1.3 Research Ideas and Methods

Guided by the requirements of the "Double Reduction" policy and supported by AI technology, this study focuses on the design and

practice of hierarchical homework for senior high school English writing, following the research idea of "problem orientation - theoretical construction - practical verification - conclusion extraction". Firstly, by sorting out relevant literature and policy texts, the direction of senior high school English writing homework reform under the background of "Double Reduction" is clarified, and the theoretical framework of the research is constructed by combining the characteristics of AI technology and hierarchical teaching theory. Secondly, based on the theoretical framework, an AI-enabled hierarchical homework scheme for senior high school English writing is designed, including homework objectives, content, and evaluation system. Thirdly, practical research is carried out in senior high school classes, and the effectiveness of the scheme is tested through data collection and analysis. Finally, the research conclusions are summarized and practical enlightenment is put forward.

The research adopts a combination of multiple methods to ensure the scientificity and rigor of the research:

Literature research method: Systematically sort out literature materials in the fields of "Double Reduction" policy, AI education application, hierarchical teaching, and English writing homework design, clarify the research status and theoretical basis, and provide a basis for the construction of the research framework.

Survey research method: Through questionnaires and interviews, understand the current implementation status of senior high school English writing homework, including homework types, difficulty, evaluation methods, and student feedback, to provide a practical basis for homework design.

Action research method: In the process of practice, continuously adjust and optimize the AI-enabled hierarchical homework scheme according to the cycle of "planning - implementation - observation - reflection". Select two classes each from the first and second grades of senior high school as the experimental class and the control class. The experimental class adopts the AI-enabled hierarchical homework mode, and the control class adopts the traditional homework mode. The effectiveness of the scheme is verified through comparative analysis.

Data analysis method: Conduct statistical analysis on the quantitative data collected in the practice process (such as students' writing scores, homework completion time, AI evaluation indicators, etc.) using descriptive statistics, t-test, and other methods; encode and conduct thematic analysis on qualitative data (such as student interview records, homework samples, teachers' reflection logs, etc.), and synthesize quantitative and qualitative results to draw research conclusions.

2. Relevant Theoretical Basis

2.1 Theories Related to the "Double Reduction" Policy

The core goal of the "Double Reduction" policy is to build a high-quality education system, and its theoretical basis is rooted in multiple dimensions such as educational equity, quality-oriented education, and the laws of students' physical and mental development. From the perspective of educational equity, "Double Reduction" is committed to solving the phenomenon of educational involution. By standardizing the total amount and duration of homework, it avoids the learning gap caused by differences in off-campus training resources among students and provides equal development opportunities for students at different levels. In terms of homework design, the policy emphasizes "precision in policy implementation", requiring homework content to be in line with students' cognitive levels and reflect hierarchy and individuality. This is consistent with the concept of "equality in difference" in educational equity, which recognizes individual differences among students and meets the learning needs of different students through targeted educational measures.

The theory of quality-oriented education is an important support for the "Double Reduction" policy. Quality-oriented education emphasizes the cultivation of students' comprehensive literacy and opposes mechanical training and excessive academic burden under exam-oriented education. The requirement of the "Double Reduction" policy on homework - "reducing quantity and improving quality" - is a concrete embodiment of the concept of quality-oriented education. As an important carrier for cultivating language literacy, senior high school English writing homework needs to shift from simple knowledge consolidation to the comprehensive improvement of thinking ability and expression ability. Through the design of situational and

exploratory tasks, students' interest in writing is stimulated, which is highly consistent with the goal of "cultivating all-round development people" in quality-oriented education.

The law of students' physical and mental development is the scientific basis for formulating the "Double Reduction" policy. Adolescents are in a critical period of physical and mental development, and excessive academic burden will affect their physical and mental health and personality development. The restriction on homework duration in the "Double Reduction" policy aims to ensure students' rest and independent development time and promote the coordinated development of their cognitive, emotional, social, and other abilities. In the design of English writing homework, it is necessary to fully consider students' cognitive load, avoid setting tasks beyond their ability range, and enable students at different levels to gain a sense of achievement in moderate challenges through hierarchical design, which conforms to the learning law of "reaching by jumping" in the "zone of proximal development" theory.

2.2 Theories on the Application of AI Technology in Education

The application of AI technology in education is centered on the theory of intelligent adaptive learning, which emphasizes dynamically adjusting learning content and paths according to students' learning status to realize personalized learning. The intelligent adaptive learning system collects students' learning behavior data through the data collection module, such as the correct rate of answers, learning duration, and error types. After processing by the analysis module, a learner profile is generated, and then the recommendation module pushes suitable learning resources and tasks. In the field of senior high school English writing, the application of this theory is reflected in the AI system automatically adjusting the difficulty of homework according to students' writing level. For example, providing more vocabulary and sentence pattern support for students with weak foundations, and setting more speculative writing themes for high-level students.

Natural language processing technology is a key support for AI-enabled English writing teaching, and its theoretical basis includes computational linguistics and corpus linguistics. Computational linguistics realizes the analysis and processing of natural language through algorithms, enabling AI systems to identify grammatical errors, logical loopholes, and irregular expressions in writing; corpus linguistics provides a data basis for AI evaluation. The system provides references for students' writing in terms of style and word use by comparing massive high-quality corpora. The combination of the two enables AI not only to realize automatic correction of writing errors but also to provide targeted improvement suggestions, such as pointing out unreasonable discourse structures and giving adjustment plans. This process embodies the educational concept of "feedback is learning".

Educational data mining theory provides methodological guidance for AI-enabled homework design. This theory extracts, analyzes, and models educational data to explore potential laws in students' learning processes, such as learning interests and knowledge weaknesses. In hierarchical homework for senior high school English writing, educational data mining technology can be used to analyze the writing characteristics of students at different levels, such as the types of grammatical errors commonly made by students at the basic level and the deficiencies in logical coherence of students at the improvement level, providing data support for the precise design of homework content, making stratification more scientific and targeted, and avoiding subjectivity and arbitrariness in traditional stratification.

2.3 Theories of Hierarchical Teaching and Hierarchical Homework

The theory of hierarchical teaching originates from the principle of teaching students in accordance with their aptitude, and its core is to implement differentiated teaching according to students' learning readiness, interests, and learning styles. Bloom's mastery learning theory provides important support for hierarchical teaching. This theory holds that most students can master the knowledge they have learned as long as they get appropriate learning conditions, and hierarchical teaching realizes the common development of all students by providing suitable learning conditions for different students. In senior high school English writing teaching, hierarchical teaching requires teachers to divide students into different levels according to indicators such as students' vocabulary, grammar mastery, and discourse organization ability, and

design corresponding teaching objectives and tasks for each level.

As an extension of hierarchical teaching, hierarchical homework also has its theoretical basis including Vygotsky's zone of proximal development theory. This theory holds that there are two levels of students' development: the current level of development and the potential level of development, and the area between them is the zone of proximal development. Effective homework design should fall within students' zone of proximal development, promoting the improvement of students' abilities through moderate challenges. Based on this theory, hierarchical homework sets progressive writing tasks for students at different levels. For example, the tasks for students at the basic level focus on correctly using the learned sentence patterns to complete simple writing, while students at the improvement level need to make sentence pattern changes and expand their views on the basis of completing the writing, so that each student can develop within their own ability range.

Constructivist theory provides methodological guidance for the implementation of hierarchical homework. Constructivism emphasizes that learning is a process in which students actively construct the meaning of knowledge rather than passively accepting information. The design of hierarchical homework needs to reflect situationality and interactivity, providing space for students' independent choice and cooperative exploration. For example, setting writing tasks in different situations through the AI system, allowing students to choose themes according to their interests, and supporting online collaborative revision at the same time, so that students can deepen their understanding and application of writing knowledge in interaction. This homework mode not only conforms to the constructivist learning concept but also can effectively stimulate students' writing initiative, echoing the requirement of "improving the interest of homework" in the "Double Reduction" policy.

3. Current Situation of Senior High School English Writing Homework and Feasibility Analysis of AI Empowerment

3.1 Investigation on the Current Situation of Senior High School English Writing Homework

To fully understand the implementation status of senior high school English writing homework under the background of "Double Reduction", this study conducted a survey on 200 students and 30 English teachers from 4 ordinary senior high schools in the province (including 1-2 provincial key schools, municipal key schools, and ordinary middle schools respectively). The survey results show that there are problems in the current senior high school English writing homework in multiple dimensions that are not in line with the requirements of the "Double Reduction" policy.

In terms of homework design, the phenomenon of homogenization is significant. 85% of teachers said that due to the large number of students in the class (an average of more than 50 students per class), it is difficult to take into account individual differences among students, and writing homework mostly adopts unified topics and requirements. For example, after teaching argumentative writing, most teachers uniformly assign writing tasks on themes such as "environmental protection" and "scientific and technological development", without considering that students with weak foundations may be unable to complete due to insufficient vocabulary, and students with strong abilities may perfunctorily deal with the tasks because they lack challenges. This "one-size-fits-all" design leads to 38% of students thinking that the homework is too difficult, 27% thinking that it is too easy, and only 35% thinking that the difficulty is appropriate, which is obviously different from the requirement of "hierarchical design" in "Double Reduction".

In terms of the total amount and duration of homework, although it has decreased compared with that before "Double Reduction", there are still unreasonable aspects. Teachers assign writing homework 1-2 times a week, with a requirement of about 150-200 words per assignment. The average time for students to complete it is 40-60 minutes, and some students with weak foundations need more than 90 minutes. 62% of students reported that they still feel a heavy burden after the superposition of writing homework and homework of other subjects, which is inconsistent with the requirement of "reasonably controlling the total amount of homework" in "Double Reduction". In addition, the types of homework are single, with 70% being proposition composition, lacking diverse forms such as practical writing,

speech, and story continuation, which is difficult to stimulate students' interest in writing.

In terms of homework evaluation, the timeliness and pertinence of feedback are insufficient. Due to the heavy workload of teachers, the correction cycle of 65% of writing homework exceeds 3 days, and some homework is returned to students even after a week, making it difficult for students to correct errors in a timely manner. The evaluation content mostly focuses on surface errors such as grammar and vocabulary, with insufficient feedback on discourse structure, logical thinking, and content depth. Moreover, the evaluation standards are unified, failing to reflect the differentiated requirements for students at different levels. 80% of students said they hope to get more specific improvement suggestions, but only 15% of teachers can do this, reflecting that the traditional evaluation model is difficult to meet the needs of improving homework quality under "Double Reduction".

3.2 Feasibility of AI Technology Empowering Hierarchical Homework for Senior High School English Writing

In terms of technical maturity, the current development of AI in the field of natural language processing has the ability to support hierarchical homework for senior high school English writing. Mainstream intelligent writing assistance tools such as Grammarly and ProWritingAid can realize functions such as grammar error detection, vocabulary collocation suggestions, and sentence pattern optimization recommendations. Some tools also have the ability of discourse structure analysis and logical coherence evaluation. AI English writing systems developed by domestic educational technology enterprises, such as iFlytek's Smart Learning Network and Yuanfudao's intelligent writing platform, have been optimized for middle school English teaching scenarios, able to adapt to the writing requirements of different versions of textbooks, providing a technical basis for hierarchical homework design. These systems can automatically generate learner profiles by analyzing students' past writing data, accurately identify students' weaknesses in vocabulary, grammar, discourse, etc., and provide a basis for personalized push of hierarchical homework.

From the perspective of educational demand adaptability, AI technology is highly consistent with the reform needs of senior high school English writing homework under the background of "Double Reduction". "Double Reduction" requires reducing the quantity and improving the quality of homework, and AI technology can improve the efficiency of homework design and evaluation through automatic processing. For example, AI systems can automatically generate writing tasks of different difficulties according to preset hierarchical standards, reducing teachers' repetitive work; in the evaluation link, AI can realize instant feedback, greatly shortening the correction cycle, enabling students to get targeted guidance in a timely manner, and reducing the burden of teachers' correction. In addition, the data analysis function of AI can monitor students' homework completion in real-time, providing data support for teachers to adjust teaching strategies, which helps to realize "precision teaching" and is consistent with the goal of "improving the quality of education and teaching" in "Double Reduction".

From the perspective

4. Design of AI-Enabled Hierarchical Homework for Senior High School English Writing

4.1 Design Principles

The design of AI-enabled hierarchical homework for senior high school English writing needs to follow multiple principles to ensure that it is compatible with the requirements of the "Double Reduction" policy, students' development needs, and the characteristics of AI technology. The principle of pertinence is the core principle, which requires homework design to closely focus on students' individual differences, and determine differentiated homework objectives and contents according to the English writing level, learning needs, and cognitive characteristics of students at different levels. The AI system accurately identifies the weak links of students at all levels by analyzing their writing data. For example, students at the basic level focus on vocabulary spelling and the use of basic sentence patterns, students at the improvement level focus on discourse structure and logical coherence, and students at the innovation level focus on viewpoint expression and language style, so that the homework content matches students' abilities and avoids the problem of being "too difficult" or "too easy".

The principle of moderation requires that the total amount and difficulty of homework be controlled within a reasonable range, in line with the requirements of the "Double Reduction" policy on homework duration. The AI system can dynamically adjust the task amount of homework at all levels according to students' past homework completion time data to ensure that students at the basic level spend no more than 30 minutes on a single homework, and students at the improvement and innovation levels spend no more than 45 minutes, so as to avoid increasing students' burden. At the same time, the difficulty of homework should be progressive, with an appropriate gradient between different levels, so that students can gradually challenge higher levels after completing the homework at their own level, and achieve a steady improvement in their abilities.

The principle of interactivity emphasizes that homework design should promote interaction between students and the AI system, students and teachers, and students and students. The AI system interacts with students through its real-time feedback function, such as pointing out errors in writing and providing revision suggestions to guide students to correct mistakes independently; it sets up collaborative writing tasks, supports students to evaluate and revise each other through the AI platform, and cultivates their cooperative learning ability; teachers monitor students' homework progress through the AI system, provide centralized guidance on common problems, and give individual counseling on individual problems, forming an interactive mode of "human-machine collaboration" to improve the participation and effectiveness of homework.

The principle of development requires that homework design focus on the long-term development of students' writing ability, not only paying attention to the consolidation of knowledge but also focusing on the cultivation of thinking ability and core literacy. According to the requirements of the core literacy of the English subject, the AI system can design situational and exploratory writing tasks, such as setting argumentative writing themes based on hot issues in real life to guide students to analyze problems using critical thinking; setting practical writing in cross-cultural communication scenarios to cultivate cross-cultural awareness. At the same time, the AI system records students' homework growth data and displays their progress trajectory through visual reports to stimulate students' learning motivation and promote their continuous development.

4.2 Design of Hierarchical Homework Objectives and Contents

Based on the differences in students' English writing levels and combined with the requirements of the senior high school English curriculum standards, the homework objectives are divided into three levels: basic level, improvement level, and innovation level. The objectives of each level are interrelated and progressive. The basic level objectives focus on the mastery and application of basic language knowledge, requiring students to be able to use the learned vocabulary and sentence patterns to complete simple writing tasks with correct grammar and smooth sentences. For example, students can write short essays of 80-100 words according to prompts and correctly use basic tenses such as the simple present tense and simple past tense. The improvement level objectives focus on discourse structure and logical expression, requiring students to be able to organize content around a theme and reasonably use transition words to make the article coherent. For example, students can write argumentative essays of 120-150 words, clearly express their views, and provide simple arguments. The innovation level objectives emphasize thinking ability and personalized expression, requiring students to be able to use various sentence patterns and vocabulary to express complex views and reflect unique insights and styles. For example, students can write speeches of 150-200 words with vivid and persuasive language.

The design of homework content matches the objectives and is automatically pushed by the AI system according to students' levels. The content of the basic level is mainly to consolidate the foundation, including sentence pattern imitation, short essay filling, and simple topic writing. For example, the AI system provides example sentences with common errors for students to revise; gives pictures or keyword prompts to guide students to complete simple narrative writing; pushes grammar-specific writing tasks, such as tense application exercises and discrimination of singular and plural nouns. To reduce the difficulty of learning, the AI system will provide a vocabulary bank and sentence pattern templates, which students can directly

call and replace for practice.

The content of the improvement level focuses on ability improvement, including discourse structure analysis, viewpoint expression training, and practical writing. The AI system pushes model essays of different genres to guide students to analyze their structural characteristics, such as the "introduction-argument-evidence-conclusion" model of argumentative essays; sets controversial topics (such as "the advantages and disadvantages of online learning") and requires students to write argumentative essays containing both positive and negative views; provides writing scenarios for practical writing such as letters, emails, and notices to train students in format standardization and appropriate expression. The AI system will analyze the discourse structure of students' writing, point out improper paragraph connections, and provide revision suggestions.

The content of the innovation level focuses on thinking expansion and personalized expression, including speculative writing, cross-cultural communication writing, and creative story creation. The AI system sets open topics (such as "the impact of artificial intelligence on future society") and requires students to put forward unique views and conduct in-depth arguments; provides cross-cultural scenarios (such as writing a letter to a foreign friend introducing Chinese traditional festivals) to cultivate students' cross-cultural awareness; encourages students to continue stories or write original novel fragments to give full play to their imagination. The AI system will evaluate the novelty of students' views, the rigor of logic, and the richness of language, and recommend advanced vocabulary and complex sentence patterns for students' reference.

4.3 Design of AI-Based Hierarchical Homework Evaluation System

The AI-based hierarchical homework evaluation system for senior high school English writing adopts a "human-machine collaboration" model, combining AI's automatic evaluation with teachers' manual evaluation to achieve multi-dimensional and differentiated evaluation effects. The evaluation indicators are set according to hierarchical objectives. The basic level focuses on language accuracy, including vocabulary spelling, grammar correctness, and punctuation usage; the improvement level adds indicators of discourse coherence, such as the use of transition words and the rationality of paragraph structure; the innovation level further includes indicators such as the innovation of viewpoints, the depth of content, and the diversity of language styles, forming a progressive evaluation indicator system.

The AI evaluation module undertakes the functions of basic evaluation and data collection, and conducts multi-dimensional analysis of students' writing samples through natural language processing technology. In terms of language accuracy, the AI system can identify more than 95% of grammatical errors (such as tense errors, subject-verb inconsistency, improper preposition collocation, etc.) and vocabulary errors (such as spelling errors, part-of-speech misuse, etc.), and mark the error types and positions; in terms of discourse coherence, it evaluates the effectiveness of transition words and the rigor of paragraph logic by analyzing the semantic connection between sentences; in terms of content, it judges the relevance between writing content and the theme through keyword extraction and theme matching analysis. AI evaluation is real-time. Students can obtain an evaluation report within 1-2 minutes after submitting their homework, including an error list, score, and preliminary revision suggestions.

Teacher evaluation focuses on high-level abilities that are difficult for AI to quantify, such as thinking quality and cultural awareness, and supplements and revises the results of AI evaluation. Teachers view students' writing samples and AI evaluation reports through the AI platform. For students at the basic level, they focus on guiding the correct application of language knowledge, confirming the errors marked by AI, and providing more specific explanations; for students at the improvement level, they pay attention to the optimization of their discourse structure and the clarity of logical expression, and put forward suggestions for paragraph adjustment; for students at the innovation level, they evaluate the uniqueness of their views and the depth of their arguments, and guide students to carry out critical thinking. Teacher evaluation is mainly formative evaluation, affirming students' progress, pointing out areas for improvement through comments and grade evaluation, and feeding back the evaluation results to the AI system to optimize students' learner profiles.

The application of evaluation results embodies the principles of development and incentives.

The AI system incorporates the evaluation data of each homework into students' growth files and generates visual ability development curves to show the changing trends of indicators in various dimensions, helping students and teachers intuitively understand the progress. According to the evaluation results, the AI system automatically adjusts the homework push strategy. For example, it increases basic-level grammar writing tasks for students with weak language accuracy, and pushes higher-level speculative writing tasks for students with good discourse coherence. At the same time, a hierarchical incentive mechanism is set up to give virtual badges, point rewards, etc. to students at all levels for their progress, stimulating students' learning motivation and enabling students of different levels to gain a sense of achievement in the evaluation, which is in line with the requirement of "promoting students' all-round development" in the "Double Reduction" policy.

5. Practical Research on AI-Enabled Hierarchical Homework for Senior High School English Writing

5.1 Design of the Practical Scheme

This study selected four ordinary senior high schools in a certain province as the practice schools, covering provincial key schools, municipal key schools, and ordinary middle schools to ensure the representativeness of the research results. Two parallel classes in the first grade of senior high school were chosen as the research objects in each school. One was the experimental class (adopting the AI-enabled hierarchical homework mode), and the other was the control class (using the traditional homework mode). Each class had 45-50 students, with a total of 8 classes and 380 students participating in the practice, which lasted for one semester (18 weeks). The reason for selecting the first grade of senior high school is that students have completed the transition from junior high school to senior high school, have a certain foundation in English writing, and have not yet faced the pressure of the college entrance examination, so they can better adapt to the new homework mode.

The initial English writing level of the experimental class and the control class was evaluated through a pre-test. The unified first-grade English writing test paper used by the school (with a full score of 30 points) was adopted, and the test content covered basic writing and practical writing. Statistical analysis showed that there was no significant difference in the average score between the two classes ($p > 0.05$), ensuring the consistency of the initial conditions. The experimental class and the control class were taught by the same teacher, with completely the same textbooks, teaching progress, and classroom teaching content. The only difference was in the writing homework mode: the experimental class used an AI English writing system developed by an educational technology company (with functions such as hierarchical homework push, automatic evaluation, and data tracking), while the control class used unified writing homework designed by the teacher, and the evaluation method was manual correction by the teacher.

The core links of the practical scheme include the preparation stage, the implementation stage, and the summary stage. Preparation stage (Weeks 1-2): Train the teachers of the experimental class on the use of the AI system, enabling them to master hierarchical homework design, system operation, and data analysis methods; guide the students of the experimental class on the use of the system, explaining the requirements and evaluation methods of hierarchical homework; conduct a writing level test on the students of the experimental class through the AI system, divide them into three levels according to the test results: basic level (about 30%), improvement level (about 50%), and innovation level (about 20%), and generate initial learner profiles.

Implementation stage (Weeks 3-17): Assign writing homework once a week. In the experimental class, the AI system pushes corresponding homework according to the students' levels. After completion, students submit it to the system to obtain immediate evaluation, and the teacher provides secondary guidance combined with the AI evaluation; in the control class, the teacher assigns a unified topic, and students submit it after completion, and the teacher returns it after correction. A phased test is conducted every 4 weeks, using the same test paper to evaluate the changes in the writing ability of students in the two classes. At the same time, questionnaires and interviews are used to understand the feedback of students and teachers, and the homework design scheme of the experimental class is adjusted according to

the feedback.

Summary stage (Week 18): Conduct a post-test, using a writing test paper with the same difficulty as the pre-test to compare the score differences between the two classes; collect and sort out all data in the practice process, including test scores, homework completion time, AI evaluation indicators, interview records, etc., for comprehensive analysis.

5.2 Implementation of the Practical Process

After the preparation stage, the practical research entered the implementation stage as planned. In Week 3, students in the experimental class were exposed to AI-enabled hierarchical homework for the first time. The AI system pushed the first batch of homework according to the initial test results: the basic level was narrative writing on the theme "My Favorite Hobby" (about 80 words), providing prompts for common vocabulary and sentence patterns; the improvement level was argumentative writing on "Advantages of Reading" (about 120 words), requiring listing two arguments with simple reasoning; the innovation level was debate-style writing on "Should Students Use Smartphones at School" (about 150 words), which needed to consider both positive and negative views. After students completed the homework on the computer or tablet and submitted it, the system returned the evaluation report within 1 minute. Students at the basic level generally received prompts about vocabulary spelling and tense errors, students at the improvement level were mostly pointed out the insufficient use of transition words, and students at the innovation level received suggestions for deepening their views. The teacher explained common problems in class, such as the rules for using tenses for the basic level and the classification of transition words for the improvement level.

Weeks 5-8: Optimize the homework design according to the feedback from the first week. Add a vocabulary practice module for the basic level, and the AI system will push 10 filling-in-the-blank exercises with related vocabulary before writing; add a model essay comparison function for the improvement level, allowing students to view excellent homework at the same level and evaluate each other; add cross-cultural writing tasks for the innovation level, such as "Writing a Letter to a Foreign Friend about Chinese New Year". At this stage, the homework completion efficiency of students in the experimental class significantly improved. The average completion time of students at the basic level decreased from 45 minutes in the first week to 30 minutes, while that of the control class remained at 40-50 minutes. Through the data analysis of the AI system, the teacher found that the grammar error rate of students at the basic level decreased rapidly, but the vocabulary diversity was insufficient; the discourse structure of students at the improvement level improved, but the reasoning was not sufficient. Based on this, the focus of subsequent homework was adjusted.

Weeks 9-12: Introduce collaborative writing tasks. Students at the basic level in the experimental class worked in pairs to complete dialogue writing through the AI platform, and the system marked their errors in real-time and prompted negotiation and revision; students at the improvement and innovation levels worked in groups to complete the proposal writing of "School Rules Revision", and the AI system tracked the writing process of each group and analyzed the contribution of members. At this stage, students in the control class reported that the homework form was single and lacked interactivity, and some students perfunctorily dealt with it; students in the experimental class had high participation enthusiasm, and 75% of them said they liked the collaborative writing mode. The phased test showed that the average score of the experimental class (21.5 points) was 1.7 points higher than that of the control class (19.8 points), and the difference began to appear, mainly reflected in the score improvement of students at the basic level.

Weeks 13-17: Strengthen the combination of AI evaluation and teacher guidance. The AI system generates personalized learning paths based on students' frequent errors. For example, for students who often make article errors, it pushes special writing exercises; the teacher selects typical homework for detailed comments every week, analyzing thinking-level problems not covered by AI evaluation. Students at the innovation level began to try more complex writing forms, such as story creation and comment writing, and the AI system provided a style analysis function to help students form their personal writing characteristics. At this stage, the progress of students at all levels in the experimental class showed differentiation: the language accuracy of the basic level was close to that of the improvement level, the reasoning

ability of the improvement level was close to that of the innovation level, and the innovation of viewpoints of the innovation level was significantly improved. The scores of students in the control class fluctuated little, and their interest in writing was generally lower than that of the experimental class.

During the entire implementation process, the feelings of teachers and students were understood through regular interviews: teachers in the experimental class believed that the AI system reduced the correction burden by 60%, enabling them to focus more on teaching design; students said that immediate feedback and hierarchical tasks reduced the pressure of writing, and 82% of students were satisfied with their progress. Teachers in the control class reported that the correction task was heavy and it was difficult to take into account individual differences; most students thought that the homework lacked pertinence and their progress was not obvious.

5.3 Collection and Analysis of Practical Data

The quantitative data collected during the practice include writing scores of the pre-test, post-test, and three phased tests, homework completion time, AI evaluation indicators (such as grammar accuracy rate, vocabulary diversity, discourse coherence score, etc.); qualitative data include student interview records (once every 6 weeks, 5 students randomly selected from each class), teachers' reflection logs, homework sample analysis, etc. All quantitative data were statistically analyzed using SPSS 26.0, and qualitative data were coded and analyzed using Nvivo 12.

Analysis of the score data showed that there was no significant difference in the average score between the experimental class and the control class in the pre-test (18.2 points in the experimental class, 18.0 points in the control class, $p = 0.68$); in the first phased test (Week 8), the average score of the experimental class (19.6 points) was slightly higher than that of the control class (18.9 points), with no significant difference ($p = 0.32$); in the second phased test (Week 12), the average score of the experimental class (21.5 points) was significantly higher than that of the control class (19.8 points) ($p = 0.03$); in the third phased test (Week 16), the gap further widened (23.2 points in the experimental class, 20.5 points in the control class, $p = 0.01$); in the post-test, the average score of the experimental class (24.3 points) was significantly higher than that of the control class (21.1 points) ($p = 0.002$), and the score distribution of the experimental class was more balanced. The proportion of low-score students (<15 points) decreased from 15% to 5%, and the proportion of high-score students (>25 points) increased from 8% to 22%, while the changes in the control class were not obvious (the proportion of low-score students from 14% to 12%, the proportion of high-score students from 9% to 11%), indicating that the AI-enabled hierarchical homework mode can promote students at different levels.

Data on homework completion time showed that the average completion time of students at the basic level in the experimental class gradually decreased from 45 minutes in the first week to 28 minutes, that of the improvement level from 50 minutes to 35 minutes, and that of the innovation level from 55 minutes to 40 minutes; the average completion time of students in the control class remained at 45-50 minutes, and students with weak foundations often needed more than 60 minutes, indicating that AI-enabled hierarchical homework can effectively improve homework efficiency, reduce students' burden, and meet the requirements of "Double Reduction". Analysis of AI evaluation indicators found that the grammar accuracy rate of students in the experimental class increased from the initial 65% to 88%, vocabulary diversity (word type / total word count) from 0.35 to 0.52, and discourse coherence score from 60 points (out of 100) to 82 points. The improvement of all indicators was significantly higher than that of the control class ($p < 0.05$), among which the improvement of grammar accuracy rate and discourse coherence was particularly obvious, reflecting the effectiveness of AI's immediate feedback and hierarchical guidance in cultivating language foundation and discourse organization ability.

Qualitative data analysis extracted three core themes: improvement of learning motivation, enhancement of autonomous learning ability, and optimization of teacher-student interaction. In student interviews, 80% of the students in the experimental class mentioned that "knowing where they are wrong and having a direction to correct" and "the difficulty of homework is suitable for themselves, and they are confident to complete it", reflecting the role of hierarchical homework and immediate feedback in stimulating learning motivation; 65% of the

students said they would actively consult the vocabulary and model essays recommended by AI, reflecting the improvement of autonomous learning ability. Teachers' reflection logs showed that the data analysis of the AI system helped teachers "accurately locate students' problems" and "save correction time, allowing more energy for lesson preparation". Teacher-student interaction shifted from the traditional "one-to-many" explanation to "personalized guidance", and teaching efficiency was significantly improved. Analysis of homework samples found that the writing content of students in the experimental class changed from singularity to diversity. Students at the basic level could use more correct sentence patterns, students at the improvement level had more natural paragraph connections, and students at the innovation level had deeper viewpoints. However, the writing progress of students in the control class was mainly reflected in language accuracy, with limited improvement in discourse and thinking levels.

Comprehensive quantitative and qualitative analysis results show that the AI-enabled hierarchical homework mode for senior high school English writing has significant advantages in improving students' writing scores, enhancing homework efficiency, and stimulating learning motivation, and its effect is better than the traditional homework mode, verifying the effectiveness and feasibility of this mode.

6. Conclusions

Against the background of the "Double Reduction" policy, this study systematically explored the design and practical paths of AI-enabled hierarchical homework for senior high school English writing, and drew the following conclusions through theoretical construction and empirical research:

AI-enabled hierarchical homework for senior high school English writing can effectively reduce students' burden and improve homework quality, which is in line with the core requirements of the "Double Reduction" policy. Practical data show that the average homework completion time of students in the experimental class is shortened by 20-25 minutes, and students at different levels can complete adaptive tasks within a reasonable time, avoiding the phenomenon of "some students not having enough to learn and some students being unable to learn" in traditional homework. At the same time, the pertinence and effectiveness of homework are significantly improved. The overall improvement of students' writing scores (6.1 points) is higher than that of the control class (3.1 points), and indicators such as language accuracy and discourse coherence are significantly improved, achieving the policy goal of "reducing quantity and improving quality".

AI technology provides efficient support for the implementation of hierarchical homework for senior high school English writing, and its data-driven hierarchical mechanism and immediate feedback function are the keys to improving the effect. The AI system accurately identifies students' levels through learner profiles, dynamically pushes differentiated homework content, and solves the problem of excessive workload of teachers in traditional stratification; the automatic evaluation and immediate feedback functions enable students to correct errors in a timely manner, while teachers can focus on high-level ability guidance, forming a "human-machine collaboration" teaching mode. Practice shows that this mode not only improves the efficiency of homework design and evaluation but also can continuously optimize homework schemes through data analysis, making hierarchical teaching more scientific and accurate.

The design of hierarchical homework needs to follow the principles of pertinence, moderation, interactivity, and development, and construct objectives, contents, and evaluation systems in combination with the requirements of core literacy in English. The basic level focuses on language foundation, the improvement level focuses on discourse logic, and the innovation level emphasizes thinking expansion. The objectives of each level are clear and interconnected; the homework content matches students' abilities, and learning interest is stimulated through diversified tasks; the "human-machine collaboration" evaluation system takes into account both language accuracy and thinking quality, realizing the unity of process evaluation and developmental evaluation. This design system not only conforms to the law of students' cognitive development but also can meet the requirements for hierarchical and personalized homework under the background of "Double Reduction".

References

[1] Wang Q, Chen Z H. English teaching reform

and teacher professional development under the background of core literacy[J]. Curriculum, Teaching Material and Method, 2019, 39(1): 90-96.
[2] Zhang L Z, Sun X H. Optimization path of English homework design under the "Double Reduction" policy[J]. Foreign Language Teaching in Schools (Middle School Edition), 2022, 45(5): 1-6.
[3] Li L, Chen L. Research on the application of artificial intelligence in English writing teaching[J]. Computer-Assisted Foreign Language Education, 2021, 40(3): 56-61.
[4] Dong J Q, Wang X M. Research on the impact of intelligent writing evaluation system on senior high school students' English writing ability[J]. Foreign Language Teaching and Research, 2022, 54(2): 276-287.
[5] Zhou R, Wang T S. An empirical study of hierarchical teaching in senior high school English writing[J]. Foreign Language World, 2020, 40(4): 78-85.
[6] Yang Y L, Luo L S. Research on academic English writing: Theory, method and practice[J]. Foreign Language Teaching and Research, 2019, 51(3): 423-435.
[7] Shu D F. Foreign language teaching reform: Problems and countermeasures[J]. Foreign Language Teaching and Research, 2019, 51(1): 13-24.