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A Study of High School English Multimodal Discourse Teaching Based on Generative Artificial Intelligence

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Abstract

This article focuses on the application of generative artificial intelligence (GAI) in multimodal discourse teaching in high school English, deeply analyzes the limitations of traditional high school English discourse teaching, and discusses how generative artificial intelligence can optimize teaching effectiveness through technological empowerment. First, the article explains the core value and key role of generative AI in multimodal discourse teaching, highlighting its importance in enhancing teaching interactivity, providing personalized feedback, generating teaching resources, and dynamically adjusting teaching strategies. Then, through specific teaching cases, the diverse applications of generative AI in actual teaching are demonstrated, including contextual corpus generation, cross-cultural comparative analysis, and critical thinking training. The study shows that the introduction of generative AI not only expands the form of teaching but also significantly improves students' core literacy and promotes the innovation and change of teaching mode.

Keywords: Generative Artificial Intelligence(GAI); High School English; Multimodal Discourse

1. Introduction

Traditional high school English discourse teaching, often dominated by single-article instruction, has been widely criticized for its limitations. Studies have highlighted issues such as single teaching method, limited sources of information,lack of targeted instruction(Danesi, 2024; Algaraady & Mahyoob, 2023). These challenges make it difficult to meet the complex demands of modern education. Furthermore, the rapid advancement of generative artificial intelligence (GAI) technology, such as large-scale language models (e.g., ChatGPT) and image generation tools (e.g., DALL-E), has opened new avenues for educational innovation (Taulli, 2023).*The 2017 Edition of the Revised 2020 Edition of the English Curriculum Standards for General High Schools (hereinafter referred to as the New Curriculum Standards)* put forward new teaching

requirements, adding the skill of “seeing” based on the four basic skills of listening, speaking, reading, and writing, that is, the skill of utilizing various kinds of pictorial resources to understand the meaning of multimodal discourse. This new skill can strengthen the correlation between modalities such as visual and tactile, thus promoting a more comprehensive comprehension of the discourse, and discourse teaching is an effective way to realize this goal. At the same time, with the rapid development of information technology, artificial intelligence is gradually applied to the field of education, and breakthroughs in Generative Artificial Intelligence (hereinafter referred to as GAI) technology, such as large-scale language models (e.g., Chat GPT) and image generation tools (e.g., DALL -E), are bringing about profound changes in educational practices. High school English multimodal discourse teaching supported by generative artificial intelligence not only fits the digital transformation trend of education but also provides an innovative path for teaching practice. Although there have been studies exploring the potential of GAI in education, empirical research on the specific applications and effects of multimodal discourse teaching in high school English is still scarce. This study examines in depth the specific applications of GAI tools (e.g., ChatGPT and DALL-E) in multimodal resource generation, personalized feedback, and cross-cultural comparative analysis through teaching case studies. The findings not only provide an innovative path for educational practice but also provide a solid theoretical basis for the digital transformation of education, which is of great significance for enhancing students' critical thinking, cross-cultural communicative competence,digital literacy.

2. Analysis of the Current Situation of High School English Discourse Teaching

Discourse teaching is the core of language learning.However, traditional high school English discourse teaching, which is often dominated by single-article instruction, has been widely criticized for its limitations. Studies have shown that this teaching mode suffers from problems, such as a single teaching method, limited sources of information, and lack of relevance in teaching (Danesi, 2024). Teachers tend to focus on basic discourse knowledge, ignoring the deeper meaning and logical structure of the discourse. This approach leads to passive learning by students who are mere recipients of knowledge rather than active participants (Algaraady & Mahyoob, 2023). In addition, the disconnect between teaching English discourse and cultural background knowledge has also been identified as a significant barrier. Classroom observations have shown that students often struggle to comprehend texts that lack cultural context, resulting in low comprehension scores on relevant assessments (Algaraady & Mahyoob, 2023). Finally, traditional English discourse teaching often suffers from unclear instructional objectives, which not only affects students' comprehension and knowledge of the discourse but also diminishes their interest and engagement in learning, ultimately leading to unsatisfactory teaching and learning outcomes (Danesi, 2024).

Table1. Overview of High School English Discourse Teaching and the Integration of Generative AI Tools for Multimodal Learning

Section	Content
Discourse Teaching Importance	Core of language learning, promotes knowledge acquisition and thinking ability
New Curriculum Standard	Integrates discourse, thematic contexts, linguistic & cultural knowledge, and learning strategies
Traditional Teaching Problems	Isolated vocabulary/grammar learning, low student interest, poor results
Current Teaching Issues	Lack of innovation, passive learning, weak reading and comprehension abilities
Teaching Method Issues	Teacher-centered, neglects deep meaning, lacks modality correlation
Discourse Materials	Disconnected from cultural knowledge, outdated textbooks, limited relevance
Teaching Objectives	Often unclear, affecting comprehension, participation, and teaching effectiveness

2.1. Single teaching method, students' weak research and reading ability

In the traditional teaching method, the teacher dominates,and focuses only on the basic knowledge of the discourse, but neglects the deep meaning and logical structure of the discourse, the teaching activities are in a single form, lack of innovation and diversity, the lack of correlation between the modalities (e.g., visual, auditory, etc.), and the students are passive recipients of knowledge and lack the opportunity for independent learning. This teaching mode is difficult to stimulate students' enthusiasm for learning, resulting in weak reading ability and difficulty in deep comprehension and analysis in discourse

2.2. Lack of relevance of discourse materials, difficult to match the actual needs of students

Discourse is not only the carrier of English knowledge but also the medium of English culture. Effective discourse reading and comprehension need to be premised on the link between discourse reading and cultural background knowledge. However, English discourse teaching is disconnected from the culture and background knowledge, and students' cultural background knowledge is generally insufficient, which makes it difficult to cross cultural-barriers in discourse learning and easy to produce comprehension misunderstandings. In addition, the content of teaching materials is fixed and slowly updated, which makes it difficult to meet students' diversified learning needs, further affecting students' learning effect.

2.3. Ambiguous Teaching Objectives, Difficult to Improve Teaching Effectiveness

Discourse teaching requires teachers to understand the curriculum standards accurately, clarify the teaching objectives, take reading as the main line, combine with the theme of the unit, explore the methods that conform to the teaching program,improve the teaching effect, teachers should guide the students from the overall comprehension of the content of the discourse to the mastery of the main idea of the article, and then carry out deeper learning. However, traditional English discourse teaching often suffers from the problem of ambiguous objectives, which not only affects students' comprehension and cognition of the discourse but also weakens their interest and participation in learning, thus leading to unsatisfactory teaching results.

3. The Connotation and Importance of High School English Multimodal Discourse Teaching under Generative Artificial Intelligence

3.1. The Connotation of High School English Multimodal Discourse Teaching under Generative AI

Generative AI (AI) refers to AI that can generate text, images, or other media content is primarily characterized by its ability to learn patterns in new input data and generate new data with similar characteristics (Taulli, 2023). It can instantly adapt to student interactions and teacher needs and is characterized by the provision of new information, provides new information, personalized instruction, instant feedback, and enhances student motivation to learn (Danesi, 2024) Currently, generative AI software such as ChatGPT, Kimi, DeepSeek, etc., can help users refine and guide conversations to a specific length, format, style, level of detail, and language requirements.

The basic theory of multimodal discourse analysis comes from the idea of “Language as social semiotic” proposed by Halliday (1978), modality can be divided into visual, auditory, olfactory, gustatory, and tactile modalities, and multimodality refers to the use of two or more symbol systems at the same time. Using two or more symbol systems to form a synergy to convey richer information. In the context of today's rapid development of science and technology, the profound impact of information technology on the way of education has shifted from the traditional single mode of teaching to the multimodal and diversified mode of teaching. Specifically, the construction of discourse is no longer limited to the traditional single textual modality but gradually develops to the combination of text and images, sound, and other modalities interacting with each other.

Kress and van Leeuwen (2001) further developed the multimodal theory, in which they emphasized that meaning is not only conveyed through verbal text but also the joint action of other modalities such as visual and auditory, to achieve a more comprehensive construction of meaning. In their view, multimodal discourse in educational practice is not just a simple superposition of modalities, but an interaction and integration between different modalities, and this interaction can promote students' multidimensional understanding of discourse and enhance the effect of language learning. Therefore, the multimodal discourse teaching of high school English based on generative artificial intelligence can not only integrate multiple resources such

as text, image, and sound but also realize the teaching mode of personalization and instant feedback with the help of artificial intelligence technology, which greatly enriches the students' learning experience and enhances the teaching effect.

3.2. The Importance of High School English Multimodal Discourse Teaching under Generative Artificial Intelligence

The systematic integration of Generative Artificial Intelligence (GAI) and multimodal discourse teaching in high school English is not only an inevitable trend for the implementation of the core literacy orientation of the New Curriculum but also an innovative opportunity to break through the constraints of the traditional education model and build a new ecology of intelligent education(Algaraady et al, 2023). At present, the traditional high school English classroom still tends to be “text-centered”, and multimodal discourse teaching often remains only in the simple presentation of textbook illustrations or pre-produced courseware, which lacks dynamism, interactivity,generativity. The intervention of GAI technology can reconfigure the logic of the supply of multimodal resources: on the one hand, intelligent text-discourse teaching can be realized through language models such as Chat GPT. On the one hand, intelligent deconstruction of text parts of speech (e.g., theme analysis, rhetorical recognition) is realized through language models such as Chat GPT, and supporting charts, mind maps or contextual animations are automatically generated by combining with cross-modal generation technology, forming a three-dimensional text-driven-multimodal derivation system; on the other hand, GAI can be customized to meet the needs of students' cognitive differences and can be customized to meet the needs of students. On the other hand, based on students' cognitive differences, GAI can customize personalized modal combination schemes, such as generating image annotations for visual learners and synthesizing voice explanations for auditory learners to optimize the effectiveness of the multimodal input (Richard, 2021).

This technology-enabled pedagogical transformation has a dual educational value: from the practical dimension, GAI effectively bridges the gap between modal homogenization and superficial interaction in the traditional classroom through the human-computer synergy mechanism, e.g., in the teaching of cultural discourse, the AI-generated virtual simulation scenarios can transform the abstract cross-cultural communication training into a tangible experience; from the strategic point of view, GAI reconstructs the “Goal-Process-Evaluation” (Goal-Process-Evaluation) model and the “Objective-Process-Evaluation” (Objective-Process-Evaluation) model. From a strategic point of view, GAI reconstructs the closed loop of education of “goal-process-evaluation”. Teachers can rely on AI to dynamically track students' performance in multimodal interactions (e.g., depth of text analysis, the accuracy of image interpretation, fluency of voice response), adjust teaching strategies in real-time, and form the “intelligent diagnosis-precise delivery-effect evaluation” literacy training The cycle system. The application of generative AI in high school English multimodal discourse teaching is essentially an innovation in the educational paradigm: through the scientific coupling of technological creativity and educational law, it not only solves the real problems of the traditional classrooms, such as single mode and lack of interaction but also provides a practical framework for the cultivation of future talents with cross-cultural communication skills, digital literacy,innovative spirit. Teachers

dynamically adjust their teaching strategies based on this framework, forming a closed-loop system of “goal setting - resource generation - process tracking - precise intervention”, which ultimately serves the comprehensive development of core literacy. Therefore, generative artificial intelligence not only improves teaching efficiency but also reconstructs the essence of education through human-computer collaboration, making technology an important tool to promote the overall development of students.

4. The practical application of multimodal discourse teaching in high school English under generative artificial intelligence.

High school English multimodal discourse teaching under the support of generative artificial intelligence has important theoretical and practical significance. The theme of this unit is “man and nature”, which explores the harmonious coexistence of mankind and nature. The teaching starts with an introduction to the environmental problems faced by Venice, the “city on water”, and then goes on to introduce the background and operation of the Longji Terraces, natural dyes, unique geographic landscapes, the lifestyle of the Inuit people, the British love of gardens, and the British culture of fruit tea and herbal tea. This series of content helps students to understand the close connection between human life and the natural environment: the natural environment has a profound impact on human life, while human beings, through their wisdom and efforts, make rational use of and adapt nature to meet the needs of survival. The contents of this unit are conducive to students' understanding and exploration of the relationship between human beings and nature, and ultimately to the formation of a sense of respect for nature, rational use and transformation of nature, and living in harmony with nature.

4.1. Generating Multimodal Contextual Corpus and Constructing Thematic Meaning Networks

The thematic context of Unit 6, 'At one with nature,' focuses on 'human and nature,' aiming to explore the harmonious coexistence of humans and nature. To enhance teaching interactivity and vividness, teachers can use various generative AI tools, such as ChatGPT, DALL-E, Synthesia, and Canva Magic Design. These tools can generate multimodal resources, including text, images, and videos. Taking The Blue Planet as an example, the teacher first generates a basic text discourse using ChatGPT by inputting keywords (e.g., “environmental protection theme essay”) for the teaching objective, and the AI automatically extracts core concepts (e.g., “carbon footprint”, “sustainability”, “environmental protection”, “environmental protection”). AI automatically extracts core concepts (e.g., “carbon footprint”, “sustainable development”) and links DALL-E to generate concept maps and data visualization charts. In conjunction with Synthesia, the text is transformed into a virtual instructor video and interactive Q&A scripts are generated simultaneously. To meet the needs of students with different learning styles, teachers can customize personalized learning resources based on students' learning profiles (e.g., learning styles, cognitive levels, interest tags). For visual learners, MindMeister can be used to transform the text structure into 3D mind maps to help them understand the content more intuitively; for auditory learners, Murf.ai can be used to transform the text into character voice-overs and add

background sound effects to enhance contextual perception; and for kinaesthetic learners, AR scenes can be created through the Metaverse platform that supports gesture operation to complete the discourse sequencing task. On this basis, Claude 2 can be used to conduct cross-cultural analysis, inputting text passages to generate a table comparing Eastern and Western views of nature, including architectural philosophy, e.g. comparing the architectural philosophies of "borrowed landscape" in Chinese gardens and geometric gardens in the West, and exploring "Taoism and nature" and "anthropology" in the West. For example, compare the architectural philosophies of Chinese "borrowed landscape" gardens and Western geometric gardens, and explore the differences in ecological ethics between "Taoism and nature" and "anthropocentrism. MidJourney was used to generate a comparative atlas of cultural scenes, such as "Greek Temple and Surrounding Natural Landscape" and "Lijiang Ancient City Water System Layout", which guided students to analyze the impact of geography on cultural expression. Finally, students use ChatGPT to generate virtual interview scripts, simulate the comments of UNEP officials on China's ecological wisdom, and record multimodal speech videos, thus cultivating students' cultural awareness and cross-cultural comparative skills, which is in line with the cultivation goal of cultural awareness in the new curriculum standard.

4.2. Creating cross-cultural comparative discourse and deconstructing cultural cognitive differences

In the practice of cross-cultural comparative discourse construction and cognitive deconstruction, with the theme of "The Unity of Heaven and Humankind" as the core, AI technology is integrated to carry out three-stage teaching (Carpio,2023). First, in the stage of cultural deconstruction and resource generation, the teacher guides the students to input the key passages of The Wisdom of the East into Claude 2, generates a comparative analysis matrix of the Eastern and Western views of nature, deconstructs the differences between the "borrowed landscape" technique of Chinese gardens and the aesthetic philosophy of Western geometric gardens, and analyzes the differences between the "Taoism of nature" and the Western geometric gardens. We also analyze the ecological and ethical differences between "Taoism and Nature" and "Anthropocentrism". At the same time, Mid Journey is used to generating comparative atlases of Greek temples and natural landscapes, and Lijiang's ancient city and water system layout to demonstrate the differences in cultural expressions through the visualization of geographic environments. Then, in the multimodal semantic correlation stage, based on the cross-cultural corpus generated by AI, the "3C" teaching mode was adopted to deepen cognition. In the meaning construction section, students use the Hypothesis annotation tool to mark cultural symbols such as corridor windows and symmetrical axes in the VR tour of the Forbidden City and the generated map of Gothic architecture provided by the AI; in the correlation and migration section, students analyze the metaphorical network of the text through IBM Watson to visualize the modal correlation between the water cycle system and the Taoist idea of yin and yang; and in the critical reconstruction section, students use the combination of Gen-2 and Canva to demonstrate the differences in cultural expressions. Gen-2 and Canva to adapt the Dong wind and rain bridge construction techniques into dynamic cartoons and write cross-media explanations. Finally, in the reflective practice output stage, students use Chat GPT to generate scripts for interviews with

officials from the United Nations Environment Programme (UNEP), simulate a multimodal debate on the modern value of traditional Chinese ecological wisdom, and record a speech video with AI-generated data visualization charts. Through the integration of multimodal resources and cross-cultural comparisons, this teaching process helps students understand the differences between Eastern and Western cultures at a deeper level and strengthens their cross-cultural comparative and application skills through critical thinking and creative expression, which ultimately achieves the goal of comprehensively improving students' cognition and cultural understanding.

4.3 Designing critical reconstruction tasks to train higher-order thinking quality

When designing critical reconstruction tasks to train higher-order thinking quality, AI technology can be utilized to carry out multidimensional teaching activities in conjunction with the teaching design of the Compulsory Study 1 Unit 6 At one with the nature of the Foreign Studies Society (Campbell, 2023). First, GPT-4 is used to generate opposing arguments, such as “Modern technology makes traditional harmony with nature obsolete”, and students are asked to combine the wisdom of building wind and rain bridges with the AI-generated case study of Dujiangyan water conservancy project in the text. The students were asked to combine the wisdom of building wind and rain bridges in the text and the AI-generated case of Dujiangyan to make a strong refutation. In this process, students need to use critical thinking to analyze the relationship between traditional wisdom and modern technology, so as to enhance their logical reasoning and dialectical thinking skills. Then, Tome was used to create a dynamic presentation document, integrating the seismic structural illustration of the Dong Drum Tower generated by DALL-E and the eco-building data dashboard generated by AI to form a visual argumentation chain. This multimodal argumentation approach not only enhances students' ability to express their arguments but also helps them understand complex concepts more intuitively. Meanwhile, in order to deepen students' metacognitive abilities, AI can analyze the logical gaps (e.g., over-generalization) in students' oral presentations and generate a Critical Thinking Self-Checklist, which guides students to reflect on and improve their thinking process.

4.4 Implementing personalized feedback intervention and optimizing modal adaptation paths

In the process of implementing personalized feedback interventions and optimizing modal adaptation pathways, teachers can use AI tools such as Otter.ai and Gradescope to achieve accurate learning assessment and support. Otter.ai analyzes recordings of group discussions and generates heat maps of vocabulary usage, providing teachers with an intuitive diagnostic of learning. Based on the results of these analyses, teachers can perform personalized modal optimization for students with different learning styles: for example, push the AI-generated dynamic disassembly video of “Mortise and Tenon Construction of Classical Chinese Architecture” to visual learners to help them understand complex concepts more intuitively （Caulfield, 2023). Generate the bilingual radio drama of “Chuang Tzu's Theory of Qi-Shih” for auditory learners to enhance their auditory perception and understanding of the text. At the same time, Gradescope can automatically generate learning profiles to record the development

trajectory of students in the three dimensions of “multimodal interpretation - cultural interpretation - the creative expression”, providing students with a clear learning growth path. This integrated design of “teaching and assessment” not only promotes the continuous improvement of students' learning ability but also meets the requirements of the learning ability goals in the new curriculum standards, providing strong support for the overall development of students. Through this process, teachers can make real-time adjustments to their teaching strategies to ensure that each student can realize his or her full potential under the appropriate learning mode and promote his or her all-round development.

In high school English multimodal discourse teaching, the use of generative AI tools to create more interactive and vivid teaching content is essential to help students grasp complex concepts and interdisciplinary knowledge. The following table summarizes the teaching framework and corresponding AI tools for the unit “Man and Nature”, aiming to integrate AI technologies (e.g., ChatGPT, DALL-E, etc.) to generate multimodal text, image, and video resources, to promote students' understanding of environmental issues and the relationship between human beings and nature, and to cultivate their awareness of respecting nature and rationally exploiting nature. Awareness of respecting nature and rationally exploiting it. As shown in Table 2.

Table2. Analysis of Current Issues in High School English Discourse Teaching and Challenges in Effective Implementation

Section	Content
Theme	Man and Nature: Exploring harmonious coexistence
Unit Focus	Environmental issues, human adaptation to nature, cultural perspectives
Teaching Content	Venice, Longji Terraces, Inuit lifestyle, British gardens, fruit and herbal teas
Objective	To understand the connection between human life and nature, and foster respect for nature
Tools Used	ChatGPT, DALL-E, Synthesia, Canva Magic Design
Example	The Blue Planet unit: Generating text, images, and videos using AI tools
Outcome	The Blue Planet unit: Generating text, images, and videos using AI tools

5. Limitations of multimodal discourse teaching in high school English with generative artificial intelligence

Although the use of GAI technology in teaching multimodal discourse in high school English is promising, it faces some obvious limitations. (1) Research has shown that the technical complexity of GAI tools can be a barrier for teachers with limited technical skills and may limit the widespread use of these tools in educational settings (Danesi, 2024). (2) Over-reliance on GAI

technologies may diminish students' self-directed learning skills and critical thinking; the goal of education should be to stimulate students' critical awareness, not to make them passive recipients of knowledge. (3) GAI technologies face challenges of algorithmic bias and data privacy; AI-generated content may be culturally biased or logically flawed, which requires teachers and students to be able to critically assess it, and ensuring data security and compliance requires the combined efforts of technology developers, educators, and policymakers. This emphasizes the need for educators and students to have critical assessment skills when using AI-generated materials (Mayer, 2021; Taulli, 2023).

6. Conclusion

The multimodal discourse teaching of high school English based on generative artificial intelligence offers a new approach for educational reform. Through the organic integration of technology, it can effectively break through the inherent limitations of traditional teaching, fostering multi-dimensional understanding and deep learning among students, and at the same time cultivate their critical thinking, intercultural communication skills, and digital literacy. Although there are some challenges in implementing this innovative teaching model, its potential enable personalized education to improve teaching efficiency, motivate students, and realize personalized education should not be underestimated. Looking ahead, with the continuous progress and improvement of AI technology, generative AI will certainly play a more critical role in the field of education, and help English language teaching to move forward in a more open, diversified, and innovative direction.

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