

Strategies of Senior English Reading Teaching with Information Technology Integration based on Deep Learning

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Abstract: The advancement of information technology has profoundly impacted English learning, with the fragmented and repetitive surface learning no longer meeting the demands of talent development. Deep learning has increasingly captured global attention, underscoring the urgent need for a deep integration of information technology within English teaching. This study delves into an English reading class as a teaching case to elucidate this integration. By revealing the characteristics of the deep integration of modern information technology with English reading teaching in high school from the perspective of deep learning, the study aims to explore strategies for integrating modern information technology with English reading teaching in high school. The study finds that technology-integrated teaching based on deep learning can enhance student autonomy, classroom contextualization, multi-directional teaching interactivity, and multimodality. The deep integration of information technology with deep learning enriches teaching methods, promotes students' learning experiences in real contexts, cultivates their higher-order thinking skills, and is of significant importance for enhancing their core competencies.

Keywords: Deep Learning; Information Technology; In-Depth Integration; English Reading Teaching.

1. Introduction

The rapid development of information technology has triggered changes in learning methods, driving the digital transformation and informatization of education, necessitating that foreign language teaching keeps pace with these advancements. Although high school English classes have adopted a blended learning environment that combines online and offline teaching methods, integrating traditional teaching techniques with educational information technology, there are still issues of superficial learning characterized by "content-heavy instruction" and "fragmented and mechanical training" (Luo, 2021). This results in students' lack of active participation in the classroom and a shallow understanding of knowledge. In other words, the improper use of educational information technology has not fundamentally changed the nature of superficial learning.

Deep learning, as opposed to superficial learning, is a new approach to learning (Marton & Säljö, 1976). Deep learning emphasizes that students should actively internalize external knowledge through output activities such as interaction and communication, transforming it into knowledge they can understand and express, which can then be applied to solve new problems in real-life situations (Wang et al., 2021). Constructivism holds that creating authentic contexts can greatly attract students' interest in learning, and modern information technology can effectively create such authentic contexts. *The General High School English Curriculum Standards (2017 Edition Revised in 2020)* clearly states that high school English courses should emphasize the transformation of teaching models and learning methods in the context of modern information technology, making full use of it to promote deep integration between information technology and curriculum teaching. During the process of course implementation, the supportive and service functions of modern educational technology in teaching and learning

should be fully utilized, choosing appropriate digital technologies and multimedia tools to ensure that the application of new technologies such as virtual reality, artificial intelligence, and big data contributes to promoting students' effective learning and the development of core competencies in the English subject (Ministry of Education, 2020). The integration of information technology can provide rich resources and tools for deep learning, supporting students in exploratory learning, developing critical thinking, and enhancing creative expression. This integration helps students move beyond traditional memorization and repetition, engaging in deeper cognitive processing, thereby achieving the internalization of knowledge and the enhancement of their abilities.

In this study, a reading lesson in high school English will be used as a case to analyze the characteristics of integrating modern information technology into English reading teaching in high school from the perspective of deep learning. The aim is to explore implementation strategies for deeply integrating information technology into English reading teaching in high school. Applying technology in English teaching can help improve teachers' information literacy and refine teaching methods. Meanwhile, it also helps students grasp the essence of knowledge through deep understanding and processing, thereby achieving deep learning and developing core competencies.

2. Literature Review

2.1. Studies on Deep Learning

Research on deep learning, both domestically and internationally, can be categorized into theoretical and applied research. The concept of deep learning originated in the 1970s. Marton and Säljö (1976) introduced the educational concepts of surface learning and deep learning, based on how learners acquire and process information. Surface learning focuses on

recitation, memorization, and the application of basic principles, knowledge, and facts. In contrast, deep learning emphasizes the complex application and creation based on a thorough understanding of knowledge.

In China, He and Li (2005) introduced the term “deep learning”, defining it as learning that builds on understanding. This involves learners critically assimilating new ideas and facts, integrating them into existing cognitive structures, making connections between ideas, and transferring existing knowledge to new situations for decision-making and problem-solving. Guo (2016) further described deep learning as a meaningful, teacher-led process in which students actively participate, experience success, and develop around challenging learning topics.

In addition to theoretical research, deep learning has practical applications across various disciplines. In English education, deep learning is primarily used to develop students’ reading and writing skills and overall instructional design. Firstly, the term “deep learning” appears frequently in the General Senior High School English Curriculum Standards (2017 Edition, 2022 Revision), prompting many educators to implement it in reading and writing classes. It demonstrates that deep learning is a viable approach for fostering students’ core competencies. For instance, Sun (2019) explored methods for conducting English learning activities in junior English classes through teaching samples and practical teaching. The findings indicated that deep learning aids in internalizing acquired knowledge and enhancing higher-order thinking skills. Secondly, researchers often combine deep learning with overall unit instructional design. Liz Grauerhdz (2001) noted that comparing deep learning with surface learning shows that holistic teaching can promote deep learning. In China, Wang et al. (2021) integrated overall unit instructional design with deep learning to study a specific path of reading instruction using examples from BNU Press textbooks.

In summary, research on deep learning is extensive and varies greatly between domestic and international contexts. International studies cover a wide range of subjects, from primary school to graduate studies, and typically employ empirical research methods. In contrast, domestic research focuses more on the development and transfer of advanced knowledge among students. These studies are crucial for understanding deep learning, offering valuable insights into its definitions, characteristics, and specific teaching models for different educational stages. They provide essential guidance for applying deep learning, improving education quality, and enhancing students’ core competencies.

2.2. Studies on Deep Learning Integrating Information Technology in EFL Teaching

With the development of information technology and its application in the field of teaching, the design and development of digital teaching resources based on deep learning has become a new research perspective. The integration of information technology with foreign language teaching is not a new phenomenon, which has evolved through stages from assistance, support, and integration, to deep fusion (Wang, 2018). The deep integration of information technology into English teaching involves the effective use of modern technological tools, ensuring a comprehensive and multi-layered fusion with all aspects of English instruction. This approach aims to meet and create students’ learning needs by establishing a “teacher-led,

student-centered” classroom model, thereby promoting deep learning (Zhang, 2020). Empirical studies on deep learning abroad focus on E-learning, artificial intelligence, and learning science (Hinton et al. 2012; Ranjan et al. 2015). In China, the studies on information technology integrating deep learning are mainly applied in college English. For instance, Yu (2021) proposed to design a flipped classroom in college English to motivate students and engage them in learning. Chen (2023) elaborated on the application and effect of the SPOC teaching model in college English teaching from the perspective of deep learning, hoping to promote the reform of college English teaching in China. Zhang (2019) explored the design of a smart English classroom based on deep learning, believing that a smart classroom can effectively promote students’ deep learning and break through the traditional classroom teaching mode mainly focused on surface learning.

Despite these contributions, there are limited studies integrating deep learning with information technology in English reading teaching. Besides, some educators have tended to prioritize technology over pedagogy, becoming overly reliant on and enamored with technological tools (Shi & Li, 2017). Additionally, the degree of integration between technology and teaching is often insufficient; for instance, certain educational websites still limit their learning activities to traditional methods like knowledge explanation, memorization, and drills (Cheng, 2018). In other words, current research offers limited exploration of integrating information technology and deep learning in high school English classrooms, resulting in a lack of replicable models and best practices. Furthermore, the lack of technological pedagogical skills among teachers has resulted in ineffective use of technology in English classrooms, hindering the promotion of deep learning. Nonetheless, the integration of information technology with deep learning is a critical direction for foreign language teaching reform, particularly in high school English education, and cannot be overlooked. Therefore, this study seeks to explore strategies for effectively incorporating information technology into high school English classrooms, to enhance teachers’ tech-based teaching abilities and foster deeper learning among students.

3. A Practice of English Reading Teaching in Senior High School Integrating Information Technology Based on Deep Learning

3.1. The Analysis of Teaching Material and Teaching Objectives

The teaching material is selected from the *English (New Standards 2019) Required Elective Course Book Three*, published by the Foreign Language Teaching and Research Press. The teaching material is analyzed from three aspects: “what, why and how”. Firstly, it is a reading class named “Artificial Intelligence: A Real Threat?” The thematic context is science and technology, which belongs to man and society. The discourse presents three opinions on AI--- AI is a real achievement; AI is a real threat; AI is a double-edged sword that humans should embrace and regulate. Secondly, as for “why”, the author intends to inspire readers to weigh the values and risks of AI and think about how people should live in the age of AI. Finally, the text type is a new media discourse---forum discussion---which meshes with information technology. The text comprises an introduction

and three netizens' opinions arranged into seven paragraphs. Each netizen sets examples and makes reasoning to argue their points. The language of the discourse is concise and logical, using lots of questions to provoke thinking.

This lesson is exemplary for integrating information technology with deep learning in senior high English classrooms for several reasons. Firstly, it is relevant to the thematic context---science and technology, which is highly relevant to contemporary society, where AI is a significant and rapidly evolving field. This context provides a rich ground for deep learning as it connects classroom learning with real-world issues. Secondly, it gives access to diverse opinion presentations. The text presents a balanced view by offering three distinct opinions on AI, which encourages students to engage in critical thinking and consider multiple perspectives. This aligns with deep learning's emphasis on developing higher-order thinking skills. Finally, it integrates with information technology. The class can utilize various digital tools and platforms to enhance learning, such as AI simulations and online forums for debate. This integration is crucial for deep learning as it provides students with the tools to explore and understand complex topics like AI.

Based on the analysis of discourse and students, the teaching objectives aimed at achieving deep learning have been set. By the end of the lesson, students are primarily able to summarize the different opinions on AI in the passage with supporting details. Then they are able to organize information to develop learning by using visual tools such as diagrams. More importantly, they are supposed to think logically, critically, and creatively about technology development and enhance awareness of the new roles of humanity in the age of AI by sharing opinions.

3.2. Characteristics of English Teaching Integrating Information Technology Based on Deep Learning

3.2.1. Subjectivity

Deep learning occurs through student subjectivity, emphasizing active participation and whole-person experience (Yang, 2024). In the era of digital intelligence, the design of learning should prioritize students' learning experiences. These experiences are not only reflected in the creation of a blended virtual and physical learning environment, the easy access to learning resources, and the personalization of learning services, but also in ensuring that students feel fully engaged in their learning process (Chen & Zhou, 2023). This sense of engagement can manifest in students' exploration of learning content under the guidance of teachers, as well as in their awareness of their cognitive development.

Firstly, students should take an active role in exploring the integration of information technology with instructional content. For example, in a lesson centered around the theme "AI-A Real Threat?", the class is structured around this question, starting with the introduction of a virtual AI learning assistant and incorporating tools like mind mapping software. Through the hands-on use of AI tools, students can experience both the convenience and potential threats of AI, thereby reflecting their active engagement in exploring the topic. Secondly, students should be involved in monitoring and perceiving their cognitive development, transitioning from lower-order to higher-order thinking. This cognitive progression can be guided by four sequential questions: "What do I know about AI? What do I want to know about AI?"

What have I learned? What do I think further about AI?" These questions, abbreviated as "KWLT," help students deepen their understanding and engage in critical thinking. This process of cognitive development is perceivable, monitorable, and adjustable, thereby reinforcing students' active role in their learning journey.

3.2.2. Contextuality

Deep learning is context-based learning. Realistic contexts connect knowledge acquisition with real-life experiences, effectively stimulating students' imagination and encouraging them to go beyond their existing knowledge, forming new cognitive structures (Zeng & Zeng, 2022). This process engages students both behaviorally and emotionally, helping them understand the real world and develop the competencies needed to tackle complex real-world problems in the future. Information technology can create authentic language learning contexts for students, aiding in deep understanding and promoting application and practice.

On the one hand, using information technology to create real-world contexts can help students deeply understand the knowledge they are learning. For instance, the text type for this lesson is a forum discussion, a new media text featuring three netizens debating the pros and cons of AI. During the transition from "What I know" to "What I want to know," which involves introducing the text, the teacher can use augmented reality (AR) to design a technology forum setting, guiding students to take on the role of forum attendees as they complete reading tasks. After the students have understood the viewpoints of the three netizens, the teacher can utilize AI voice and image tools (such as TT Talk) to bring the characters and text to life, allowing students to immerse themselves in the technology forum scene. This method not only deepens students' comprehension of the text but also trains their listening skills.

On the other hand, creating realistic contexts enhances students' practical application abilities. For example, in the "What I think further" stage, when students are required to express their opinions based on the viewpoints in the text and additional perspectives provided by the teacher, the teacher can construct a scenario related to real life. The teacher might say, "Suppose you are the next presenter of the Technology of Tomorrow Forum. Now it's your turn to share your opinions." This allows students to shift from the role of audience members to speakers. After collaborating in groups to prepare their speeches, a representative from each group presents, while members of other groups act as judges, scoring the presentations based on criteria provided by the teacher. This immersive learning, by simulating real-life contexts, makes learning activities more concrete and vivid, greatly enhancing the interest and practicality of learning. It improves students' English expression skills and assesses their understanding and internalization of the knowledge. Meanwhile, it trains students' higher-order thinking, enhances their ability to solve problems in real world, promotes deep learning, and reinforces core competencies.

3.2.3. Interactivity

The quality of interaction between teachers and students is crucial to learning outcomes (Chen & Zhou, 2023) and is a key condition for deep learning. Information technology can expand the scope of interaction, facilitating multidirectional communication between students and teachers, students and peers, and students and educational resources. In comparison to other educational stages, primary and secondary education place greater emphasis on the deep integration of digital

technology with subject teaching, focusing on live classroom interaction and face-to-face engagement. This approach prioritizes classroom management and interaction design, such as using digital technology to enhance classroom interaction and student participation, rather than merely inserting digital resources into lessons (Jing & Lü, 2023). In high school English teaching, the deep integration of information technology enhances interaction between teachers and students, among students, and between humans and machines. Human-computer interaction aims to highlight students' sense of engagement, immediacy, and experiential learning, often characterized by one-on-one interaction, immediate feedback, diverse choices, and self-paced learning (Xu & Chen, 2021).

The reading class on "AI---A Real Threat?" exemplifies interactivity, particularly the features of human-computer interaction. When led in the lesson, the teacher introduced a virtual AI learning assistant and initiated a dialogue between the assistant and the students. Here is a portion of the dialogue:

AI Assistant: "Hello ladies and gentlemen. I'm Mr. Smart, your artificial intelligence learning assistant. What do you know about me, about Artificial Intelligence?"

Student A: "I use an AI cleaner."

Student B: "I know Siri and Chat-GPT."

AI Assistant: "I'm glad to hear that. I made a video to introduce myself. Would you like to take a look?"

Unlike traditional introduction methods, this lesson began with an interactive exchange between the AI assistant and the students. Through a Q&A session and the AI's self-introduction video, students' interest in the lesson was sparked, and their prior knowledge was activated. Moreover, the firsthand experience of interacting with AI prompted students to actively consider the impact of modern information technology, such as AI, on their learning and daily lives. In this process, information technology is not merely a tool to improve English teaching methods but is integrated into the essence of the English learning process.

3.2.4. Multimodality

Information technology can offer students a more diverse array of language input materials and means for demonstrating learning outcomes. Beyond traditional images, audio, video, and presentations, AI animations and augmented reality can provide more intuitive experiences. Additionally, tools like mind mapping software and concept mapping tools can support the visualization of students' thinking processes and enhance the efficiency of their output.

For instance, in the post-reading stage of the "AI-A Real Threat?" lesson, after guiding students to reflect on human perspectives of AI, the teacher posed a rhetorical question, prompting students to consider how AI might view its own role. The AI assistant then responded with an animated example. This activity not only demonstrated the human-computer interaction within high school English teaching but also highlighted the multimodal approach of integrating modern information technology. The thoughtful integration of IT into the classroom enables teachers to use various teaching media-images, text, sound, and video-to enrich the learning environment, expand the scope of instruction, and deepen students' understanding.

However, creating a multimodal high school English classroom does not mean inundating the lesson with various teaching media throughout. Instead, technology should be introduced at appropriate points based on the lesson objectives, ensuring that it serves the content rather than

overshadowing it.

In conclusion, the integration of IT with deep learning in high school English teaching creates an environment that fosters student agency, contextual learning, interactivity, and multimedia engagement. This method not only enhances students' English skills but also cultivates the core competencies they need to face future challenges. Through this in-depth integration, teachers can employ more flexible and innovative teaching methods that meet students' individual learning needs, guiding them to process knowledge deeply, transfer it to real-world contexts, achieve deep learning, and develop core competencies.

4. Strategies for Promoting the Deep Integration of Information Technology in High School English Teaching

4.1. To Set Personalized Goals and to Stimulate Students' Subjectivity

In the context of deeply integrating information technology into high school English teaching, setting personalized goals is a key strategy to enhance student agency. Students' subjectivity, which emphasizes initiative and autonomy in the process of learning, is crucial for deep learning. By establishing individualized learning goals, students' interest in English can be effectively stimulated, leading to active participation in the learning process. The creation of personalized goals should consider factors such as students' learning backgrounds, interests, and learning styles, ensuring that each student finds their own place in English learning and uses it as motivation to engage in classroom activities.

For example, teachers can use educational platforms or intelligent learning systems to accurately analyze students' learning status and then develop personalized English learning plans for each student. These plans may include not only vocabulary and grammar mastery but also specific goals related to reading materials of interest, listening exercises, and oral expression. This approach allows students to continuously experience their own progress, enhancing their sense of self-efficacy and gradually forming intrinsic motivation for English learning. Additionally, the setting and adjustment of personalized goals should involve active student participation, enabling them to express their needs and expectations, thereby truly exercising their agency and promoting deep learning.

4.2. To Create Authentic Contexts and to Promote Immersive Learning

Creating authentic contexts is an essential means of promoting immersive learning. In English classrooms, teachers should strive to create real-life contexts whenever possible. Since language use is based on real-life situations, authentic contexts facilitate genuine language expression and the development of practical language skills (Cheng, 2010). The application of information technology provides teachers with a wealth of tools, enabling classroom teaching to simulate or recreate real-life language environments, and allowing students to learn and use English in contexts that closely resemble reality. Immersive learning emphasizes deep understanding through comprehensive sensory and emotional engagement, a process that not only aids in mastering language knowledge but also cultivates the ability to apply the

language in real-life situations. For instance, teachers can use augmented reality (AR) technology and digital textbooks to “bring to life” the text and images on the page, allowing students to interact with the content and gain a deeper understanding. By creating these authentic or semi-authentic contexts, students can better connect classroom knowledge with real-life experiences, enhancing their language application and problem-solving abilities, and thereby achieving deep learning.

4.3. To Build Interactive Platforms and to Enhance Student Interactivity

Building interactive platforms with the support of information technology is an effective strategy to enhance student interactivity. High-quality interaction is crucial for ensuring the effectiveness of classroom teaching and is also key to promoting deep learning. Interactive platforms not only support collaboration and communication among students but also enable multidirectional interaction between students and teachers, as well as between students and learning resources. Through these interactions, students can receive timely feedback, adjust their learning pace, and deepen their understanding of knowledge through communication with others.

For example, the “Rain Classroom” app, as an interactive teaching tool, provides a convenient communication platform for teachers and students. Teachers can use the Rain Classroom app to distribute pre-class preparation materials, discussion topics, and post-class exercises, and collect student feedback in real-time during the lesson. Students can use the app to answer questions online, participate in discussions, and access learning materials. This mobile internet-based interactive platform not only breaks the limitations of time and space, making interactions inside and outside the classroom more flexible and diverse, but also greatly increases student engagement and interest in learning. In addition to Rain Classroom, teachers can also use other social media or online learning platforms, such as WeChat groups or DingTalk, to organize extracurricular English exchange activities. This diversified interaction method enriches the student learning experience and enhances their initiative and creativity in learning.

4.4. To Develop Diverse Resources and to Expand Multimodal Learning

Multimodal learning emphasizes acquiring and expressing information through various sensory channels, and the application of information technology provides abundant resources and tools for multimodal learning. By developing and integrating diverse learning resources, teachers can offer students a more varied learning experience, helping them achieve more comprehensive development in language learning.

In a multimodal learning environment, students can not only access information through text and voice but also learn through images, videos, animations, and interactive software. For example, teachers can use AI technology to generate animated videos to help students understand English grammar or cultural background knowledge; use mind mapping software to assist students in organizing the structure of articles and clarifying logical relationships; or provide a rich array of English reading materials and audio-visual resources through online libraries to meet the diverse learning needs of different students. Moreover, students can also use

information technology tools to express and showcase their learning outcomes. For instance, by using PowerPoint, video editing software, or blogging platforms, students can present their learning achievements in various formats. This multimodal learning approach not only enhances student learning outcomes but also improves their expressive abilities and overall competencies.

In conclusion, the deep integration of information technology is not just a supplement and extension of traditional teaching methods but also an innovation in educational philosophy and a deepening of educational practice. By setting personalized goals, creating authentic contexts, building interactive platforms, and developing diverse resources, teachers can better leverage the advantages of information technology to stimulate students’ learning motivation, improve their language skills and core competencies, and truly achieve deep learning.

5. Conclusion

A systematic exploration of the integration strategies of information technology based on deep learning in high school English reading teaching is conducted in this paper through in-depth analysis and practical investigation. The findings indicate that the incorporation of information technology has enriched English teaching with a multitude of resources and tools, effectively facilitating students’ deep learning and enhancing their core competencies in the English discipline. In summary, the integration of information technology with deep learning not only diversifies teaching methods but, more importantly, fosters the development of student autonomy, contextual learning, interaction, and multimodal learning. By establishing personalized learning goals, creating authentic contexts, constructing interactive platforms, and developing a variety of learning resources, students’ English learning becomes more dynamic, effective, and creative.

The prospects for applying the integration of information technology and deep learning in high school English teaching are promising. Future research could further explore how to assess and enhance the long-term impact of this integration on students’ language abilities and other core competencies. Furthermore, the professional development of teachers is a significant direction for future research. Enhancing teachers’ information literacy to enable them to flexibly apply information technology in designing and implementing deep learning activities will remain a topic of ongoing interest in the educational field.

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