Strategies for Enhancing Senior High School English Teaching with Digital Education from the Perspective of the Theory of ZPD

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Abstract: This paper explores the application of digital education in high school English teaching and proposes strategies to enhance the effectiveness of high school English teaching from the perspective of Vygotsky's Zone of Proximal Development (ZPD) theory. The article begins by introducing the background and significance of digital education, followed by a literature review that analyzes the relationship between digital education and English teaching, as well as the connection between the ZPD theory and English teaching. The research design includes research questions, subjects, and processes, and through classroom observations, curriculum overviews, specific manifestations of digital teaching methods, and case studies, it deeply analyzes the current state of application of digital education in high school English teaching. The article also discusses the rationality of teaching objectives, the systematic nature of the teaching process, the richness of digital teaching resources, and post-class reflection, and puts forward relevant insights on teacher's digital literacy, student factors, and the applicability of the ZPD theory. Finally, the article predicts how technological factors of educational digitization, teachers' digital literacy, and student factors will affect future education, and taking the Sora artificial intelligence text-to-video generation model released by OpenAI on the early morning of February 16, 2024, as an example, it looks forward to the extensive application of digital education platforms and courses in future education.

Keywords: Digital Education, High School English Teaching, Zone of Proximal Development (ZPD) Theory, Educational Modernization, Information Technology

1. Introduction

With the rapid development of information technology and the continuous advancement of educational modernization, digital education has become a significant trend in the global education field. In high school English teaching, the application of digital education is increasingly extensive, providing students with more diversified and personalized learning experiences. Following the launch of the national strategy of "Digital China", "digital education" has become a hot topic in academic circles, with many experts reaching a consensus that digital education is the presentation of educational content, processes, evaluations, and other aspects in digital forms, aiming to achieve the goals of digitization, networking, intellectualization, and personalization of educational resources. Digital education emphasizes the application of digital technology in the field of education, involving digital textbooks, resources, and platforms [1]. Nevertheless, how to effectively integrate digital education into high school English teaching to enhance students' comprehensive English application ability remains a pressing issue in the current education field. With the support of information technology, the Zone of Proximal Development (ZPD) theory has been endowed with new connotations. Therefore, this study chooses to delve into the current status of digital education empowering high school English teaching from the perspective of the ZPD theory. The ZPD theory, an essential theory proposed by psychologist Lev Vygotsky, emphasizes the gap between learners' current level of development and their potential level of development, as well as educators' promotion of learners' development through appropriate teaching strategies and resources [2]. Relying on the ZPD theory, which is one of the critical theories in the field of educational psychology and holds significant guidance for teaching practice, this study aims to construct a more scientific and systematic theoretical framework to explain the mechanism of digital education in high school English teaching. This will contribute to enriching and developing existing educational theories and providing new ideas and directions for future educational research and practice.

2. Previous Studies

2.1 The Relationship of Digital Education and English Teaching

Existing research has indicated that digital education can provide students with authentic contexts, abundant learning resources, and diversified learning methods, which are conducive to enhancing students' interest in English learning and learning outcomes. As of January 7, 2024, a search in the China National Knowledge Infrastructure (CNKI) using "digitalization" and "English teaching" as keywords yielded 679 academic journal articles and 80 dissertations. Based on relevance and publication year, 300 academic journals and theses were selected for analysis in Citespace. The larger the node, the more research it represents, and the stronger its association with other topics. The warmer the color of the node, the closer it is to the present, and vice versa, as shown in Figure 1. From Figure 1, it can be seen that there is a strong correlation between digitalization and eight aspects: high school English, English teaching, college English, primary school English, teaching models, vocational college English, information technology, and English.

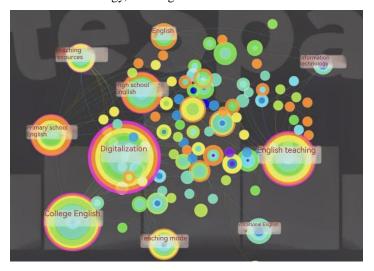


Figure 1: Relationship between digitalization and English teaching

2.2 The Relationship between the ZPD and English Teaching

Relevant studies suggest that teachers should pay attention to students' Zone of Proximal Development (ZPD) in teaching. By designing appropriate teaching activities and providing suitable learning resources, they can help students transcend their current developmental level to reach their potential developmental level. As of January 7, 2024, a search in the China National Knowledge Infrastructure (CNKI) using "Zone of Proximal Development" and "English teaching" as keywords yielded 193 academic journal articles and 48 dissertations. After sorting by relevance and year, the same 241 journals and theses were analyzed in Citespace, as shown in Figure 2. The analysis revealed strong correlations between the ZPD and various aspects such as English teaching, high school English, differentiated instruction, scaffolding, scaffolding theory, junior high school English, college English, etc. Moreover, the node color for high school English is more towards the warm end of the spectrum, indicating that research between the ZPD and high school English is a hot topic in recent years, which holds significance and value for research.

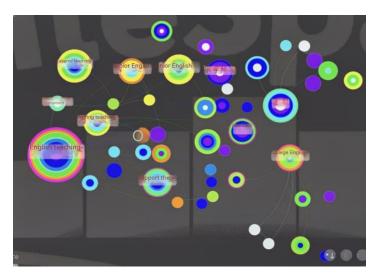


Figure 2: Relationship between ZPD and English teaching

3. Research Design

3.1 Research Questions and Subjects

3.1.1 Research Questions

- ①What are effective measures to promote digital education in high school English teaching to enhance the English learning abilities of high school students?
 - ②What factors influence the application of digital education in high school English teaching?

3.1.2 Research Subjects

This study will select high-quality courses related to digital education empowerment in high school English from online platforms and take the teachers and students involved as the subjects of the research.

3.2 Research Process

3.2.1 Classroom Observation

In today's digital era, the rapid development of educational technology is undergoing a profound transformation of traditional teaching methods. The National Smart Education Platform for Primary and Secondary Schools, as an important carrier of educational digitization in the new era, provides a wealth of teaching resources and learning platforms for teachers and students. Therefore, the author chooses to study high-quality courses in high school English, observe the actual application of educational digitization in high school English teaching, and record teachers' teaching methods, instructional designs, etc. The high school English courses selected from the National Smart Education Platform for Primary and Secondary Schools are mainly based on the 2019 People's Education Press (PEP) textbooks. Although the textbooks are rich in content, including compulsory and elective courses, with different design modules and learning objectives, they still contain a large number of digital teaching methods. The author will start with these teaching materials to conduct more detailed classroom observations and records.

3.2.1.1 Curriculum Overview and Its Digital Characteristics

The People's Education Press (PEP) high school English textbooks, as one of the main teaching resources on the National Smart Education Platform for Primary and Secondary Schools, cover two major parts: compulsory and elective courses, totaling 7 volumes, with 3 compulsory volumes and 4 elective volumes. Typically, each volume contains 5 to 6 units, and each unit can generally be divided into 5 to 8 modules. In these modules, digital teaching methods have been widely applied, especially prominent in modules such as "Reading and Thinking," "Listening and Talking," "Reading for Writing," and "Video Time".

3.2.1.2 The Specific Manifestations of Digital Teaching Methods

In the "Reading and Thinking" aspect, based on Vygotsky's Zone of Proximal Development (ZPD) theory, teachers will list the objectives to be achieved in this module at the beginning of the class, and generally, these objectives are challenging for students to accomplish individually. They need the assistance of peers and teachers to gradually complete them. With the help of technology, teaching methods are continuously evolving towards digitization. Teachers will present pictures and video materials related to the learning objectives to help students better understand the goals, and then complete tasks such as reading comprehension and thinking training in class.

In the "Listening and Talking" aspect, first, teachers will play the prepared listening materials for students, accompanied by courseware to help students better learn the target content. After the listening materials are finished, teachers will visually process the questions that appeared in the materials into a table to help students think and then solve the problems. Secondly, to better understand the students' learning situation, teachers will place a five-point scale in the PPT, which is convenient for students to fill in and also facilitates teachers to tally the results.

In the "Reading for Writing" aspect, teachers will display pictures related to the learning objectives during the lead-in or warm-up part, and then use PPT to gradually present the content to be learned, emphasizing the key and difficult points of the content. In the "Video Time" aspect, teachers will present video materials related to the learning objectives to students at the beginning of the course. Using this digital teaching method not only helps students better understand the content but also makes the classroom more vivid, which is a highlight of the information-based English class.

3.2.2 Case Study (Unit Two "Travelling around" from B1U2 of 2019 PEP)

3.2.2.1 Class Observation Record

Section One: Listening and Speaking; Teaching Objectives: First, the teacher plays listening materials through digital multimedia and asks students to grasp key information about travel plans; Second, students are required to express their own travel plans using content learned in class; Third, students practice the pronunciation of consonants; All three objectives are designed based on the concept of the students' Zone of Proximal Development (ZPD), aiming to set a learning area that can stimulate students' desire to challenge without being too difficult to cause them to lose confidence.

Teaching Process: Pre-listening stage, the teacher first raises questions to provoke students' thinking, then provides listening strategies to become the "scaffold" for students. And teacher helps them better understand the listening materials, such as informing students to catch key words and understand the general idea of the material instead of just listening to single words or grammar. While-listening stage, the first listening of the material is played and students listen to the dialogue one material. Then they answer the three questions raised in activity 2 on page 24 of the book, including Meilin's mode of travel and the destination. The second play focuses on dialogue two, teacher asks students to answer about Paul's travel plan in the textbook, that is, activity 3. Finally, the third complete play of the listening material, let students complete the table in activity 4 of the book to test their understanding of the entire listening content. Speaking stage, students use the language structure and expression in the listening activity to talk about their own travel plans. Teacher continues to act as a "scaffold", giving examples of similar dialogues related to travel types for students to refer to. Pronunciation training stage, students listen to the recording, and follow the reading and imitation of the words in activity 1 on page 25 of the textbook, learning the pronunciation rules of consonants. And further follow the reading of the sentences in activity 2.

Section Two: Reading and Thinking; Teaching Objectives: First, the teacher will ask students to distinguish between encyclopedia entries and travel guides; Second, the teacher plays a video related to Peru, and after watching the video, students can describe the country in simple language; Third, with appropriate language, recommend itineraries that match the personalities and hobbies of several tourists who want to go to Peru.

Teaching Process: Pre-reading stage, based on the ZPD theory. Teacher continuously gives clues, letting students guess which country it is. Then the teacher plays the video material, and students watch the video and answer questions, including: "What did you see in the video?", "What other sources of information can you find about Peru?", to test students' observation and information collection abilities. While-reading stage, students first browse the text in activity 2, then think about whether the text is an encyclopedia or a travel guide. After browsing, teacher, as a guide, helps students summarize and supplement the differences in stylistic features and language styles between the two texts. Secondly, the

teacher displays a PPT through a multimedia platform, listing a Peru information form. Then teacher asks students to complete the form after reading the text, using the information in the form to briefly introduce Peru, thereby deepening students' understanding of the language characteristics of travel brochures. Post-reading stage, the teacher raises a new question, "Could you make a better one and how if you were a brochure designer?" to provoke students' thinking. Then the teacher asks students to arrange a trip to Peru for four tourists. After comparative analysis, teacher recommends itineraries that match each tourist's personality and hobbies and explain the reasons. This will encourage students to use appropriate expressions learned in class for display to enhance their practical application ability.

Section Three: Reading for Writing; Teaching Objectives: This section aims to guide students to master the ability to extract key information from the text through in-depth reading, and learn to use this information to construct a clear logic and appropriate emotional expression in travel plan writing. First, students need to understand the core content of Richard's email and the main information of the Terracotta Army propaganda page, secondly, analyze the structure of travel plan writing and the characteristics of emotional expression in language, and finally complete the reply to Richard and elaborate on their personal travel plans.

Teaching Process: Warm-up stage, the teacher also uses digital multimedia to present photos of ancient pavilions and lotus leaf pools to introduce the topic, guiding students to talk about popular tourist cities in China, such as related questions: "Which city in our country may attract foreign visitors the most?" to promote communication and thinking among students; Pre-reading stage, the teacher continues to play the role of "scaffold", guiding students to pay attention to the Terracotta Army pictures presented in the textbook, and actively encouraging students to talk about the content of the photos, learning and learning the related expressions of the Terracotta Army; While-reading stage, first, the teacher asks students to read the content of the Terracotta Army propaganda page, further guiding students to initially form a language structure for expressing emotions, such as the question: "What amazes you the most?", secondly, students read Richard's email, understand the content of the travel plan in the email, and analyze the structure of the email, complete the table in the textbook. This table involves the main idea of the paragraph and specific expressions, helping students to summarize the emotional expression and language structure in the email; Writing practice stage, first, the teacher will guide students to imitate writing according to the previous table in the textbook, secondly, after the imitation writing is finished, students are required to sort out their own travel plans and writing structures according to the previous table, and appropriately expand and improve the framework content, and reply to Richard to talk about their own travel plans, during which students can form groups and use brainstorming methods to construct their own travel plans, finally, the teacher guides students to refer to the evaluation checklist, that is, the writing project checklist provided in activity 3 on page 31 of the textbook, to modify their first drafts, and guides students to carry out peer evaluation, to put forward suggestions for their peers' writing, and to modify the composition.

Section Four: Video Time; Teaching Objectives: First, the teacher plays video materials related to Machu Picchu to let students obtain key information; second, cultivate students' ability to introduce Machu Picchu to others in their own language; finally, on the issue of whether ancient sites similar to Machu Picchu should continue to be open to tourists, let students express their own views.

Teaching Process: Since this module is the last link in the teaching process, the teacher will use the method of reviewing previous content for introduction. By displaying related pictures and reviewing the texts learned before, activating students'existing knowledge schema, related questions include: "What city is it?" "What kind of city is it?"; Pre-watching stage, the teacher guides students to learn the introduction text on the right side of the textbook pictures, and then helps students learn new words (magnetic center, Inca civilization...), removing reading obstacles, letting students initially understand the city of Machu Picchu, and finally the teacher guides students to predict the themes that the video material may involve; While-watching stage, the teacher asks students to watch the video for the first time to verify the previous predictions and answer the questions in the textbook, then students have to watch the video twice to obtain key information about Machu Picchu, sort out the main line of the video, and answer related questions: "What does Machu Picchu look like?" "Can you compare the past and the present of Machu Picchu?..."; Post-watching activity stage, the teacher gives full play to students' initiative, letting students role-play, acting as tour guides to introduce basic information about Machu Picchu to tourists, the teacher further expands and promotes, and raises questions that provoke students' thinking: "Should tourism be stopped in places like Machu Picchu? Why or why not?".

3.2.2.2 Class Observation Analysis

3.2.2.2.1 Rationality of Teaching Objectives

The three teaching objectives set by the teacher in the instructional design are all based on the concept of the students' Zone of Proximal Development (ZPD). This not only indicates that the teacher has a clear understanding of students' learning abilities and levels, but also allows for the creation of a learning environment that is challenging yet not overly difficult. The teacher acts as an auxiliary to students' learning, serving as a "scaffold," and such instructional design helps to stimulate students' motivation to learn, to exert their initiative, and to actively participate in the classroom. In addition to the alignment of teaching objectives with the ZPD theory, the goal setting in Section Three subtly extends from foreign historical culture to the excellent traditional culture of China, a move that coincides with the current curriculum ideology of "telling Chinese stories well." Through this design, the theme of high school English teaching is continuously deepened and sublimated.

3.2.2.2.2 Systematic Nature of the Teaching Process

Teachers typically divide the teaching process into three to four stages, from "before learning, that is, pre-" to "during learning" and then to "after learning," with each stage having clear objectives and corresponding activities. This aligns with the cognitive development laws of students and also conforms to the theory of the Zone of Proximal Development (ZPD). Each stage of learning also integrates digital technology methods; in Section One, teachers guide students to start with simple listening materials, gradually transition to more complex speaking exercises, and then to pronunciation training. This helps students to gradually improve their language abilities as they delve deeper into the learning process; in Section Two, teachers first provide clues and video materials to stimulate students' interest and curiosity, and then guide students to think further and apply what they have learned through questions and tasks; in Section Three, which is also divided into four stages, from introduction to reading comprehension to imitative writing, and finally to evaluation and feedback, each stage is closely connected and builds upon the previous one, helping students to gradually deepen their understanding of the text, master writing skills, and enhance their practical application abilities; in Section Four, teachers start by reviewing previous content to pave the way for new learning, and in the post-watching stage, teachers have students role-play as tour guides to introduce Machu Picchu to tourists, which not only consolidates the knowledge learned but also cultivates students' language expression abilities. Finally, teachers pose extension questions to guide students in deep thinking, expanding their thinking space.

3.2.2.2.3 Richness of the Utilization of Digital Teaching Resources

The Platform called SMART EDUCATION OF CHINA, as an essential part of digital education, provides a wealth of knowledge resources covering various subjects, bringing great convenience to students of different ages and grades, as well as teachers who assist in teaching. The platform deeply integrates digital teaching elements from Section One to Four, covering all aspects of teaching dimensions such as "listening, speaking, reading, and writing." Listening materials exist in digital form and are played through multimedia; teachers play video materials about Peru, providing students with a more intuitive and vivid way to obtain information, and the visual and auditory elements in the video also help students better understand the local customs and conditions of Peru; teachers use multimedia to present a variety of pictures related to teaching to students, stimulating students' interest in learning through the application of visual elements, and more intuitively understanding the historical background, providing a foundation for subsequent reading and writing activities; in Section Four, before showing the video of Machu Picchu, teachers first guide students to make predictions, highlighting the interactivity of teaching itself. Digital teaching emphasizes students' active participation and initiative. Through prediction and verification, students can have a deeper understanding and memory of the video content.

3.2.2.3 Post-Class Reflection

3.2.2.3.1 Effective Integration of Digital Resources

Digital education provides a vast array of resources for teaching, including images, audio, video, and more. First and foremost, as teachers, they should reflect on how to more effectively select and integrate these resources after class, ensuring that they are closely related to teaching objectives and content, stimulating students' initiative and arousing interest in learning. Secondly, teachers must also consider how to effectively incorporate these resources into the teaching process, avoiding the mere accumulation and misuse of resources to achieve a deep integration of resources and teaching. Lastly,

in addition to effectively utilizing digital teaching resources, teachers should also pay attention to the timeliness and accuracy of digital resources, which can be updated and maintained on the platform in a timely manner, supplementing new and valuable resources to maintain the appeal and vitality of digital teaching.

3.2.2.3.2 Promotion of Interactive Learning through Digital Tools

Digital tools focus more on interactive learning for students, serving as a bridge for communication and a link for information among students, which can greatly enhance the learning outcomes in the teaching process [3]. First, teachers should reflect on how to better utilize these digital tools after class, designing interactive learning activities such as online discussions, group collaborations, and role-playing to improve student engagement and collaborative skills. Second, teachers also need to pay attention to the assessment of interactive learning outcomes, adjusting and improving interactive strategies in a timely manner to ensure the effectiveness and efficiency of interactive learning. Lastly, teachers should actively explore and develop new digital tools to meet the interactive learning needs of students in different subjects and age groups, providing students with a more diverse and rich interactive learning experience.

3.2.2.3.3 Promotion of Interactive Learning through Digital Tools

With the rapid development of information technology, the methods of education have also shifted from traditional face-to-face teaching in the classroom to a more networked and digital direction [4]. In this transformation process, higher demands are placed on teachers' digital literacy. Teachers can reflect on how to improve their abilities in digital resource integration, digital tool application, and digital teaching design through training and practice after class. In the digital process, teachers can act as participants, actively taking part in digital education training courses organized by schools or institutions, learning new digital educational concepts and technologies; they can act as researchers, actively participating in digital education practices and research projects, accumulating experience and achievements in digital education, maintaining sensitivity and exploratory spirit towards new technologies and methods, and keeping up-to-date with the latest trends in digital education. They should also study students' learning characteristics and patterns to better meet their learning needs [4], thereby presenting higher quality and more efficient teaching.

4. Research Results

4.1 Anticipated Discoveries

4.1.1 Technological Factors of Educational Digitization

Firstly, there are hardware and infrastructure, such as stable internet connections, high-performance computing devices, and cloud computing services. The instability or insufficient performance of these infrastructures can affect the effectiveness of digital education. Secondly, there is the digital software, including the quality and functionality of educational application software and online learning platforms, which directly affect the implementation of digital education. These digital software solutions need to be easy to operate, feature-rich, and stable. Lastly, the technology itself, as information technology continues to evolve, digital educational tools and platforms also need to be continuously updated and iterated to meet new educational demands.

4.1.2 Digital Literacy of Teachers

Firstly, it is the teachers' own information literacy that is required, possessing a certain level of information literacy and being able to proficiently use various digital educational tools and platforms; otherwise, it will affect the promotion and implementation of digital education. Secondly, it is the teachers' technical abilities that need to be mastered, such as online teaching, course recording, creating electronic courseware, and using a variety of educational software. Lastly, teachers also need to have innovative thinking and integrate it into their teaching, being able to design and implement effective digital teaching plans that take into account the interests and needs of different students, stimulating students' interest and motivation to learn.

4.1.3 Student Factors

Firstly, it is the age and learning habits of students. Students of different age groups have varying degrees of acceptance and needs for digital education. For example, high school freshmen, whose physical and mental development is close to that of adults and whose knowledge has been

accumulating since junior high school, need to be exposed to newer and more comprehensive knowledge. Through learning English, they continuously broaden their horizons. At the same time, students' learning habits also affect their attitude and effectiveness towards digital education. Good learning habits influence how much knowledge students can absorb from digital education platforms, and they should make full use of the platforms and resources to enhance their English cultural literacy. Secondly, it is the students' digital literacy. Entering the era of the Web3.0, the ability to use electronic devices, collect and process information, and engage in online learning has become particularly important. Whether it is the previously popular Chatgpt or the currently trending Sora, they will be important tools for students' future learning, helping them to better utilize digital educational resources. Lastly, it is the students' own initiative and interest. The students' interest and motivation for digital education are also important factors affecting the effectiveness of digital education. If students are interested in digital education and actively participate, they will achieve better learning outcomes.

4.2 Relevant Isights

4.2.1 Applicability of the ZPD Theory

Teachers, when designing teaching objectives and processes, take into full consideration the current level and potential capabilities of students, ensuring that the content is challenging enough to engage students without being so difficult that it causes them to lose confidence. Throughout the teaching process, teachers act as a "scaffold", offering strategies, examples, and guidance to help students gradually expand and deepen their understanding of travel plans. This teaching strategy aids students in enhancing their English language skills step by step with the support of the teacher.

4.2.2 Optimization of Digital Educational Resource Construction

To fully leverage the advantages of digital education in high school English teaching, schools and educational departments need to take a series of measures to strengthen and optimize the construction of digital educational resources. Firstly, secondary schools can continuously improve and build a teaching resource library, reasonably allocate materials, practical content, and curriculum content in the resource library, optimize the construction of digital educational resources, and provide a foundation for online and offline resources. By enriching the audio-visual materials, remote teaching resources, review and examination question banks, etc., in the resource library, talent cultivation and skill practice can be carried out for high school students [5]. Secondly, in the construction and management of digital educational resources, a unified management approach should be adopted. Each school should plan and organize digital educational resources in a unified manner to ensure orderly construction of digital resources in secondary schools, further facilitating learners [6]. Lastly, schools and educational departments should also strengthen the integration and sharing of digital educational resources. By building a platform for digital educational resources, gathering various high-quality educational resources together, achieving resource sharing and interconnectivity, and closely integrating with the high school English curriculum standards to meet students' actual needs, not only can the waste and redundant construction of resources be avoided, but also more students can benefit.

4.2.3 Enhancement of Teachers' Information Technology Skills

Firstly, for high school English teachers, it is necessary to plan and design an information technology curriculum holistically, which should not only cover theoretical knowledge courses but also include practical courses. This can encompass the use of digital educational resources, the application of multimedia teaching tools, and the operation of online teaching platforms. Systematic training for high school English teachers should be provided to equip them with solid theoretical knowledge in information technology and proficiency in practical IT skills, better preparing them for future educational teaching work [7].

Secondly, experts or scholars in the field of digital education can be invited to give special lectures. These experts typically have rich practical experience and a deep theoretical background. Their sharing can not only bring the latest concepts in digital education to teachers but also introduce the most cutting-edge technical tools and application methods. This form of training can stimulate teachers' interest in learning, broaden their horizons, and promote continuous learning and improvement, providing ideas and inspiration for future teaching innovation.

Lastly, schools can also establish a platform for teachers to exchange information technology skills, encouraging teachers to learn from each other, share experiences and resources. Through this platform, teachers can exchange teaching experiences, discuss the application of digital education in English

teaching, and jointly improve the quality of teaching.

5. Conclusion

On the early morning of February 16, 2024, OpenAI released the Sora artificial intelligence text-to-video generation model. This model can create realistic videos up to 60 seconds long based on the user's text prompts. The videos generated by Sora deeply imitate the real physical world and can include multiple characters and complex scenes with specific movements. The release of Sora has not only shocked the entire field of technology, but its impact on the education sector is equally deafening. With the continuous advancement of artificial intelligence technology, more and more advanced products are gradually integrating into teaching practices, becoming an important force in promoting the modernization of education. The digital education platforms and courses mentioned in this article will be used more widely in the future and will be suitable for more people. Videos generated by artificial intelligence like Sora will also appear in future classrooms, saving the time cost of finding videos related to course objectives in segments like "Video Time", allowing teachers to focus more on the design and innovation of teaching content. This assists teachers in providing better teaching, continuously fostering students' interest in learning, innovative thinking, and practical abilities. With the continuous advancement and application of technology and the continuous expansion of application scenarios, we have reason to believe that the education of the future will be more intelligent, personalized, and efficient.

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