Case Study of Digital Transformation Based on ChatGPT Teaching Application

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Abstract: With the wide application of ChatGPT in teaching, digital teaching is ready to emerge, and new requirements and expectations are put forward for the digital transformation of teaching system and its whole elements. As a natural language model with highly intelligent knowledge search and automatic text editing, ChatGPT has been widely used in teaching with its powerful Adaptive learning ability and convenient and practical human-computer dialogue system, and has gradually formed Digital transformation cases based on language learning, subject knowledge assistance, creative writing, learning guidance and many other teaching scenarios in the exploration of teaching reform practice. Based on ChatGPT application of teaching reform and exploration, this paper collects and sorts out teaching cases related to digital transformation. Through the investigation and analysis of the existing Digital transformation cases, this paper discusses the general characteristics and rules of digital transformation of teaching elements, and discusses the structural changes of the teaching system and teaching elements under the ChatGPT application scenario from the two aspects of application scenario creation and application effect evaluation, and puts forward countermeasures and suggestions for building a digital teaching system, which has important theoretical and practical significance for deepening curriculum and professional reform and accelerating independent training of innovative talents.

Keywords: ChatGPT, Artificial Intelligence, Digital Technologies, Digital Teaching, Digital Transformation

1. Introduction

ChatGPT As a kind of based on machine learning and natural language model of a new generation of artificial intelligence technology, with real-time convenient information dissemination, intelligent knowledge search, automated text editing and generation functions, [1] is widely used in a variety of different areas and specific business occasions, created the form of different application scenarios, in continuous exploration and practice accumulated the successful cases of digital transformation, thus greatly promote the historical process of digital social construction. ChatGPT Widespread application in teaching not only triggers the digital teaching revolution with subversive significance, but also enables the development of education.

It provides a path choice for deepening the curriculum and professional reform and accelerating the independent training of innovative talents, and has accumulated many digital transformation cases with fundamental reform significance and long-term impact. In fact, the development of ai-enabled education has also attracted the continuous attention of more and more educational researchers and practitioners. [2] Based on ChatGPT application scenario of teaching reform and exploration, collect and organize and digital transformation related teaching cases, and analyze the characteristics of structural restructuring and digital transformation, discusses the artificial intelligence and teaching depth fusion background to strengthen the students' innovative spirit and practice ability training, build the digital teaching system of theory and practice problems, for deepening the reform of

curriculum and professional, speed up the independent cultivation of innovative talents has important theoretical and practical significance. [3]

2. Digital Transformation Case Analysis in ChatGPT Teaching Application

As a kind of highly intelligent knowledge search, and automatic text editing generation ability of natural language model, ChatGPT with its powerful adaptive learning ability and convenient and practical man-machine dialogue system, has been widely used in teaching, gradually formed based on language learning, subject knowledge auxiliary, creative writing, learning to guide the digital transformation of teaching scenario case. The reason why ChatGPT is widely used in teaching has triggered the subversive digital teaching revolution in the field of education is that the deep integration of the artificial intelligence technology and teaching has greatly promoted the structural restructuring and digital transformation of teaching elements. From the perspective of ChatGPT teaching application and the case of digital transformation, the application of digital transformation in the field of education can help schools and other educational institutions to achieve more intelligent and efficient teaching management and education services. [4] Here, the specific cases of digital transformation are analyzed based on the current widely applied teaching scenarios, so as to provide ideological enlightenment or experience reference for the deep understanding and grasp of the essential connotation of digital teaching.

2.1. Case Description of Digital Transformation Based on ChatGPT Teaching Application

Case 1: Online learning AIDS
Background: With the popularity of online learning, students may face difficulties in understanding courses and answering questions. Applying ChatGPT to the online learning platform can provide intelligent learning AIDS to support students to get immediate help in the learning process.

Solution: Apply the ChatGPT to the online learning platform to promote the digital transformation of teaching links.
1. Course understanding: Embedding ChatGPT into an online learning platform to help students understand the course content, answer course-related questions, and provide real-time learning assistance and solutions.
2. Homework tutoring: ChatGPT Can provide targeted answers and guidance, according to students' questions, help students to complete homework, understand difficult points, and provide learning suggestions.
3. Learning plan: ChatGPT According to students' learning situation and learning objectives, we can provide personalized learning plan, including learning progress, learning time arrangement, learning resources recommendation, etc., to help students plan their

learning routes.
4. Learning evaluation: ChatGPT According to students' learning performance, they can conduct learning evaluation and feedback, provide learning suggestions and improvement suggestions, and help students improve their learning effect.

Effect:
1. Improve the learning effect: Through ChatGPT real-time assistance and answers, students can get timely help and guidance in the learning process, improve the learning effect, improve their learning interest and enthusiasm.
2. Improve student satisfaction: Students can interact with ChatGPT and obtain intelligent learning services to meet their needs for personalized learning and improve students' satisfaction.
3. Improve teachers 'work efficiency: ChatGPT It can reduce the burden of teachers, provide learning AIDS, help teachers to better manage students' learning, and provide personalized learning guidance.

Case 2: AI-assisted English writing teaching
Background: A high school English teacher found that students have great difficulties in English writing and needed more personalized guidance and feedback, but due to limited human resources, they cannot provide enough time and resources for each student.

Solution: Provide students with personalized English writing guidance and feedback by introducing ChatGPT as an AI aid.
1. When learning English writing, students can interact with ChatGPT and input their own writing works, including articles, short essays, etc.
2. ChatGPT Analyze students' writing works through natural language processing technology, including grammar, vocabulary, logic and other aspects, to identify potential problems.
3. ChatGPT According to the students' writing works and problems, provide targeted writing guidance and feedback, including grammatical errors correction, vocabulary replacement suggestions, sentence structure adjustment.
4. Students can modify and improve based on ChatGPT instruction and feedback, and perform multiple rounds of writing training and feedback loops through interaction with ChatGPT.
5. Teachers can view students 'writing and ChatGPT feedback records through the background management system, monitor and evaluate students' writing progress, and provide additional guidance and guidance when needed.

Effect:
1. Students can receive personalized English writing guidance and feedback to help them identify and correct problems in writing and improve their writing skills and skills.
2. Teachers can analyze students 'writing progress through the data provided by ChatGPT, so as to better

understand students' learning needs and provide targeted teaching guidance.

3. With teachers work burden, more time and resources can be used to other teaching tasks to improve teaching effect and student satisfaction.

4. By introducing ChatGPT as an AI aid, students can get personalized guidance and feedback in English writing, and teachers can better understand students' learning situation, improve teaching results, and realize digital transformation.

Case 3: School online learning platform

Background: A primary school is located in the suburbs of the city, with a number of about 1,000 students and about 50 teachers. Due to the rapid development of society and the continuous progress of science and technology, the school hopes to improve the learning effect of students, improve the teaching quality of teachers, and better communicate with parents and the community through digital transformation.

Solution: The school has decided to introduce an online learning platform to promote the digital transformation of the teaching process.

1. Student online learning platform: By introducing an online learning platform called "Learning Paradise", the school provides students with online courses, learning resources and homework submission functions. Students can study at any time and in any place through the platform, and learn according to their own pace and interests.

2. Online teaching resources for teachers: The school provides online teaching resources for teachers, including teaching plans, courseware, exercises, etc. Teachers can upload, manage and share the teaching resources through the platform, so as to improve the teaching effect and efficiency.

3. Online homework and quizzes: Use online learning platforms to manage and correct homework and quizzes. Students can submit homework online, and teachers can correct homework through the platform and timely feedback to students, so as to promote students' independent learning and improve the quality of homework.

4. Communication platform between parents and teachers: The school has introduced a communication platform between parents and teachers called "Home-school co-education" to facilitate the interaction and communication between parents and teachers. Parents can use the platform to learn about the students' learning situation, check their academic performance, and communicate with the teachers online.

5. Data analysis and personalized learning: The data analysis function provided by the online learning platform is used to analyze and mine the students 'learning data to understand the students' learning situation and needs, so as to provide students with personalized learning suggestions and guidance.

Effect:

1. Students' learning effect improves: students can study at

any time and place, and learn according to their own learning pace and interest, thus improving the learning effect.

2. Improvement of teacher teaching quality: teachers can improve the teaching effect and efficiency through the uploading, management and sharing of online teaching resources, so as to improve the teaching quality of teachers.

3. Homework quality improvement: Students can submit homework online, and teachers can correct homework through the online learning platform, and give timely feedback to students, so as to help students improve the quality of homework.

4. Strengthening home-school interaction: Through the communication platform between parents and teachers, parents can easily understand students 'learning situation, check their academic performance, and communicate with teachers online, so as to strengthen home-school interaction and pay attention to students' learning progress.

5. Data analysis supports personalized learning: The school uses the data analysis function provided by the online learning platform to analyze and mine students 'learning data, understand students' learning situation and needs, and provide students with personalized learning suggestions and guidance, so as to promote students' personalized learning.

6. Improve the image and competitiveness of the school: Through the digital transformation, the school has introduced an online learning platform to improve the level of digital education, improve the image and competitiveness of the school, and attract the attention and choice of more students and parents.

Case 4: Intelligent-assisted language learning platform

Background: There are the limitations of traditional teaching mode in foreign language teaching in universities. It is difficult for teachers to timely understand students' learning progress and difficulties, and it is difficult for students to obtain personalized language learning assistance in the limited classroom time.

Solution: Introduce ChatGPT technology to build an intelligent assisted language learning platform.

1. The platform provides one-to-one language learning assistance services based on ChatGPT, and students can obtain personalized language learning guidance and feedback through dialogue with ChatGPT.

2. The platform provides learning resources and learning communities, where students can conduct collaborative learning and knowledge sharing with other students.

3. Teachers can monitor students 'learning situation through the platform, understand students' learning progress and difficulties, and provide targeted teaching guidance according to students' learning situation.

Effect:

1. Students choose the learning content and method according to their learning interest, progress and ability level, and obtain personalized learning assistance.

2. Students can have a dialogue with ChatGPT at any time to solve the doubts and difficulties in language learning and improve the effect of language learning.
3. Students can conduct collaborative learning and knowledge sharing with other students through the resources of the platform to improve their ability of learning cooperation.
4. Teachers can monitor students' learning situation in real time, give teaching guidance in time, improve teaching effect.
5. Overall, realize the personalized learning personalized, real-time feedback, collaborative learning and teaching monitoring, and other functions, promote the language learning, students can get personalized learning auxiliary services, teachers can also real-time understanding of students' learning situation, so as to improve the effect of language learning and teaching quality, realize the innovation and development of digital teaching.

The digital transformation based on the application of ChatGPT teaching case shows that digital teaching is represented by ChatGPT a new generation of artificial intelligence and teaching depth fusion, the inevitable product of interactive development, its essence is the man-machine fusion teaching system reconstruction and structural reorganization of teaching elements, not simply to artificial intelligence technology superposition or transplanted to the teaching process and its links. Therefore, it is necessary to analyze from the teaching process and its various links under the ChatGPT application scenarios of the teaching system and teaching elements of the specific and different fundamental changes, which is the premise and key problem to correctly understand and grasp the connotation of digital teaching. [4]

2.2. Analysis of the Structural Restructuring of the Teaching System and Teaching Elements

So-called teaching system, refers to the teaching process of the basic structure, framework, teaching content design, teaching method design, teaching process design and teaching results evaluation of unified whole, contains the teaching order, process, way, method, form, content, feedback, evaluation, summary, comparison and derivation and a series of teaching elements. [5] Combined with the above teaching cases related to digital transformation, the structural changes of teaching system and teaching elements under ChatGPT application scenario can be investigated and analyzed from two aspects of application scenario creation and application effect evaluation.

2.2.1. Regarding the Construction of Application Scenarios and Teaching Systems

The Main Focus Is on the Creation of Ten Major Teaching Scenarios, Promoting the Deep Integration of Artificial Intelligence and Teaching, and Examining the Specific Application of ChatGPT in Teaching.

1. Online language learning: ChatGPT can be used as a language learning tool to help students improve their listening, speaking, reading, writing and translating skills in English and other languages. Students can practice language expression, dialogue skills, grammar knowledge, writing and reading comprehension to obtain real-time language correction and pronunciation instruction. ChatGPT According to the students' language level and learning objectives, appropriate learning resources and language practice activities can also be recommended, so as to promote the interaction and practice of language learning.
2. Subject knowledge auxiliary and online questions: ChatGPT as a tool for online tutoring and answering questions, can help students solve mathematical problems and geography problems, provide the explanation of history or scientific knowledge of learning assistance, can also according to the needs of students and learning progress, recommend related learning materials and discipline activities, help students to understand and master the subject knowledge. Students can interact with ChatGPT, ask questions about mathematics, science, history and other subjects, get immediate answers and explanations, and obtain the necessary subject knowledge support.
3. Creative writing: ChatGPT can be used as an auxiliary tool to help students generate the beginning, end, paragraph transition, etc., to provide inspiration and writing advice. Students can get creative and writing help by talking with ChatGPT.
4. Learning q & A: ChatGPT can be used as a q & A tool to answer students' questions in the learning process, including the understanding of the course content, concept explanation, and answers to homework questions. Students can get learning help and answer questions by conversations with ChatGPT.
5. Learning guidance: ChatGPT can be used as a guiding tool to help students make learning plans, set learning goals, supervise learning progress, etc. Through dialogue with ChatGPT, students can set learning goals and make scientific and effective learning plans, so as to improve the learning effect.
6. Intelligent teaching assistant: ChatGPT As a virtual teaching assistant, it can generate customized learning materials and resources according to students' needs and learning progress, and provide recommendations and guidance for students. Students can share learning experiences, discuss problems and solve problems together through the dialogue with ChatGPT, promote resource sharing and collaborative learning among students, and realize a more cooperative and co-built learning model under the digital revolution. At the same time, ChatGPT can also assist teachers in classroom and teaching management, help teachers understand students' learning situation, difficulties and questions, targeted teaching plans and teaching guidance, and improve the intelligent level of teaching.
7. Learning experience of science and technology

integration: After the introduction of ChatGPT, students will have an interactive dialogue with artificial intelligence in the learning process, and experience the learning method of science and technology integration. This kind of learning experience can not only improve students 'learning interest and enthusiasm, but also cultivate students' scientific and technological literacy and digital ability, so as to better adapt to the learning and work needs of the digital revolution era.

8. Social learning and collaboration: ChatGPT As a platform for student interaction and collaboration. Through conversations with the ChatGPT, students can share their learning experiences, discuss problems, and work collaboratively to solve difficult problems. ChatGPT It can also provide the guidance and support of collaborative learning according to the interaction and cooperation between students, and promote the resource sharing and collaborative cooperation among students, so as to realize social learning and collaborative construction of knowledge system.

9. Virtual experiment and simulation practice: ChatGPT It can simulate the experimental scene or the actual working environment, providing students with opportunities for virtual experiment and simulation practice. Students can gain practical experience and skills by having conversations with ChatGPT for experimental operations or practical tasks. This digital practice method can make up for the shortage of traditional experimental and practical resources, and improve students' practical operation ability and professional quality.

10. Online testing and assessment: ChatGPT can be used as a tool for online testing and assessment to help students conduct self-assessment. Students can talk to the ChatGPT, take online tests, and get immediate test results and evaluation reports. ChatGPT You can also provide personalized learning suggestions and subject improvement plans based on students' test results and evaluation reports to help students improve their learning results and academic performance.

2.2.2. Regarding the Structural Restructuring of Application Effectiveness and Teaching Elements

The Main Focus is to Evaluate the Fundamental Changes Brought About by Teaching Reforms, and Specifically Analyze the Disruptive Impact of ChatGPT on Teaching Forms and Models. ChatGPT Application in teaching can be regarded as an embodiment of the digital revolution, because it introduces new technologies and methods, fundamentally changes the traditional teaching forms and teaching methods, and brings a subversive influence with broad and far-reaching significance. Specifically, it is mainly manifested as the fundamental changes in the following ten areas.

1. Improving the learning experience: ChatGPT Changing the traditional online learning approach by providing an interactive and conversational learning experience. Students can ask questions in natural language, and the ChatGPT will generate detailed and accurate answers. The model understands and responds to a wide range of topics, including the ability to understand and respond to complex concepts, making the learning process even more engaging and dynamic. More importantly, students can learn at any time and in any place. Through real-time dialogue with ChatGPT, students can promote in-depth inquiry and understanding, and realize cross-time learning experience. This provides students with a more flexible and convenient learning method, and promotes the continuous deepening and revolutionary development of digital learning.

2. Improve student participation: ChatGPT Encourage students to participate actively through interactivity. Students can have real-time conversations with the virtual TA, ask questions, seek clarification, and discuss related topics in a conversational manner. This increases students' participation, which not only imitates the classroom experience in real life, but also creates a strong educational atmosphere of teaching and learning, teacher and student interaction and unity and cooperation.

3. Personalized learning and real-time feedback: ChatGPT Can provide personalized and real-time feedback for students based on the ability to analyze personal queries and automatically generate responses. ChatGPT It can generate customized learning materials and resources according to students' personalized needs and learning progress, and provide students with personalized learning feedback and suggestions. This enables students to learn according to their own learning rhythm and understanding situation, and is no longer limited by the unified teaching schedule and rhythm. This personalized learning way will help to meet the needs of different students learning and learning style, can help students better understand their advantages and disadvantages, according to their own learning interest, learning progress and learning style, customized to choose learning content, learning style and learning rhythm, learning adjustment and optimization, promote more effective more personalized learning process.

4. Transformation of independent learning and teaching methods: ChatGPT The introduction of online learning platform has brought about a major change in teaching methods. Based on traditional teachers to students and students passive teaching methods, after the introduction of ChatGPT become more interactive dialogue, students are no longer passively accept knowledge, but through real-time dialogue with ChatGPT to explore and understand the learning content, from one-way communication information to dialogue interaction and dynamic learning experience, promote the students' participation and enthusiasm. ChatGPT As a virtual teaching assistant, it not only enables students to control their own learning, ask

questions, seek clarification and participate in dialogue, but also forms a student-centered teaching method in practical application. Accordingly, the role of teachers has also changed, that is, teachers are no longer just the impartors of knowledge, but also become the guides and instructors of students. Teachers can monitor the interactive dialogue between students and ChatGPT and provide targeted guidance, so as to improve the teaching effect and the quality of students' independent learning.

5. Interactive learning experience and classroom interaction mode change: Traditional classroom teaching is usually taught by teachers, with students listening to lectures and asking questions. With the introduction of ChatGPT, classroom teaching becomes more interactive. Students can have dialogues with ChatGPT to ask questions and answer questions, discuss and interact with them, which promotes the interaction and communication between students and knowledge. This makes the students in more active in the classroom, help to stimulate students' thinking and creativity, to strengthen the interactive learning experience, improve the depth and breadth of learning, attract students to more actively participate in learning, fundamentally change the traditional classroom single monotonous and passive indoctrination, classroom atmosphere depressing condition, effectively promote the digital revolution of the learning process.

6. Convenience of cross-regional and cross-cultural learning: ChatGPT Online distance teaching can be realized through the Internet. Students and teachers will no longer be limited by geographical location and time, but can communicate or learn in different regions and cultural backgrounds, so as to obtain more extensive and diversified learning resources and life experience. The convenience of such cross-regional and cross-cultural learning is of great significance for promoting the application of the digital revolution in education.

7. Artificial intelligence (AI) -assisted teaching development: using AI technology, Incorporate the ChatGPT into the online learning system, With bulk data to train the ChatGPT as a natural language model, Integrating it into an existing learning-management system, Promote the transformation and development of digital teaching, Using the adaptive learning ability of artificial intelligence to realize the intelligent assisted teaching of students, And based on the students' learning data and behavior patterns, Performed the intelligent analysis and evaluation, Provide targeted learning advice, Let the teachers better understand the students' learning situation, Conduct personalized guidance, Thus improving the teaching quality and teaching effect.

8. Expansion and optimization of teaching resources: The introduction of ChatGPT can expand the scope of teaching resources and educational services, provide more abundant and diversified learning resources, and promote the digital revolution of teaching resources. ChatGPT Rich and diverse learning materials and resources can be generated for students according to their needs and learning objectives. Through the interactive dialogue with ChatGPT, students can acquire knowledge and information from different fields, expand the scope of learning resources, and enrich the learning content. As a virtual teaching assistant, ChatGPT can generate customized learning materials and resources according to students' needs and learning progress, and provide recommendations and guidance for students. Students can flexibly choose learning resources according to their own interests and needs to improve their learning flexibility, which greatly contributes to students to obtain and use teaching resources, promote the optimization of teaching resources, and further improve the learning effect.

9. Improve accessibility: ChatGPT Integration into the online learning platform improves educational accessibility for different learners. Virtual teaching assistants can cater to different learning styles, rhythms, and preferences, making education more inclusive. Students with disabilities, language barriers or different learning needs can participate in ChatGPT in a manner appropriate to their requirements, break barriers and promote inclusion.

10. Reform and innovation of assessment and evaluation methods: the traditional assessment methods are usually written test, examination and other forms, unable to fully understand the students' learning situation. The introduction of ChatGPT can understand students 'learning process and learning performance in real time according to the interaction and dialogue with ChatGPT, and provide customized feedback and suggestions to achieve a more comprehensive, objective and true evaluation of students' academic and learning effects.

It can be seen that, based on the application of ChatGPT in teaching, not only created a series of application scenarios different from traditional teaching forms, teaching methods and methods, but also the digital transformation in ChatGPT teaching application scenarios in the teaching process and various links, digital teaching has been ready. However, it should also be noted that the above case analysis shows that the digital transformation of teaching elements is only preliminary, not thorough and comprehensive, and is still in a decentralized and messy state, and lacks the systematic design and effective integration of the in-depth integration of artificial intelligence and teaching. That is to say, to build a digital teaching system based on man-machine integration and innovative talent training, it is still necessary to further promote the digital transformation of teaching elements and realize the structural reorganization of teaching elements.

3. On promoting the Digital Transformation of Teaching Elements and Building a Digital Teaching System

Since the digital transformation and structural reorganization of teaching elements constitute the substantive connotation of digital teaching, it is necessary to first understand what digital teaching is, and further promote the digital transformation of teaching elements, and build a digital teaching system based on man-machine integration and innovative talent training.

3.1. Correct Understanding of the Connotation of Digital Teaching Is the Fundamental Premise

There is no unified conceptual definition of what is digital teaching, which can be said to be different opinions. To sum up, there are mainly four representative views.

The first is "application" said, think "digital teaching is information technology as the carrier, through the digital resources, mode and data application of a teaching activity", emphasize "digital teaching is the upgrade of traditional book teaching, the text, tables and resources such as digital technology transformation and output, make resources more fit students actual, knowledge is more easy to absorb". [6]

The second is the "classroom shift" said, think "digital teaching means through digital technology, digital teaching environment and teaching data analysis mining, promote from parallel classroom (i.e., students can choose to participate in multiple classroom) to interactive classroom (i. e., students can deeply participation and interaction of multiple classroom) to fusion classroom (i. e., to digital, virtualization, intelligent infinite replication and multiple combination of classroom) shift". [7]

The third is the "teaching activities and teaching mode" said, "The so-called digital teaching, Referring to teachers and students in a digital teaching environment, Following the modern educational theories and laws, Digital processing of various teaching information resources, Teachers and students to fully harness information technology tools, Using a variety of modern digital information retrieval and acquisition methods, Teaching activities of cultivating compound talents with innovative consciousness and innovative ability through digital teaching mode", Highlight that "the core of digital teaching, Is the use of digital teaching tools nonlinear, interactive comprehensive processing of teaching text, graphics, images, animation, audio and video and other media teaching information, Get this information to establish logical connections, By adopting a digital teaching mode to implement teaching activities". [8]

The fourth is "teaching technology and teaching method" said, think "digital teaching refers to the teachers use multimedia technology, in the form of interactive way, the graphics, images, text, animation, video, sound and other media after computer processing, in the form of single or integrated of a kind of teaching technology and teaching method, it emphasizes the combination of people and computer technology". [9]

Comprehensive these ideas, digital teaching is based on digital thinking and personalized, targeted, innovative and other modern education concept, make full use of artificial intelligence, big data, Internet, block chain, 5G digital technology, for the curriculum system and teaching content, teaching methods and teaching media and technical means and a series of teaching elements of digital transformation and structural optimization reorganization, so as to build up to man-machine fusion as the outstanding features, innovative spirit and practice ability training as the goal of digital teaching system and operation mechanism. [10] In short, digital teaching is a kind of different from the traditional teaching form, teaching mode of new teaching system and operation mechanism, the core is the interaction of digital thinking and modern education concept, goal is the cultivation of innovative spirit and practice ability, the essence is the teaching elements of digital transformation and structural optimization reorganization.

3.2. Strengthening Strategic Planning and Top-Level Design Is the Key Link

Digital teaching is an organic whole composed of multiple elements, which is the fundamental transformation of the traditional teaching mode and teaching form by artificial intelligence technology characterized by man-machine integration. [11] It must be built on the realistic basis of overall planning, system design and structural optimization and reorganization. So, how to carry out the planning and design of digital teaching? It is necessary to change the piecemeal and scattered digital transformation mode, and strengthen the strategic planning and top-level design of the construction of digital teaching system. Obviously, this is not a local one or several schools and education institutions of simple technology application problem, but the teaching management, need to consider, government, schools or education institutions, enterprises, society, build government-led, schools or education institutions as the main body, enterprise to support, social participation for the important guarantee of digital teaching community, in digital governance social environment promote teaching elements of digital transformation and structural restructuring.

3.2.1. Strengthen the Government's Planning, Management and Policy Guidance on Digital Transformation

The Government Should Formulate the Strategic Planning and Implementation Plan for the Development of Digital Teaching, and Coordinate the Task Division and Specific Implementation of Multiple Subjects in Teaching Governance, so as to Provide Policy Guidance for the Construction of Digital Teaching System.

In doing anything you will succeed if you make preparations; without preparations you are bound to fail. As the leading force to promote the development of digital teaching, the government is very important to the planning, management and policy guidance for the optimization and

reorganization of teaching elements and digital transformation. At present, the digital teaching, related digital transformation has been piecemeal, messy scattered state, because the government for the leading role of digital teaching management is not sufficient, difficult to plan as a whole and integration of multiple governance subject teaching resources, collectivization, integrated combat and systems and mechanisms of collaborative innovation. Priority is the government should attach great importance to the digital teaching development, deeply understand the digital transformation to realize education quality development and deepen the strategic significance of teaching reform, from the national development for global strategy of innovative talents training, strengthen the strategic planning and guiding development of digital teaching, as soon as possible for digital transformation and digital teaching standards, to further promote the teaching elements of digital transformation provide the necessary policy guidance and professional standards. At the same time, the government should give full play to the policy leading role of schools or educational institutions, enterprises and social forces in teaching governance and digital transformation, and strengthen relevant policy research and planning.

3.2.2. Actively Promoting the Planning and Implementation of Digital Transformation in Schools

Schools or Educational Institutions Should Promote the Planning and Implementation of Digital Transformation in a Planned and Step-by-step Way According to Their Respective Teaching Realities and Existing Educational and Training Conditions, so as to Explore New Ways for the Construction of Digital Teaching System.

From the above digital transformation cases, it is not difficult to see that the current school digital teaching development has great deficiencies or blindness in the theoretical preparation and ideological understanding. The above four digital transformation cases, are from the existing teaching mode and teaching mode adjustment and reform, the introduction of ChatGPT, online learning platform and related software such as digital technology, the local, specific operation level of teaching methods and means of reform, not the digital transformation of the whole advancement and teaching system innovation. Next, further promote the teaching elements of digital transformation, must give full play to the school or education institutions in the development of digital teaching, teaching elements under the condition of digital optimization reorganization, strengthen the curriculum and professional reform level of digital teaching development planning and guidance, pay attention to mobilize the enthusiasm of teachers to participate in teaching reform and digital transformation initiative creativity, form the overall force of the development of digital teaching. At the same time, schools or educational institutions should also strengthen the working connection with the government, enterprises and social forces, strive for policy support for promoting the development of digital teaching transformation at the school level, expand funding sources, seek technical or intellectual support, and create a good external environment. Only by combining the internal and external resources, integrating the resources inside and outside the school, and forming the overall joint force of the digital teaching development, can we focus on the teaching reform and digital development, attract and mobilize the majority of teachers to participate more, and further promote the digital transformation of teaching elements and build the digital teaching system.

3.2.3. Strengthen Enterprises' Technical Support for the Construction of Digital Teaching System

The Enterprise Level Should Pay Attention to and Support the Development of Digital Teaching, Take the Development of Digital Teaching as an Important Aspect of Enterprise Strategic Management and Business Operation, and Provide Technical Support for the Construction of Digital Teaching System.

The development of digital teaching is a new cause with long-term significance and strategic investment value, which contains huge business opportunities and profit space. Paying attention to and supporting the development of digital teaching is not only the social responsibility and obligation of enterprises, but also an important entry point for their own development and innovative business strategic management. As a strategic investment field with development prospects, education digitalization including the development of digital teaching is likely to grow into a super volume industrial cluster, forming a strong support for the sustainable economic and social development. From the sensational effect of ChatGPT, in 2022, OpenAI, with the goal to achieve general artificial intelligence, released ChatGPT, and won the title of "the fastest product with millions of users in history" one week after its launch! [12] What's more, due to ChatGPT's friendly interaction and strong learning ability, the technology has reached 100 million users only two months after its launch, causing a huge impact in the economy, society, culture, education and other fields. [13] What's more incredible, ChatGPT has achieved applications in almost all areas. According to the online course provider, Study. In a survey conducted by com among 1,000 students over 18, more than 9 out of every 10 students knew ChatGPT, more than 89% used ChatGPT to complete homework, 48% completed quizzes with ChatGPT, 53% wrote papers with ChatGPT, and 22% used ChatGPT to produce an outline. [14] ChatGPT Such success is due to the unique features in technology. The most important reason is the use of the Transformer structure and the "autoregressive + Prompting" training mode, which makes the natural language processing research paradigm develop into the pre-training mode, and finally move to the general artificial intelligence mode. Transformer The low and middle level of the structure store knowledge of speech and syntax, while the middle and high level extensively store knowledge of abstract semantics and factual concepts, among which the total number of model parameters is as high as 175 billion, enabling the model to unlock many large language models. [14] OpenAI The

reason why the company does not hesitate to develop and develop ChatGPT is because of its huge market profits and broad application prospects. Digital teaching as an important application of the development of artificial intelligence and teaching depth fusion, enterprise attention and attention, depth participation and seek digital transformation of education cooperation, not only provide schools or education institutions is technical support, but also understand a line demand, technology research and development and digital products, innovation enterprise business model and operation strategy important opportunity. In the so-called helping others to achieve themselves, the development of an enterprise cannot be separated from the users it serves and supports. Returning to the society itself is also a process of gathering resources, building brands and establishing image. In short, the construction of digital teaching system cannot be separated from the technical support of enterprises. In the process of win-win and multi-win socialization, participating in teaching management and digital transformation, enterprises are duty-bound, and will make a great role to win the "double harvest" expectation of economic and social benefits.

3.2.4. Creating a Good Environment and Opinion Atmosphere for the Construction of Digital Teaching System

The Social Level Should Vigorously Promote the Development of Digital Teaching, Take the Development of Digital Teaching as the Most Important People's Livelihood and Benefit the People Project, and Create a Good Environment and Public Opinion Atmosphere for the Construction of Digital Teaching System.

As one of the most important benefits of people's livelihood, education has always been widely concerned about and highly valued by the society. The problem lies in that at present, digital teaching is far from attracting due attention, the focus of social attention is still on economic development and related topics, and the digital transformation of teaching governance is not included in the strategic focus and priority of the development of social undertakings. In order to support the needs of talents and intelligence in strong economic and social construction, it is necessary to have a broad vision of education, enhance the cultural consciousness of deep integration and integrated development of education and economy, and solve a series of bottlenecks in the development of education with the market. As a social cause, the core of education development is the development of teaching. Therefore, it is very important to establish the concept of digital teaching at the social level, and to strive to create a digital transformation environment and public opinion atmosphere conducive to the development of teaching. Whole society do education, universal attention teaching management, vigorously promote the development of digital teaching, giving full play to the advantages of new national system, grab the education science and technology, in today's international strategic competition and the world pattern changes to realize high level technology self-reliance,

speed up the independent cultivation of innovative talents is of special significance and strategic vision. It can be seen that teaching development and digital transformation are the underlying logic that integrates the whole body and affects the overall situation, and even affects the benign interaction between the development of science and technology and Chinese modernization. Only with a favorable external environment and good public opinion atmosphere with wide social attention and participation of the whole people, can we form the overall force of collective wisdom and strength conducive to the integration and optimal allocation of teaching resources, ensure the in-depth promotion of the digital transformation of teaching elements, and jointly welcome the real arrival of the digital teaching era.

3.3. The Construction of Digital Teaching System Is the Only Way

On how to further promote the teaching elements of digital transformation, solve the problem of ideological understanding, strengthen the strategic planning and policy guidance, is very important, but still need to build based on man-machine integration and innovative talents training digital teaching system, from the implementation path and propulsion strategy to seek new measures, new breakthrough.

3.3.1. Further Promote the Strategic Innovation of Digital Transformation of Teaching Elements

Efforts Should Be Made to Get Rid of Path Dependence, Innovate the Application Scenario of Digital Teaching, and Build a Platform for the Construction of Digital Teaching System, Which Is a Major Strategic Innovation to Further Promote the Digital Transformation of Teaching Elements.

When it comes to the digital transformation of teaching elements, people always consciously or unconsciously understand it as in the existing teaching scenarios to apply such as ChatGPT, Internet, big data, block chain, 5G digital technology, solve the media in teaching, teaching content update, teaching methods, teaching effect and a series of specific operation level of technical problems. However, the problem lies in that many current systems, scenarios and modes have been difficult to adapt to the changing new situation, and we need to carry out fundamental changes. Objectively, we need to break through the tradition, get rid of the habit of the long-standing path dependence, and strive to seek to explore and create new application scenarios. Just like driving a train on a motorway and flying a plane on a racetrack, the functions of these digital technologies are difficult to fully play without exploring new roads. More importantly, the successful replication mode based on fine quantitative sampling cannot be transplanted or migrated in the teaching process, and the application of digital technology has specific standard requirements and environmental support conditions for the application of teaching scenarios. Take the teaching application of ChatGPT as an example, ChatGPT, as the most advanced intelligent learning machine and man-machine dialogue system, should give full play to its powerful natural language

understanding and automatic text generation ability in teaching application scenarios, which is not a simple application, but needs to understand, get familiar with and interactive training. Whether as a teacher or a student in the new teaching relationship in the application scenario of ChatGPT, we need to first understand and gradually get familiar with the ChatGPT technical realization principle, basic functions, working mode, operation environment and other related knowledge, technical performance and operation methods. Next, combined with the actual teaching needs and teaching problems encountered, the planning and design of the teaching process and specific application scenarios. Only by understanding and mastering what ChatGPT can do as an intelligent learning machine and how to do it, and clarifying what problems they need ChatGPT to help them solve in teaching, can teachers and students enter the teaching application scenario of man-machine combination in a purposeful, planned and step-by-step way. In fact, is not only the teaching and learning relationship between teachers and students, ChatGPT application scenarios and a new teaching relationship for teaching and learning behavior management and evaluation problems, including the teachers 'teaching behavior supervision, peer class evaluation, teaching management cadre lectures and teaching evaluation, and for the students' learning effect and the actual progress of learning monitoring, big data analysis, dynamic data collection, crisis warning and real-time management, and so on, involving object and content is extremely complex, full of variables. Only clear teaching requirements, learning requirements, learning machine performance and other specific characteristics and actual situation, the digital technology and teaching depth fusion, develop digital teaching application scenarios based on man-machine fusion, build the corresponding digital teaching platform, can gradually get rid of the long habit of traditional thinking and path dependence, promote the digital transformation of teaching elements.

3.3.2. Further Promote the Path Selection of Digital Transformation of Teaching Elements

The Teaching Process and Teaching Links Should Be Designed Scientifically, to Promote the Optimization and Reorganization of Teaching Elements, and to Break New Ways for the Construction of Digital Teaching System, Which Is the Fundamental Way to Further Promote the Digital Transformation of Teaching Elements.

ChatGPT, Digital transformation in the teaching application scenario, in the final analysis, is to dare to innovate, break through the traditional teaching mode, break a new way different from the previous customary thinking and can change the lane and overtake. Its essence is to create a new teaching mode and promote the optimization and reorganization of teaching elements. Here, the so-called new teaching mode, refers to the ChatGPT application scenarios effective teaching, personalized learning, fine management, multiple quantitative evaluation of man-machine fusion, and with the help of intelligent learning machine and

man-machine dialogue system, maximize the teaching mode before class, class, and teaching, learning, tube, evaluation of mutual cohesion and organic combination. Specifically, in the construction of the digital teaching mode of man-machine integration, at least the following four aspects should be promoted: First, to guide students from passive acceptance to active inquiry, and to promote the effective teaching based on man-machine integration. The effectiveness of teaching lies in promoting the development of students and guiding students to learn something. As far as teaching activities are concerned, the classroom is undoubtedly the main position and the key link to improve the quality of teaching. However, teachers, teaching is not equal to the students to learn, and the students to learn is not equal to learn. Only by guiding students from passive learning to active inquiry through teacher teaching, can we say that students have truly become the master of learning. ChatGPT Application scenario effectiveness teaching, is to through the digital technology, digital teaching environment and teaching data analysis mining the three aspects, promote the fundamental change of the traditional classroom, so as to realize from free for students to choose and peripheral to multiple parallel classroom for students to participate in multiple interactive classroom to can through digital, virtualization, intelligent infinite copy and the combination of multiple classroom. In fact, the fundamental change of classroom structure and functional form is the true meaning of digital teaching. The second is to guide the learning goal from standardization to personalization, and promote the personalized learning of human-machine integration. ChatGPT Applied in teaching, the biggest change is to make it possible to "provide suitable education for everyone". Looking back on the development course of education in the past hundred years, the learning process of students is always "he adaptation", that is, learning with the established content, rhythm and method provided by teachers, learners are always passive, forced to obey the rules and procedures. ChatGPT Adaptive learning system in application scenarios is integrated with man and machine. learners are active, and the content also serves learners. Rules and processes are completely reorganized and reconstructed around the needs of learners. Third, to guide the teaching management from static supervision to dynamic governance, and to promote the fine management of man-machine integration. The application of artificial intelligence technology represented by ChatGPT in teaching has maximized the process of teaching management, the data of management process and the diversification of data collection methods. In this way, not only the teaching management gradually achieve more efficient supervision, and then constantly optimize the management process and mechanism. Through the real-time collection of data from students 'learning, teachers' teaching, resource application, platform use and other aspects, the digital twin digital campus and environment are constructed, the teaching governance mechanism of effective decision-making is established and improved, and finally the intelligent management and dynamic governance of the digital teaching

platform are realized. Fourth, guide the teaching evaluation from selection to promote the development of students' personality and promote the multiple quantitative evaluation of man-machine integration. The traditional teaching evaluation function is screening and selection, but the fundamental purpose of teaching evaluation and even the whole teaching activity is to promote students to grow up better and guide students to do their best self. Multiple quantitative evaluation based on man-machine fusion, evaluation concept, technology and methods have undergone fundamental changes, the implementation path is the core literacy as the gripper, supported by digital technology, build up to strengthen the core literacy oriented teaching evaluation system, focus on complex evaluation task automation generation, automation score, diagnosis and counseling and a series of intelligent technology, construct the measurement model based on multimodal data and data science depth fusion of computing psychological measurement model, thus greatly promote the digital transformation of teaching evaluation.

3.3.3. Further Promote the Educational Return of Digital Transformation of Teaching Elements

We Should Pay Attention to the Educational Return of Digital Teaching, Cultivate the New Form of "Education + Digital" Teaching, and Increase the Popularity for the Construction of Digital Teaching System, Which Is the Foothold of Further Promoting the Digital Transformation of Teaching Elements.

Currently, the technology of the western society for a new generation of artificial intelligence technology such as ChatGPT excessive hype and excessive superstition, reflected in the teaching field, is "defiant", see and value more is the "big data" and intelligent learning machine function very powerful, just ignored the invention of all technology and application are inseparable from the people, are human service, education return and humanistic care is the fundamental foothold of all teaching activities. Specific to the domestic, also have a similar situation. That is to say, is in the digital transformation of the new form still failed to get rid of the thought of technology, far out of the practice of scientific superstition, promote the teaching reform and digital transformation, mostly based on the idea of "big data", has not yet to further the inherent needs of personalized development, lack of multidimensional, individualized "small data" collection, mining and use. In this regard, Mr. Yuan Zhenguo calls it "digital + education" or "cold digital education". In his opinion, education is an activity aimed at people, cultivating talents for the country and promoting personal development, and an activity with love, righteousness and temperature. Therefore, digital education should be transformed to "education + digitalization" and develop digital education with temperature. [15] Similarly, digital teaching should also to "teaching + digital", adhere to the people-centered, take learning as the center, to promote the free, comprehensive, personalized development, for the purpose of in order to solve problems and change innovation as the guidance, to education

teaching law and talent growth law as the guide, make technology for education service, in promoting the comprehensive growth and progress of people play in digital teaching education function, make man-machine fusion of digital teaching real return education, the development of the real human service. In fact, the so-called man-machine fusion not only refers to the combination of man and the machine, but also includes the fusion of the machine and the environment, in fact, has gone beyond the binary relationship between man and the machine. Here, human-machine integration is the multi-interaction of educators, educators, machines and educational environment. It is a new intelligent form beyond the intelligence of human and machine on the basis of integrating the wisdom of educators and the intelligence of machines. Looking forward to the future of digital teaching, Human-machine fusion not only changes the separation of host and guest between the teaching parties and the machine, Make the teaching and digital technology with a real integration of the posture to achieve the embodiment and application of technology, And more importantly, it is able to reconstruct the ontology of teaching participants in the way of human-machine integration, Make the teachers and students' body, perception and cognition, Especially with intelligence, All get a qualitative enhancement, Using intelligent products and conducting teaching activities in a more creative way, In order to realize the ideal and value pursuit of digital teaching development.

4. Conclusions

To summarize, this paper thinks that with the wide application of ChatGPT in teaching and digital teaching is emerging, a teaching revolution with far-reaching influence and fundamental change significance has quietly come. Through a case study of digital transformation under ChatGPT teaching application scenarios, To investigate the structural changes of teaching system and teaching elements under ChatGPT application scenario from the application scenario creation and application effect evaluation, To correctly understand the characteristics and laws of the digital transformation of teaching elements, and to accurately understand and grasp the concept and connotation of digital teaching, To solve the deep-seated problems of digital teaching development and digital transformation, and then build a digital teaching system, To deepen the teaching reform and accelerate the training of talents for independent innovation, Both will undoubtedly have extremely important theoretical and practical significance.

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Conflicts of Interest

The authors declare no conflict of interest.

References

[1] Bowen Zhang, Jinru Mao. On the Teaching and Learning in the Information Age of "Big Data + Internet?"——Some thoughts on the Application of ChatGPT in Teaching [A]. C. F. Peng et al. (Eds.): EIMT 2023, AHSSEH 8 [C]. Atlantis Press, pp.   1005-1016,   2023. https://doi.org/10.2991/978-94-6463-192-0_131.

[2] Hua Lulu, Chen Lin, Sun Mengmeng. Ai-Promoting English Learning Change Research [J]. Modern Distance Education, 2017, 174 (06): 27-31.

[3] Bowen Zhang, Jinru Mao. Teaching reform and digital governance under the application of ChatGPT——On the digital transformation of teaching governance [A]. Proceedings of the 3rd International Conference on Internet, Education and Information Technology (IEIT2023) [C]. Atlantis Press, Ximen China, 04/28/2023-04/30/2023.

[4] Bowen Zhang. Case study on digital transformation of teaching governance in ChatGPT application scenario [R]. Guizhou University of Finance and Economics, 2023-04-30.

[5] https://baike.baidu.com/item/%E6%95%99%E5%AD%A6%E 4%BD%93%E7%B3%BB/303275.

[6] Zhang Yuguang. How to do a good job in high school English digital teaching [J]. Campus English, 2023, (01): 180-182.

[7] Yuan Zhenguo. Digital transformation of education: what to turn, how to turn [J]. Journal of East China Normal University (Education Science Edition), 2023, 41 (03): 1-11.

[8] Han Yalan, Deng Haiping. Research on the digital teaching of literature retrieval course [J]. Scientific and Technological Information Development and Economy, 2007, (03): 259-260.

[9] Cao Xianqing. Digital teaching of animal husbandry and veterinary medicine specialty [J]. Anhui Agriculture Bulletin (Second half issue), 2009, 15 (24): 132-133.

[10] Zhang Bowen, Mao Jinru. On the teaching and learning in the information age of "BigData+ Internet" ——Some thoughts on the application of ChatGPT in teaching [A]. Proceedings of 2nd International Conference on Educational Innovation and Multimedia Technology [C]. Atlantis Press: Paris, France, 2023.

[11] Yuan Zhenguo. What and how to transform Digital transformation of education [J]. Journal of East China Normal University Education Science Edition, 2023-03-20.

[12] Zhong Binglin, Shang Junjie, Wang Jianhua, Han Yunbo, Liu Jin, Zou Hongjun, Wang Zhanlu. ChatGPT Challenge to education [J]. Higher education research in Chongqing: 1-25.

[13] Wenqiao. Why is the daily activity volume of ten million ChatGPT so popular around the world? Every reporter experiences what a chatbot can do: answer the profound physical concepts, write financial news...... [N]. National Business Daily, 2023-01-31 (4).

[14] Shang Junjie: What are the impacts of ChatGPT on higher education? How should we respond? [EB/OL] https://www.sohu.com/a/648080465_608848.

[15] Yuan Zhenguo. Educational governance in the Perspective of digital transformation [J]. China Journal of Education, 2022, 41 (03): 1-6+18.

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