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Language Governance and Policy Interaction: New Trends in Language Planning in China in the Digital Age

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Abstract

With the advent of the digital era, the role of language has changed from a mere communication tool to a key resource of the information age and an important carrier of cultural inheritance. Through a comprehensive examination of policy documents, academic research, and case studies, we discuss the implementation and effectiveness of China's language resources protection project, the application of intelligent language services in public services, and the digital transformation of international Chinese language education, to reveal the internal logic of the interaction between language governance and policy. Policy recommendations are put forward to strengthen the integration and management of linguistic data, promote the healthy development of linguistic intelligence technology, and build a language governance system with pluralistic participation, in order to promote scientific, precise and intelligent language planning in China, which will help to enhance the national linguistic capacity and strengthen cultural soft power.

Keywords

Digital age; China; policy; language planning.

1. Introduction

Driven by the wave of digitisation, language is not only a tool for communication and expression, but also a key resource in the information age and an important carrier of cultural heritage. With the rapid development of Internet technology, the use and dissemination of language has undergone profound changes, and new contexts and communication platforms have challenged traditional language policies and planning. China, as a multi-ethnic and multilingual country, faces new opportunities and challenges in language governance and policy interaction in the digital age. Against this background, this paper aims to analyse the historical evolution of language policy in China, examine the impact of current digital technologies on language use, and explore the role of emerging technologies, such as Big Language Models, in language planning. Through a comprehensive examination of policy documents, academic research, and case studies, this paper attempts to reveal the internal logic of language governance and policy interaction, and to provide theoretical support and practical guidance for building a harmonious, healthy, and vibrant digital language environment. An in-depth understanding of the mechanism of language governance-policy interaction is of great significance in promoting scientific, precise and intelligent language planning, and it also helps to enhance the national language capacity and strengthen cultural soft power.

2. Theoretical Basis and Literature Review

2.1. Theoretical construction of language governance and language planning

Language planning in China has a long history, from the policy of "writing in the same language" during the reign of Emperor Qin Shi Huang to the "correcting the sound" campaign to promote the official language during the Yongzheng and Qianlong periods of the Qing Dynasty, all of

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which are typical examples. After entering the new century, especially during the period from 2000 to 2020, thanks to the promulgation and implementation of the Law of the People's Republic of China on Languages and Writing Systems in General Use and the List of Standardised Chinese Characters in General Use, these two decades constitute the third golden period for the language and writing system in the People's Republic of China. In recent years, with the development of information technology, China has also carried out a great deal of innovative practices in language planning. The series of books entitled "A Treatise on Language Planning in China" explores in detail the theory of language planning and its application in practice. In addition, academics have organised a number of seminars on language policy and planning, such as the 9th and 10th Academic Symposium on Language Policy and Language Planning in China, which discussed issues such as ChatGPT and language life, linguistic data and digital economy.

At the macro level, language planning needs to take into account factors such as social ecology, organisational structure, population distribution and technological conditions [1]. These factors together constitute a comprehensive ecosystem for language planning and management. At the concrete operational level, language planning should focus on the solution of practical problems, such as the promotion of Putonghua, the formulation of Chinese character standards, and the development of language education. This will not only help to improve national language ability, but also promote social harmony and economic development. With the enhancement of international exchanges, the theory of language planning at the supranational level has gradually been paid attention to, and in global affairs, the language policies of international organisations have had a significant impact on the language planning of countries. Language governance is a more systematic and comprehensive management mode based on language planning. It not only includes the content of language planning, but also extends to language education, language resource management, emergency language management and other fields. Modern language governance theory emphasises the characteristics of systematicity, democracy and heterogeneity. These features require that the needs and interests of different groups must be fully considered when formulating and implementing language policies. In practice, language governance involves work at many levels, such as language management in foreign-related public spaces and the research and implementation of national language education policies. These endeavours not only help to safeguard ethnic rights, but also maintain national stability and social harmony.

2.2. International Comparison of Language Policies in the Digital Age

In recent years, there has been a wide range of research hotspots in language policy and planning, covering areas such as language education and the phenomenon of multilingualism. Research has gradually focused on the micro level, exploring the interaction between language and various social factors. For example, more attention has been paid to language planning in specific fields and the influence of ideology on the formation of language policy has been explored. In terms of development trends, the overall development of international research on language policy and planning has been slow, but there are four new developments and shifts: from monolingual to bilingual and multilingual language planning, from national to domain-specific language planning, from state-based to community-based language planning, and an increasing number of studies focusing on language rights and social inequalities from a critical perspective. There is a growing body of research at [2]. In the future, research themes and perspectives will become more diverse, with more intersections and overlaps, closer links with language education, and more interdisciplinary features.

In terms of its performance in different countries and regions, international research on language policy and planning has shown an uneven development in terms of country/region distribution, but in terms of the distribution of high-yield organisations, there is a more

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balanced distribution in all regions of the world. For example, language policy in Europe is dominated by the promotion of multilingualism and multilingualism, while the United Nations stresses the importance of linguistic diversity, arguing that a more diverse organisation is better able to respond to the needs of Member States or civil society. The use of digital technologies is also driving language policies. For example, in China, around the construction of Digital China, the standardisation and standardisation of language informatisation has been further strengthened, and the digitisation of language and writing has been used to promote the high-quality development of education and language and writing. And in Europe, the Multilingual European Technology Alliance (META) has demonstrated its efforts in language technology and language preservation by publishing a white paper on 32 European languages in the digital age [3].

2.3. Modelling language governance and policy interactions

The main paths of language policy and planning research abroad include early language planning, historical-discourse research, political theory research, law and media discourse research, etc. These paths explore the formation, implementation and effects of language policy through different perspectives. The causal chain model (P-TOP) emphasises that political debates lead to the formulation of policy measures and points to the interplay between the development of language vitality and actual language use, arguing that policy formulation is the result of causality rather than merely a manifestation of results. The Competence-Opportunity-Desire (COD) model emphasises that policy development should focus on three conditions: language competence, opportunity to practice, and willingness to use the language, and this model argues that individuals are only likely to show a preference for a language if they have sufficient language competence and have the opportunity to use that language. Ethnolinguistic Identity Theory (ELIT), based on social identity theory, explores how individuals in multilingual areas define and develop the identities of the communities to which they belong, and emphasises the role of language in identity construction; this model is particularly suitable for understanding the language choice behaviour of individuals in multilingual environments.

In China, cities at all levels have carried out internationalised language environment governance. An analysis of official policies published by 13 provinces and cities between 2011 and 2023 reveals that language governance policies in the process of internationalisation of contemporary Chinese cities present themes such as reshaping multilingual landscapes in modern cities, constructing a multilingual information system in cities, and developing multilingual competence in a pluralistic society [4]. With the development of Internet technology, online social media has become an important platform for observing the interaction between language management, language practice and language ideology. On social media, there are co-temporal similarities and differences in language management styles across different platforms, and it is also worth paying attention to the historical changes of language policies within a single media platform. The core feature of modern governance systems is the interaction and co-operation between government and society for the sake of shared values, in order to achieve a coherent and sustainable society. Language governance requires broader participation and co-operation, including not only top-down policy making but also bottom-up feedback mechanisms [5].

3. Practical Cases of Language Governance and Policy Interaction in China

3.1. Implementation and Effectiveness of China's Language Resources Protection Project

Since its launch in 2015, the China Language Resources Protection Project (the "Language Protection Project") has achieved remarkable results. Organised and implemented by the

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Ministry of Education and the State Language Commission, the Project aims to record and preserve China's language resources in a multimodal, holographic and standardised manner, so as to ensure the inheritance and development of Chinese language and culture.

The language preservation project is divided into two phases: the first phase runs from 2015 to 2019, and the second phase runs from 2021 to 2025. In the first phase, a total of 1,712 survey sites have been completed, covering all provinces of China, Hong Kong, Macao and Taiwan, covering 123 languages and dialects across the country, and more than 10 million pieces of raw corpus data have been collected, including more than 5.6 million pieces of audio data and more than 5 million pieces of video data, with a total physical capacity of 100 terabytes (TB), and the world's largest language resource library has been built, which not only contains a large amount of audio and video data, but also provides a convenient data display platform. In addition, landmark achievements such as the Collection of Chinese Language Resources have been published, further enriching China's language and cultural resources. The second phase of the construction focuses on the comprehensive and systematic collation and processing of the collected language resources, as well as the renovation and upgrading of the existing data platform. At the same time, in-depth surveys will be carried out on a number of persistently endangered linguistic dialects in order to further enhance the level of protection and utilisation of China's linguistic resources. The language preservation project has been highly evaluated and widely supported by all walks of life, with the active participation of governments and universities around the world, and favourable social response, resulting in many advanced models and important progress. For example, in the Chinese dialect survey project in Jiangxi and other places, the team of experts made outstanding achievements and was awarded the title of "Advanced Collective of Chinese Language Resources Protection Award".

The language protection project was carried out in accordance with unified work and technical specifications to ensure the scientific, standardised and consistent nature of the professional and technical work. In order to ensure the efficient and high-quality completion of the project, the relevant departments have formulated and promulgated a series of management methods, such as the Measures for the Administration of the Chinese Language Resources Protection Project and the Measures for the Administration of the Special Funds for the Chinese Language Resources Protection Project, etc., which are implemented in strict accordance with the system. The project carries out nationwide salvage investigation, recording and preservation of Chinese dialects, minority languages as well as endangered languages and dialects. Through scientific planning and the use of modern technology, the project comprehensively investigates and preserves today's real-state corpus of China's Chinese dialects, minority languages and oral cultures, which not only involves the field of linguistics, but also combines the technical strength of many disciplines, such as computer science, information engineering and other disciplines, in order to realise the digital construction, storage management and management of linguistic resources. digital construction, storage management and organisation and analysis of language resources. In addition, it also pays attention to the reference and promotion of international experience. The project adopts modern technological means, including audio recording, video recording, pictures, texts and other forms to collect and record the real-state corpus of Chinese dialects, minority languages and oral cultures, making data collection more efficient and accurate. A large-scale, sustainably growing multimedia language resource database has been established for preserving, retrieving and displaying the multimedia language resource data collected by the project survey. With regard to the information construction of minority languages and scripts, normative standards for minority languages and scripts were developed, and scientific design and unified planning were made for the collation and preservation of audible corpus of Putonghua, Chinese dialects and minority languages, as well as their in-depth development and utilisation. With the implementation of

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the second phase of the language preservation project, the existing data platform has been revamped and upgraded, further enhancing data processing and management capabilities.

The task of the Chinese Language Resources Protection Project is a very heavy one, which puts high demands on the units, organisers and subject participants undertaking this task. It requires not only a great deal of time and energy, but also a high level of expertise and technical support. With the rapid development of society and economy as well as the increase of population mobility, more and more language problems have been exposed. Protecting the diversity of language resources, encouraging the preservation and use of endangered language resources, and realising the sustainable development of language resources have become the problems that must be solved nowadays. The development of modern information technology has provided new means and platforms for the construction of language resources, but it has also brought new challenges. How to record and preserve the endangered languages of ethnic minorities by using modern technological means, and to explore the scientific way of dialect use and protection are the urgent problems to be solved nowadays. In the future, it is necessary to strengthen the scientific research and resource development and utilisation of the languages and scripts of all nationalities, promote the sharing of language resources, and fully explore and reasonably utilise the cultural and economic values of language resources; promote the digitisation of language resources, set up and improve language resource libraries, and make use of modern technological means to record and preserve the endangered languages of minority nationalities and achieve the sharing of resources through the Internet and other platforms; and, in the process of the development of the languages of national minorities, emphasise co-operation and sharing. development process, emphasise the importance of cooperation, sharing and co-construction, which requires the joint efforts of experts from multiple fields, units and cross-regions; the government and all sectors of society should continue to attach great importance and support to mobilising all sectors of society to participate in language conservation work and change people's mentality, especially the impact of government policies and social changes; use modern technological means, such as big data and artificial intelligence, to push forward the language science and technology industry development, and the current situation and construction path of corpus oriented to AI technological innovation. China's language resources protection project is a long-term action, with huge space for sustainable follow-up operation. After the completion of the special task, it is necessary to continue to promote the relevant research work, so as to ensure the long-term protection and development of language resources.

3.2. Intelligent Language Services in the Public Service

The application of intelligent language services in China's public services is mainly reflected in various aspects such as intelligent question and answer system, intelligent search, conference management and remote authentication. Based on speech recognition and natural language processing technologies, intelligent Q&A systems can realise the intelligent Q&A consultation function of government websites and APPs, enabling the public to interact with government service platforms and obtain the information they need through voice or text. Through voice, text recognition and face recognition technologies, self-service government terminals are created to provide users with convenient search services, and in government services, users can use voice commands to quickly find relevant information and policies. Using image recognition, speech technology and machine translation technology to realise real-time meeting intelligent interaction and content summary, which not only improves meeting efficiency, but also ensures that important information is accurately recorded and communicated. Online self-service authentication is realised through face recognition technology to improve auditing efficiency, simplifying the approval process while enhancing data security and reliability. Relying on AI algorithms to mine and analyse large amounts of

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data, it helps the government monitor demographic trends and provides insights into the outlook for industrial resources, contributing to scientific decision-making and policy formulation. With the research and development of the National Intelligent Speech Innovation Centre and other institutions, China has made significant progress in multilingual speech recognition, speech synthesis, and semantic understanding, and the application of these technologies has greatly enhanced the internationalisation of public services and met the needs of people from different language backgrounds. Intelligent customer service systems are widely used in many fields, such as finance, transport, logistics and government affairs, to provide quality control, marketing and after-sales services, etc. It is expected that the market size of China's intelligent customer service market will exceed 10 billion yuan by 2025, showing its potential for rapid growth. Strengthen the construction of language informatisation and enhance the application of the results of language informatisation to improve the level of urban traffic informatisation by matching the names of streets in cities with the names of streets in electronic maps. Relying on the national integrated government service platform, provincial administrative licensing matters have been accepted online and the goal of "running at most once" has been achieved, which not only shortens the waiting time but also speeds up the approval process. Generative AI technology has brought the quality of automated translation and localisation to a new level, further enhancing the quality of language services for public services. Overall, intelligent language services, through the application of a variety of advanced technologies, have greatly enhanced the level of intelligence in China's public services, improved efficiency and service quality, and also provided strong data support for government decision-making.

Intelligent language services accurately capture communication dialogue fields through AI technology, accurately understand the intent of residents' inquiries, and translate spoken language into the language of government business, thus improving the efficiency of government services. For example, the Guiyang government portal has introduced an intelligent Q&A service that uses big models and natural language analysis technology to understand public questions at the semantic level and find the most matching knowledge content, significantly improving service response speed and accuracy. In government services, AI is able to handle multiple tasks at the same time and give timely feedback and analysis based on task execution, which not only improves administrative efficiency, but also reduces administrative costs. This multitasking capability makes intelligent language services perform well in complex service scenarios. Generative AI (e.g., Large Language Models LLMs) shows great potential in several areas of urban public services and governance, and can help translate government policies, procedures, and services to improve the ease and inclusiveness of public access to information. For example, it can help draft email responses, provide clear and understandable information, and more, leading to improved delivery of unemployment insurance and shorter application times. Research shows that more than 90 per cent of respondents believe that LLM helps improve operational efficiency and the quality of outcomes. Intelligent Q&A services are capable of cross-document content merging and multi-answer preference to ensure that the most accurate and useful information is provided to the user. This comprehensive technical approach further enhances the quality of the service and user experience.

China has made significant progress in multilingual speech recognition and semantic understanding technologies, mainly focusing on improving recognition accuracy, expanding supported language types, optimising data processing and privacy protection, and enhancing natural language processing capabilities. Research at the Institute of Acoustics, Chinese Academy of Sciences (CAS) and the School of Electrical, Electronic and Communication Engineering, University of Chinese Academy of Sciences (UCAS) has shown that multilingual acoustic modelling based on the sharing of model parameters effectively mitigates the problem

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of insufficient target language recognition accuracy. In addition, multilingual acoustic modelling based on language classification information improves the overall performance of multilingual acoustic models. The end-to-end keyword retrieval technique significantly improves the accuracy and confidence reliability of the temporal starting and ending points of keywords, so that end-to-end speech recognition can be effectively utilised in the keyword retrieval task. The Starfire Speech Grand Model developed by KU Xunfei covers 24 major languages, of which the recognition rate of 13 key languages exceeds 94%, which signifies that it has reached the practical threshold in the field of multilingual speech recognition. The project "Key Technology and Industrialisation of Multilingual Intelligent Speech" led by KU Xunfei won the first prize of the 2023 National Science and Technology Progress Award, demonstrating China's scientific research strength and application achievements in this field. In recent years, hybrid expert architectures have received widespread attention and research for their effectiveness in improving multilingual speech recognition performance in monolingual and codebook conversion scenarios. The Star Super Multi-Dialect Speech Recognition Big Model released by China Telecom's Artificial Intelligence Research Institute supports the free mixing of 30 dialects, which breaks the limitation that a single model can only recognise a specific single dialect, and is the most supported dialect speech recognition big model in China. Baidu's technology and application of knowledge graph-based understanding from text to multimodal content has also made new progress, further promoting the development of complex knowledge representation and multimodal semantic understanding technology.

3.3. The Role of Large Language Modelling in Language Planning

China's large-scale language modelling industry is growing rapidly. The market size is expected to reach 60 billion yuan by 2027 and 118.6 billion yuan by 2029, with a compound annual growth rate of over 40%. This growth is largely driven by technologies such as ChatGPT and the improvement of the domestic AI industry chain. However, although China's big language modelling is at the forefront of development globally, there is still a gap compared with the US. China's big language modelling industry can be divided into four main categories: general basic big models, vertical basic big models, application development and tool layer vendors. These vendors need to overcome key challenges in terms of data diversity and quality, model interpretability and transparency in order to further promote the development of big language models in China.

General-purpose base models are highly versatile, capable of handling many types of natural language tasks, such as machine translation, text generation, etc., and usually have large parameter scales to capture complex language patterns. Some of the more well-known general-purpose models on the market include Baidu's "Wenshin", Alibaba's "Tongyi", Huawei's "Wudao", Tencent's "Pangu" and "Pango". Alibaba's "Tongyi", Huawei's "Wudao", Tencent's "Pangu" and ByteDance's "Mixed". These models have significant advantages in Chinese generation and reasoning capabilities, and have a rich and diverse application ecosystem. Vertical base models focus on specific industries or domains, such as finance, commerce, healthcare, etc., and perform well in these specific scenarios, but are not as widely applicable as general models. Some domestic technology companies are exploring customised models in vertical domains to better meet industry-specific needs. Tool platforms provide a range of tools and services to help developers and enterprises use big language models for development and application, and such platforms usually integrate the functions of multiple models so that users can choose the right model according to their specific needs. For example, "Negotiation" is a typical tool platform that allows users to realise the complex functionality of the Big Language Model through simple API calls. Application products directly facing end users, such as chatbots, intelligent assistants, etc. These products rely on the powerful capabilities of the big language model to give greater value to the real data in the landing scenarios. With the advancement of

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technology, more and more application products are beginning to adopt big language models to improve user experience and service quality.

China's big language modelling industry is developing rapidly, however, the diversity and insufficient quality of data sources are still one of the main bottlenecks restricting its development. Currently, the quality of data for big model training in China is low and limited, the closed ecosystem among Internet companies leads to insufficient openness of high-quality data, many valuable data cannot be formed, and Chinese data accounts for a very low percentage of Internet content (less than 2%), and the quality is uneven. Big Language Models require a large amount of diverse data to be trained to ensure that they can handle a variety of different inputs and scenarios, yet existing data often lack sufficient diversity, which limits the ability of the models to be applied in different domains. As the demand for data from large models increases, data security risks are also becoming more prominent, and the data input to the models must be secured or it may pose serious pitfalls. The annotation of high-quality data is complex and time-consuming, requiring manual preparation of answers, as well as classification and quality assessment to ensure the accuracy and applicability of the data. To address the above challenges, there is a need to enhance data openness, encourage sharing of high-quality data among Internet enterprises, break down information silos, and form a more open data ecosystem; increase the proportion of Chinese data in Internet content and improve its quality, e.g., the quality of the Chinese corpus can be improved by improving the lexicon and word lists; and collect and integrate high-quality data from different domains to enrich the model's training datasets and improve their performance in specific domains; implement strict auditing and monitoring measures during data collection, storage, and use to ensure data security and compliance; use advanced technologies, such as blockchain, to protect data privacy and prevent data leakage and misuse; develop and use automated data annotation tools to reduce the workload and error rate of manual annotation; and develop unified data annotation standards and processes to ensure consistency and comparability of annotation results among different teams.

Despite the many achievements, there are still some challenges for big language modelling and language planning in China. Firstly, the problem of losing important semantics in character-level sequences in the Chinese vocabulary needs to be addressed in terms of data diversity and quality. Second, the interpretability and transparency of the models need to be further improved. In addition, autonomy and control is an important factor in guaranteeing network security, so it is important to focus on this point in the development of big modelling technology. Overall, China's big language modelling and language planning has a broad development prospect in the future, and is expected to maintain its leading position globally and provide strong technical support for socio-economic development through continuous technological innovation and policy support.

3.4. Digital Transformation of International Chinese Language Education

The digital transformation of international Chinese language education is a comprehensive, integrated, long-term iterative and multi-party collaborative systematic project, the essence of which is the application of digital technology to carry out a comprehensive, in-depth and lasting reengineering of international Chinese language education. The fundamental purpose of this transformation is to establish a digital ecosystem for education, so as to make teaching and learning more efficient and convenient in the future. In terms of concrete implementation paths, there is a wide range of online platforms for online teaching and learning, which provide a wealth of Chinese language learning resources and make them accessible to learners wherever they are. Virtual Reality (VR) and Augmented Reality (AR) technologies have also been introduced into international Chinese language education to enhance learners' motivation and interest, and indirectly promote language proficiency. Digital transformation also involves the

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construction of an intelligent Chinese language teaching cloud platform, which integrates teaching, resources, management and service functions, breaking down the barriers between online and offline teaching data circulation and services, and realising precise and collaborative teaching. The concept of virtual teaching and research office has also been promoted, through bringing together excellent teachers' resources both on and off campus and even at home and abroad, forming a team teaching advantage, and exploring the "online + offline" combination of teachers' teaching and research mode that breaks through time and space constraints. In addition, the application of artificial intelligence technologies, such as ChatGPT and Sora and other large models, is also advancing the technological change of international Chinese education, which can not only provide a personalised learning experience, but also help teachers to improve their irreplaceability. For example, online Chinese education platforms have developed a variety of new teaching methods, including diversified digital education models such as catechism, recording, live streaming and flipped classroom. The digital transformation of international Chinese language education also includes the digital transformation of educational resources and modes of education, so that teaching resources are rich in content and compatible, and teaching modes are independent, diversified and easy to use, which not only helps to improve the quality and efficiency of international Chinese language education, but also expands its dissemination and influence, and helps to improve China's image. The digital transformation of international Chinese language education is a multi-faceted and multi-level process, covering all aspects from infrastructure construction to teaching method innovation. By making full use of modern information technology, international Chinese language education is ushering in unprecedented development opportunities and challenges.

In the process of digital transformation of international Chinese language education, several online teaching platforms have been widely used and achieved certain results. linoace is known for its interactivity and fun, which is especially suitable for children to learn Chinese, and its course design focuses on game-based learning, which can stimulate students' interest in learning, but some users reflect that its course content is sometimes too simple for advanced level students. Wukong Chinese provides rich curriculum resources and personalised learning solutions for learners at different levels, and the platform also supports multiple language versions for international students, but some users think that the price is relatively high and some courses are updated slowly. pptutor provides one-to-one customised teaching services, with a team of professional and experienced teachers who can provide personalised teaching according to the specific needs of the students. The disadvantages are that it is expensive and the booking time may be long. eChineseLearning focuses on Chinese language education for foreigners, providing one-to-one Chinese courses for ethnic Chinese and supporting 7*24 hours course selection. eChineseLearning has rich teaching and research resources and a professional team of teachers, providing personalised Chinese learning services for foreign students. Although the quality of the courses is high, the scope of its services mainly focuses on Chinese students, with limited appeal to non-Chinese students. Overall, the choice of online teaching platform should be based on students' actual situation and learning needs. For beginners, platforms that are highly interactive and interesting, such as linguoace, can be chosen; while platforms such as pptutor or eChineseLearning can be considered for students who need personalised teaching. In addition, teaching technology aids such as Kahoot!, Zoom, and Google Classroom also play an important role in international Chinese online teaching, helping teachers to better manage and track students' learning progress.

There are rich and varied use cases of Virtual Reality (VR) and Augmented Reality (AR) technologies in international Chinese language education, and these technologies significantly enhance learners' language proficiency by providing an immersive learning experience. Beijing Foreign Studies University (BFSU) is developing a global Chinese language learning platform

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that combines a smart campus, high-quality programmes, and a platform that breaks down time and space constraints, using VR technology to provide students with an immersive Chinese language learning environment that enables them to learn the language in a simulated environment. Dalian University of Foreign Languages has launched the VR Foreign Language Virtual Simulation Language Skills Training Centre, which combines the latest VR technology and AI artificial intelligence to provide students with an immersive multi-language language learning and practical training environment.The centre effectively enhances students' professional skills and practical abilities through real-life simulation and interactive teaching.The VR and AR technology enables learners to practice language in a near-real-life language environment through the creation of a simulated situation for language practice. In the VR Chinese Language Experience, students can immerse themselves in a real Chinese city environment and engage in daily dialogue and communication, thus improving their speaking skills and cultural understanding. Digital Simulation Chinese Education uses speech recognition and synthesis technology to help students accurately master Chinese pronunciation. In writing instruction, handwriting text recognition technology can help students correct writing errors and improve writing accuracy. The Deep Learning Adaptive System can intelligently match suitable learning resources according to students' learning progress and abilities, which not only improves learning efficiency, but also provides personalised learning solutions based on individual needs. However, to fully realise the potential of these technologies, some practical issues need to be addressed, including the professional training of teachers and the correct usage habits of students.

4. Policy Recommendations and Future Prospects

4.1. Enhancing the integration and management of linguistic data

Strengthening the integration and management of linguistic data requires a number of aspects, such as building a national platform, adopting a suitable technical platform, ensuring data security, establishing thematic databases and standardising data strategies.

According to the Plan for the Construction of the National Language and Literature Think Tank, it is recommended that a national-level language data resource platform be constructed to integrate existing dispersed language data resources, which will help centralise the management and sharing of a large amount of linguistic data, and improve data utilisation and the depth of research. Choosing the right technology platform is crucial to achieving efficient data integration. Adopting a unified data exchange format and middleware can simplify the management of cross-lingual data flow, ETL (Extract, Transform, Load) tools can be used to deal with large-scale linguistic datasets, and reasonable data synchronisation strategies can be designed to ensure real-time or regular data updates. When integrating and managing linguistic data, it is important to comply with data governance strategies that ensure compliance and establish appropriate access control, protect data privacy and comply with relevant regulations that can enhance stakeholders' trust in data management and prevent data leakage and misuse. The digital era requires language planning research to build a data-driven research paradigm at its core and achieve an empirical shift in research methodology. In order to better support the research needs of specific fields, thematic databases can be established to classify and annotate data according to different research directions and application scenarios, so as to improve the retrievability and usability of data. The collation, editing and digitisation project of dialect data in Fangzhi precisely collects a large amount of dialect data through field surveys and questionnaires, and systematically collates and digitises them to provide detailed data support for language resources. For large-scale language models (LLMs), effective data management is crucial in the pre-training and supervised fine-tuning phases, which requires careful preparation of raw data to be collected, cleaned, documented and stored in a systematic

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structure, and also requires consideration of how to efficiently manage and query external data. The process of combining two or more datasets into a unified database through data merging allows for the addition of new details, additional cases and the removal of any duplicated or incorrect information to existing data, and the promotion of data integration and sharing can better utilise big data resources for economic and social development.

4.2. Promoting the healthy development of language intelligence technology

Promoting the healthy development of language intelligence technology requires multifaceted efforts and coordination. By strengthening technological innovation, policy support, education and training, interdisciplinary cooperation and practical application scenarios on the ground, and focusing on ethics and social responsibility, this cutting-edge technology can better serve the development of human society.

The development of language intelligence technology cannot be separated from continuous technological innovation and R&D investment. Currently, AI-driven language technologies are developing rapidly and will change the way we interact with machines and process language. The application of large models such as ChatGPT in the field of natural language processing demonstrates their powerful functions and potentials, and in order to further enhance the performance of these technologies, it is necessary to continuously optimise the algorithms, improve the quality of the data, and enhance the generalisation ability of the models. The national level should formulate corresponding policies and strategic plans to support the development of language intelligence technology, determine the tasks of resource construction based on the national language and writing development strategy, focus on the development goals of language intelligence, make a good top-level design, assess the difficulty of construction, and collaborate with multiple forces to organise and implement the project in a step-by-step manner. The development of language intelligence technology needs the support of professionals. Universities and research institutes should strengthen the construction of related disciplines and the construction of talent training system, carry out the pilot work of language intelligence experimental classes, and cultivate talents with interdisciplinary knowledge background. Foreign language educators also need to actively embrace the new technology, and improve their own technological level and teaching ability through the fusion of classroom teaching and online courses, and the combination of paper teaching materials and online resources. and teaching ability. Interdisciplinary cooperation is an important way to promote the development of language intelligence technology. Experts from linguistics, computer science, artificial intelligence and other fields should discuss how to combine their respective strengths to achieve technological innovation and application landing, and the communication bridge between the government, industry, academia and research institutes is also very important, which can be used to promote exchanges and cooperation in various aspects through forums, seminars and other forms. Language intelligence technology has a wide range of application scenarios, from speech recognition, machine translation to natural language generation, etc. There are prospects for a wide range of applications. In order to promote the practical application of these technologies, an open platform can be established to provide resources such as large-scale language models, large-scale datasets, model fine-tuning tools, and application development tools for developers. With the wide application of language intelligence technologies, the social impacts they bring also need to be paid attention to. For example, in foreign language education, although language intelligence technology can improve teaching efficiency and learning experience, it may also have an impact on the traditional education model, and while promoting new technologies, it is important to focus on ethical issues and social responsibility to ensure that technological development does not harm human linguistic ability and cultural diversity.

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4.3. Building a Multi-Participatory Language Governance System

The construction of a language governance system with pluralistic participation requires the Government to clarify its roles and responsibilities, to improve the mechanism for the participation of social forces, and to pay attention to the importance of international cooperation and exchanges. Only in this way can we achieve comprehensive and fair language governance and meet the diverse needs of the public.

The government plays a central role in building a language governance system with pluralistic participation, assuming multiple responsibilities such as formulating policies, co-ordinating management, guiding social participation, and strengthening the building of language capacity in government affairs. The government is an important supplier and demander of language services, and plays an important role in the construction of the urban language service system. Providing sufficient, abundant and high-quality language services and building a better language life are important elements of modern urban governance and important responsibilities of modern governments. Government-led, social and individual participation is the basic model of language governance in China, which means that the government not only needs to formulate policies and plans, but also needs to guide and support the broad participation of all sectors of the society, forming a governance pattern of up-and-down interaction and shared governance. The government also needs to strengthen its government language capacity building, enhance its ability to express government discourse, and improve communication between the government and the public. This requires the Government to apply scientific theoretical guidance in the management of language resources and language life.

The participation mechanism of social forces in the language governance system has been constructed through the establishment of the public participation system, the active participation of communities and social organisations, and the governance of cyberspace, etc., which together promote the modernisation and diversified development of language governance. Language governance is not only the responsibility of the government, but also requires the extensive participation of all sectors of society. The experience of public participation in Switzerland's language legislation has provided many insights for China's language legislation. Community leaders in areas such as education, media and business can influence the participation of linguistic minorities and facilitate additional institutional support, thus enhancing their community engagement. Social organisations play an important role in safeguarding linguistic rights and interests by enforcing laws and regulations, protecting linguistic diversity, ensuring equal access to public services and promoting the use and transmission of minority languages. Cyberspace is an important part of the language governance system and requires the participation of all sectors of society in its governance. For example, the Zhihu community governs language violence through user supervision and self-regulation, reflecting the positive role of social forces in the Internet space.

International cooperation and exchanges are crucial to the construction of a pluralistic and participatory language governance system. The basic task of global language governance is to overcome the multilingual communication barriers of human society, which requires the joint efforts and cooperation of the international community. As the country of origin of Chinese language, China plays an important role in the international dissemination of Chinese language, and promotes global linguistic harmony and mutual understanding of civilisations through the provision of linguistic, educational and academic resources, as well as the establishment of smooth, efficient and diversified supply channels. In the reform of the global governance system, language assistance is indispensable, and the protection of more than 7,000 languages in the world requires the common attention of the international community to establish scientific technical and social norms for the collection, labelling, library building and sharing of languages. Therefore, international cooperation and exchanges in building a pluralistic and participatory

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language governance system will not only help to enhance the national language governance capacity, but also promote global linguistic harmony and the common well-being of mankind.

5. Conclusion

This paper provides an in-depth discussion of the new trends in language planning in China in the context of the digital age, especially the practices and challenges in the interaction between language governance and policy. By analysing the historical evolution, we find that China's language policy has undergone a shift from unification of script to promotion of Putonghua, and has been driven by information technology to innovate the practice of language planning. This paper focuses on the impact of digital technologies on language use, the role of the Great Language Model in language planning, and the digital transformation of international Chinese language education. It is found that China has achieved remarkable results in language resource protection, intelligent language service application, and the promotion of language intelligence technology, but also faces challenges such as data diversity and quality issues, model interpretability, and autonomy and control. In order to further promote scientific, precise and intelligent language planning in China, it is recommended to strengthen the integration and management of language data, build a national-level language data resource platform, adopt a suitable technology platform, guarantee data security, and establish thematic databases. At the same time, it promotes the healthy development of language intelligence technology, strengthens technological innovation, policy support, education and training, interdisciplinary co-operation, as well as practical application scenarios on the ground. In addition, build a language governance system with pluralistic participation, clarify the roles and responsibilities of the government, improve the participation mechanism of social forces, and pay attention to the importance of international cooperation and exchanges.

Although this paper comprehensively analyses the new trends of language planning in China in the digital age, it still has some limitations. Firstly, the study mainly focuses on the policy level, with insufficient in-depth analyses of the effects of implementation at the grassroots level. Second, the ethical and social implications of the Big Language Model have not been sufficiently explored. Future research can focus on the following directions: first, going deeper into the grassroots level to assess the actual effects and challenges of language policies; second, exploring the adaptability and impact of the Big Language Model in different linguistic environments; third, examining the impact of the digital transformation on the roles of language teachers and their teaching methods; and fourth, strengthening interdisciplinary research, combining sociology, jurisprudence, and computer science in order to comprehensively assess the social impact of language planning. Through these research directions, more in-depth insights and suggestions can be provided for language planning in China and globally.

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