From Computer Aided Chinese Learning to Intelligent Chinese International Education

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ABSTRACT

This article explores the evolution of Computer-Aided Instruction (CAI) in teaching Chinese as a foreign language, from early mainframe systems to the current integration of AI-powered tools. While CAI has improved language learning through multimedia and interactive platforms, challenges remain in effectively integrating cultural context and language complexities like tones and characters. The article discusses how AI-driven systems offer personalized learning experiences, real-time feedback, and the potential to enhance both language proficiency and intercultural understanding. It concludes by highlighting the role of intelligent education in the global spread of Chinese language and the need for further research to optimize CAI technologies for better learning outcomes.

Keywords: *Computer-Aided Instruction; Chinese learning; Chinese International Education*

INTRODUCTION

With the popularization of computers and the development of multimedia technology and network technology, computer-aided instruction (CAI) has been more and more widely used in the teaching of different disciplines. Teaching Chinese as a foreign language is no exception. Many textbook writers and publishers are keen to develop computer-aided teaching curriculum software and multimedia textbooks. More and more teachers are making courseware using multimedia demonstration systems for classroom teaching. Many scholars have made valuable discussions on Chinese CAI in theory and practice. However, what is the effect of CAI and whether the use of computers can really promote teaching? How to design and apply software to effectively promote students' learning? So far, there are few empirical studies on the effect of CAI in the field of teaching Chinese as a foreign language (Gao, 2023). This paper intends to introduce the research on the effect of CAI in foreign countries, and explore how to study the effect of CAI in teaching Chinese as a foreign language.

In recent years, the integration of artificial intelligence (AI) and machine learning into CAI systems has opened up new possibilities for enhancing the learning experience. Intelligent systems, powered by AI, offer personalized and adaptive learning experiences based on individual student needs. These systems can dynamically adjust to each learner's progress, offering tailored feedback, targeted exercises, and real-time assessments (Xia et al., 2024). The use of AI in Chinese language learning is proving to be especially beneficial for international students, as it allows them to engage with the language in a more interactive and immersive environment. Additionally, AI-enabled platforms provide access to rich, contextualized content that combines both language learning and cultural education, helping students gain a deeper understanding of Chinese society and values (Huang, 2020).

However, despite the advances, challenges remain in the design and application of CAI and AI in language teaching. One of the critical issues is how to effectively integrate these tools with cultural content, which is essential for mastering a language like Chinese. Language learning is not just about

vocabulary and grammar but also understanding cultural contexts. Many current CAI systems focus more on linguistic skills, neglecting the importance of cultural immersion, which is crucial in a language as rich and context-dependent as Chinese (Xie et al., 2020). As the demand for Chinese language learning continues to grow worldwide, there is a need for intelligent education systems that offer both language instruction and cultural education, bridging the gap between linguistic proficiency and intercultural understanding.

LITERATURE REVIEW

2.1. Research contents of CAI

The research on the effect of CAI includes three development stages. The first stage is the research on the effect of mainframe Cai project (from 1950s to the end of 1970s), the second stage is the research on the effect of microcomputer assisted instruction (from the end of 1970s to the end of 1980s), and the third stage is the research on the effect of Interactive Multimedia Assisted Instruction (from the end of 1980s to now).

In each stage, the research on the effect of CAI includes four aspects: (1) pure research on the effect of computer teaching. It means that researchers explore whether the new media (mainframe, microcomputer or multimedia) can promote teaching more effectively than the original media. Among all the articles on the effect of CAI, the research on the effect of computer teaching is the most. The method used is mainly comparative experiment, that is, the effect of computer-aided teaching is compared with that of traditional teaching (Liu et al., 2019). (2) Research on CAI software design. It refers to the research on the relationship between the design of CAI software and Cai effect, including what are the basic modes of CAI, how to provide immediate feedback, how to present screen information, what learning control mode to adopt, how to realize interaction, and how these factors affect the effect. This research enriches the types of CAI software, improves the quality of software, and improves the evaluation system of teaching software (Schleyer & Johnson, 2003). (3) Research on CAI application process. It refers to the research on the teaching methods and environmental conditions of applying CAI, including whether CAI is used to present teaching information or classroom practice; Individual learning or cooperative learning and so on. This research has attracted people's attention to teacher training. (4) CAI comprehensive research. It refers to comprehensively considering the influence of CAI teaching environment, students' characteristics and teachers' characteristics on CAI effect, including all links from software design to application; Pay attention to how to cultivate students' ability to solve problems and learn to learn through CAI; Pay attention to the important role of teachers in CAI (Gao, 2023).

2.2.Research status of computer-aided Chinese Learning

Computer technology has attracted more and more attention in second language learning and teaching. The research of computer-aided Chinese learning and teaching includes many aspects, including two main aspects. One is the discussion of modern educational technology theory, but the development, application and evaluation of multimedia courseware and resources for Chinese learning and teaching. The latter is briefly introduced below. In the field of Chinese as a second language teaching, the first computer-aided Chinese learning software is the Chinese character teaching software developed by Chin Chuan Cheng (1973, 1977) of the University of Illinois. In 1981, Kim Smith of brightam young university in the United States compiled and published the first commercial Chinese learning software, which is a software to help students learn Chinese characters. Since then, there have been many computer-aided Chinese learning materials, and many people have made many meaningful attempts in the application of computer technology in Chinese teaching practice. In recent years, many scholars have conducted a comprehensive investigation on the materials of computer-aided Chinese learning or teaching. For example, Yao (1996) listed more than 20 kinds of computer-aided Chinese learning

software compiled in recent 20 years, and Zhang (1998) summarized 10 kinds of software.

Recently, Hu (2023) of brightam young university in the United States comprehensively summarized the materials of computer-aided Chinese learning and teaching. He adopted a broad definition of the term "computer-aided Chinese learning", which includes computer-aided language learning, computer-aided teaching, distance learning and online learning. He divided the materials in these fields into five categories: CD-ROM courses and tools, online courses and tools, online media and library, Chinese language and culture sites, and test software. In the appendix, he listed the sources, main characteristics and acquisition methods of various materials, including nearly 50 CD-ROM courses and tools, which provided very valuable information for people.

In multimedia computer-aided Chinese teaching, it is also a very important aspect to use speech analysis software for Chinese speech learning and teaching. Olson (2014) Proposed that students can use speech analysis software to obtain visual information of pronunciation, so that pronunciation can not only be heard, but also be "seen". Students can compare their pronunciation (such as tone type of tone, etc.) with the visual information of standard pronunciation, which helps students improve the correctness of pronunciation (Rahnavard & Mashhadi Heidar, 2017). Teachers should use speech analysis software as a tool of computer-aided teaching. At present, many speeches analysis software can be downloaded from the Internet.

The network topology of computer-aided Chinese learning software system is shown in Figure 1.

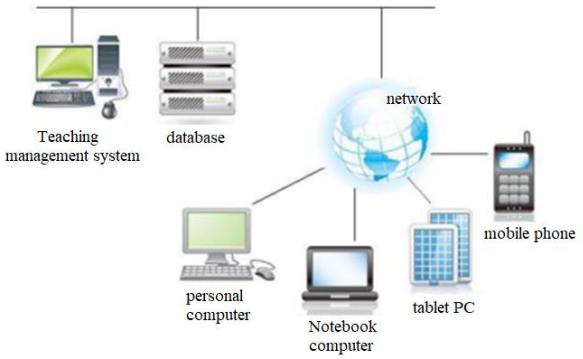

Figure 1. Computer aided learning

METHODS

3.1. Main Research Methods Of Computer-Aided Chinese Learning

Multimedia technology has had a great impact on the learning and teaching of English, French and other foreign languages, and its impact on the learning and teaching of Chinese is also expanding day by day. Many people suggest that more software and websites should be developed for Chinese learning and teaching. However, in order to make the effective application of multimedia technology in Chinese learning and teaching, designing multimedia materials only by intuitive experience or compiling multimedia materials by moving textbooks can not meet the needs. In order to achieve good results, we should not only be based on the technical and aesthetic principles of multimedia design and the research results of language ontology, we must also absorb the theories and achievements of psychology on general learning process and teaching process, absorb the research achievements of multimedia learning theory and teaching theory, and use scientific research methods to carry out empirical research on CAI.

At present, the research of computer-aided Chinese learning and teaching mainly includes theory introduction, experience summary, software programming and so on. The value of these non-empirical studies is that they can form a part of a

complete scientific research. Previous theories and their own teaching experience can be used as one of the bases for raising problems in scientific research or interpreting research results. However, as a complete scientific research, experiments, investigations and other empirical research need to be carried out on this basis.

For example, a researcher is interested in students' perceptual preference. Through consulting the literature, he learned that students can be divided into auditory preference type, visual preference type and no obvious preference type according to perceptual preference. Then he applied the previous research results to the preparation of multimedia learning courseware, It provides auditory learners and visual learners with learning courseware in line with their perceptual preferences. From the perspective of scientific research, only the first half of the research has been completed. Researchers interested in scientific research should further explore whether this new courseware really promotes students' learning better than traditional courseware, that is, it is necessary to collect learners' relevant data according to the research design, and then draw a conclusion on the basis of statistical analysis. Here, the experimental research method is usually used to compare the learning effects of new courseware and traditional courseware. Of course, questionnaire survey can also be used to systematically understand learners' attitudes and feelings towards different courseware.

In empirical research, researchers use scientific research methods such as experimental method, investigation method, systematic observation method and case method to collect certain data purposefully, and usually conduct quantitative or qualitative analysis on the collected data. Whether quantitative research or qualitative research, as scientific research, it must go through a series of systematic research processes, such as raising questions, consulting literature, research design, collecting data, analyzing data and drawing conclusions.

RESULTS

4.1. From Computer-Aided Chinese Learning to Intelligent Chinese International Education

In the process of learning language, we will naturally come into contact with culture, not only foreign students, but also some cultural contents when we learn Chinese. We can extract a lot of cultural information from a Chinese character, so in many cases, if we can't grasp the cultural background well, we can't really understand and master the language.

For example, when explaining the word "fish", why are there many examples of using fish to symbolize male and female spouses in ancient Chinese classics and folk songs? In New Year pictures, there are often boys holding carp, and "deep love between fish and water" is often used to describe the harmonious relationship between husband and wife. When explaining these problems, we should further explore the cultural connotation. The word "fish" actually symbolizes women. The fish belly has many children and has strong reproductive ability. It also expresses the good wishes of ancient women, so there will be such an explanation. Similarly, when explaining words such as "mutual help", "marriage", "marriage", "security" and "propriety", properly adding some cultural explanations will have a multiplier effect on students' understanding and memory .

In recent years, China's national strength has been continuously strengthened, its international status has been continuously improved, and Chinese has gradually sprung up all over the world, which is an unprecedented great opportunity for the spread of Chinese. In the process of spreading Chinese, if we can pay more attention to cultural teaching and carry out cultural communication appropriately, it will be very beneficial to the promotion of Chinese culture (Lan, 2011). What the international promotion of Chinese needs to do is to promote Chinese and Chinese culture to the world. In the process of realizing this goal, the teaching mode with Chinese teaching as the carrier and Chinese culture course as the main teaching content is a

good method. Language teaching will promote the spread of culture. In turn, the prosperity of Chinese culture in the world will attract more students to learn Chinese, which is a win-win measure.

CONCLUSION

At present, there is a lack of empirical research on the effectiveness of multimedia Chinese courseware for many reasons. The main reasons are that the research on computer-aided Chinese learning and teaching started late, the research strength is insufficient, some researchers do not understand the importance of empirical research, and the cooperative research between different disciplines is insufficient. Therefore, the effectiveness of multimedia courseware is evaluated Targeted empirical research is far from enough. With the deepening of research, the future research on computer-assisted Chinese learning will pay more and more attention to using empirical research to test the effectiveness of computer-assisted Chinese learning.

REFERENCE

Gao, X. (2023). Technology-Enhanced International Chinese Education: An Overview. *International Journal of Chinese Language Teaching*, *4*(3). https://doi.org/10.46451/ijclt.20230301

Hu, M. (2023). Benefits and Challenges of Computer-Assisted L2 Chinese Learning in Higher Education. *Theses and Dissertations*. https://scholarsarchive.byu.edu/etd/10093

Huang, S. (2020). *Research on the Application of Artificial Intelligence in Teaching Chinese as a Foreign Language*. 201–204. https://doi.org/10.2991/assehr.k.201030.041

Lan, Y. (2011). Computer-assisted Learning of Chinese Language and Culture: About the National Palace Museum Digital Archives. *19th International Conference on Computers in Education (ICCE 2011)*. https://www.academia.edu/95111328/Computer_assisted_Learning_of_Chinese_Language_and_Culture_about_the_National_Palace_Museum_Digital_Archives

Liu, X., Sun, L., & Tu, J.-F. (2019). Effects of Computer Assisted Language Learning on Learner Autonomy. *2019 IEEE International Conference on Computation, Communication and Engineering (ICCCE)*, 124–126. https://doi.org/10.1109/ICCCE48422.2019.9010804

Olson, D. J. (2014). Phonetics and Technology in the Classroom: A Practical Approach to Using Speech Analysis Software in Second-language Pronunciation Instruction. *Hispania*, *97*(1), 47–68.

Rahnavard, F., & Mashhadi Heidar, D. (2017). The Impact of Computer–Assisted Language Learning (CALL) /Web-Based Instruction on Improving EFL Learners' Pronunciation Ability. *International Journal of Research in English Education*, *2*(1), 49–57. https://doi.org/10.18869/acadpub.ijree.2.1.49

Schleyer, T. K. L., & Johnson, L. A. (2003). Evaluation of Educational Software. *Journal of Dental Education*, *67*(11), 1221–1228. https://doi.org/10.1002/j.0022-0337.2003.67.11.tb03713.x

Xia, J., Ge, Y., Shen, Z., & Najar, D. M. R. (2024). The Auxiliary Role of Artificial Intelligence Applications in Mitigating the Linguistic, Psychological, and Educational Challenges of Teaching and Learning Chinese Language by non-Chinese Students. *The International Review of Research in Open and Distributed Learning*, *25*(3), 116–133. https://doi.org/10.19173/irrodl.v25i3.7680

Xie, C., Cheung, A. C. K., Lau, W. W. F., & Slavin, R. E. (2020). The Effects of Computer-Assisted Instruction on Mathematics Achievement in Mainland China: A Meta-Analysis. *International Journal of Educational Research*, *102*, 101565. https://doi.org/10.1016/j.ijer.2020.101565