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Original Paper

AIGC and Digital Twin-enabled Business Chinese Teaching: A Case Study of the "Voice along the Silk Road" Project

Yunting Wu[1], Jiaying Liu[1], Hanyue Zhang[1], & Yue Niu[1]

[1] Zhejiang Normal University, China

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Abstract

Against the Belt and Road Initiative, deepening China-Africa business cooperation has exposed prominent flaws in traditional business Chinese teaching, such as its detachment from real trade scenarios and lack of personalized instruction, while relevant research remains inadequate. Adopting questionnaires, corpus building, case analysis and action research, the Silk Road Chinese Voice project draws on theories of Chinese for Specific Purposes, situational teaching and multimedia learning. Rooted in Yiwu International Trade City, it constructs a multilingual dynamic corpus of over 120,000 valid entries and develops a digital twin teaching system with AI teachers and learning companions. It applies an "occupation + industry" curriculum and a "learning-practice-application" model, and adopts a dual-track operation and multi-channel overseas promotion strategy. The project helps learners master core business communication skills rapidly and boosts local China-linked trade. It establishes an "industrial scenarios + AIGC" human-AI collaborative CSP paradigm, offering practical insights for AI-driven international Chinese education.

Keywords

AIGC, Business Chinese, digital twin

1. Introduction

At present, AIGC and digital twin technology have been applied in practical experimentation in business Chinese teaching scenarios. However, most of these practices remain one-sided breakthroughs in technological application, lacking deep integration with real-world industry scenarios and localized solutions for Africa. Related studies also mostly focus on innovation in the technology itself and have not established a fully replicable implementation model. To address these research gaps, the Silu Huasheng project (Voice along the Silk Road: A Business Chinese Teaching Program) applies AIGC and digital twin to the entire process of business Chinese.The project aims to enrich and develop the

theoretical system of Chinese for Specific Purposes and provides useful theoretical references for the new form of human-AI collaborative language teaching in the age of AI.

2. Theoretical Basis of the Project

2.1 Chinese for Specific Purposes

The theory of Chinese for Specific Purposes (CSP) serves as the core linguistic foundation of the Silu Huasheng project. Its central claim is that CSP teaching is, in essence, a "customized" preparatory Chinese enhancement or intensive course designed for specific professional or vocational learning. (Guan, 2023) This means that general Chinese textbooks cannot fully meet the needs of individualized business communication. Based on this claim, the teaching design of business Chinese must be oriented towards practical business application scenarios, serving real business communication in terms of corpus selection, scene design and differentiated design. The Silu Huasheng project focuses on the language service requirements of business cooperation along the Belt and Road initiative. It anchors itself in the Yiwu Small Commodity City, from which all corpora are collected from authentic business scenarios, rather than relying solely on Business Chinese textbook vocabulary, in order to satisfy the practical language requirements of Belt and Road initiative business cooperation.

2.2 Situational Teaching Theory

Situational Teaching Theory serves as the core foundation for the project's teaching methods design. Its definition is that "Situational Teaching Theory creates situations that contain real events or problems, allowing students to autonomously construct knowledge and meaning in the process of exploring events or solving problems." (Gu, 1999) Situational Teaching Theory holds that learners can acquire a large amount of implicit knowledge through situational learning, thereby spontaneously applying both explicit knowledge and implicit knowledge in real-world scenarios. (Chen, 2016) That is the significance of situational learning not only in explicit knowledge, but more importantly in implicit knowledge which can not be acquired in non-situational learning. Based on this theory, the Silu Huasheng project has developed learning scenarios that simulate real-world business for Business Chinese learners, using 3D real-scene modeling and real-time intelligent interaction technologies as its technical basis. The project has created a one-to-one digital replica of Yiwu International Trade City, covering more than 30 types of business communication scenarios and enabling learners to engage in immersive learning. Learners can engage in full-process Business Chinese hands-on practice, ranging from inquiry and negotiation to contract signing and after-sales service. Additionally, learners acquire knowledge beyond Business Chinese textbooks, such as negotiation skills, so as to adapt to real-world business scenarios.

2.3 Cognitive Theory of Multimedia Learning

In terms of educational technology theory, the project takes the Cognitive Theory of Multimedia Learning (CTML) as its theoretical basis, the core claim of which is that "The way of expression that uses both images and language is better than expressing purely verbally. Multimedia audiovisual

materials can attract learners' attention more effectively, stimulating learners' exploration of the relation between language and images in textbooks." (Wang, Y. N., Wang, Y. F., & Kong, 2005) If multimedia is used properly, its teaching effectiveness will be far greater than traditional teaching. Furthermore, within the Cognitive Theory of Multimedia Learning, the Multimedia Principle and Individual Differences Principle provide direct guidance for the project in developing a platform with the aid of AI and digital technology. The Multimedia Principle holds that dynamic and audio multimedia improves learners' learning efficiency, so designers should integrate multimedia that can attract learners' attention, such as audio and animation. In terms of course format, the project leaves a deeper impression on learners mainly through language interaction based on corpora. The Individual Differences Principle holds that the effect of multimedia is more pronounced for low-knowledge learners than for high-knowledge learners. The "Silu Huasheng project" project targets merchants from countries along the Belt and Road, among whom the majority of learners have not received systematic Chinese instruction. Thus, the learning platform supported by AI and digital technology in the project aligns with the Individual Differences Principle, helping low-knowledge learners master basic Business Chinese knowledge as soon as possible.

3. Operating Mechanism of the Project

The Silu Huasheng project began with a systematic investigation into the business Chinese learning needs in the China-Africa trade cooperation market during the preliminary stage. Based on 1423 valid questionnaires and 37 in-depth interviews in North Africa, the survey results show that current business Chinese learning commonly faces core challenges, including a considerable gap between teaching content and real-world scenarios, high learning costs, and a lack of multilingual resources for learners with diverse native language backgrounds. Taking these problems identified in these research findings as the starting point, and in the context of policy support for the Belt and Road initiative and the continuous deepening of China-Africa trade, the project is intended to improve the existing level of business Chinese teaching with the support of AI technology, whose design direction centers on international trade as a real-world scenario.

In terms of technology application, in response to problems in existing business Chinese corpora including a disconnect from the realities of China-Africa trade, inconsistent use of professional terminology, and significant cross-cultural differences in linguistic expression, the Silu Huasheng project team has stationed at Yiwu International Trade City for two years, conducting dynamic corpus collection across all scenarios and the entire process, standardizing professional terminology. It has achieved that the corpora content covers the entire cross-border trade process, including business inquiries, product promotion, price negotiation, order confirmation, logistics coordination, payment settlement, and after-sales verification. All the corpora were sourced from real-world transaction dialogues in order to address the pain point that existing business Chinese textbooks fail to meet the needs of real-world trade practice. The project team used natural language processing techniques to

clean, deduplicate, classify, annotate, structurally code, and standardize the raw corpus data. It then categorized the data along two dimensions, career orientation and business type, and finally constructed a dynamic multilingual business Chinese corpus covering five languages: Chinese, English, French, Arabic, and Hausa. Based on the rapidly evolving business and trade market, the corpora of the project should keep pace with the times. Up to now, the corpus contains more than 120,000 valid entries. On this basis, a high-frequency word cloud visualization module has been developed, which supports regular dynamic updates.

AIGC and digital twin-enabled teaching platform covers modules such as virtual, AI dual teachers, and a “learn-practice-apply” closed loop. According to the theory of situational teaching, the research team of the project integrates cutting-edge technologies such as natural language processing, AI digital twinning and three-dimensional real-life modeling into teaching. Students can practice scenes in the virtual space built by the teaching platform, interact with buyers or sellers in real time, and improve their ability to use business Chinese in practice. At the same time, in order to solve the problem of limited business Chinese teaching teachers, the team developed AI digital teachers and AI learning companions. by using the Tencent Cloud AI Digital Human Platform. These Digital Human support high-intensity interaction, and can also design personalized teaching programs according to the actual situation of students. In the process of practical application, the project team found that the study time of African students is scattered, and too rich course content and too long teaching time will disturb their study. Moreover, most students who study business Chinese have a very clear practical purpose and hope to see results in a short time. Therefore, the teaching team collected rich corpus resources from the real trade scene of Yiwu International Trade City, and on this basis, designed a progressive teaching system. Students can use fragmentation time to complete the study of each module, and the business Chinese expressions they have learned can be directly used in the transaction.

The SiLu Huasheng project aims at the practical characteristics of business Chinese and develops a targeted curriculum system in combination with the students’ occupations. The curriculum research and development team of the project is jointly established by multiple colleges and institutes of Zhejiang Normal University—including the College of Education, the College of International Culture and Social Development, the Institute of African Studies, and the College of Foreign Languages. After long-term investigation and testing, the team has developed a total of 324 standardized courses of business Chinese. The course focuses on the real demand and trade characteristics of the African market. It not only designs targeted content according to different professional positions such as business managers, marketers and ordinary salespeople, but also provides special training modules according to different business types such as retail, manufacturing and service industries, so as to fit the actual use scenarios of different students. The content of the course includes standardized teaching of Chinese phonetics, vocabulary and grammar, and a large number of real language materials including communication skills and international business etiquette, which can help students establish systematic business cognition while ensuring the accuracy of language output.

4. Multi-Dimensional Innovation System of the Project

4.1 Innovative Technology Application: Development of a Specialized Corpus and Intelligent Teaching System

4.1.1 Full-scenario, Full-process, and Dynamic China-Africa Business Corpus

The research team established a specialized corpus named “Chinese Echo” in strict accordance with the development specifications of the BCC Corpus developed by Beijing Language and Culture University. The content of the database covers the whole trade workflows of Yiwu International Trade City, including inquiry, bargaining, contract signing, logistics coordination and after-sales service. The team used advanced natural language processing technology to clean, deduplicate, categorize, annotate, structurally encode and standardize the data. As a full-scenario, full-process, and dynamic China-Africa business corpus, “Chinese Echo” can dynamically adapt to market changes and relevant policies and regulations. Meanwhile, the corpus integrates a high-frequency word cloud visualization module, which can directly display high-frequency vocabulary and commonly used expressions, so as to improve the precision of teaching.

4.1.2 Digital Twin Real-Scene Teaching System

Based on the established dynamic China-Africa business corpus, the research team has further developed the digital twin real-scene teaching system to construct virtual teaching scenarios. The project employs cutting-edge technologies, including Natural Language Processing (NLP), AI digital twin, 3D real-scene modeling and real-time intelligent interaction, to complete the 1:1 digital model of Yiwu International Trade City. Within this virtual environment, collaborating merchants are rendered as interactive roles with whom users can engage in situated learning without time-space barriers. The learning is carried out through the map check-in mode in the virtual scene.

4.1.3 AI-Powered Interactive Learning System

Leveraging the Tencent Cloud AI Digital Human Platform, this project has launched exclusive AI digital teachers and AI learning companions. Learners can personalize the appearance, vocal characteristics, instructional methodologies, and pacing of both AI instructors and learning companions based on individual requirements. This learning companion system provides round-the-clock instructional support, including pre-class preview guidance, in-class interactive practice, and after-class review for knowledge consolidation. AI teachers and learning companions work collaboratively to monitor data, identify learners’ weak points, and targetedly adjust teaching paces to maximize learning efficiency.

4.2 Innovative Curriculum System: Emphasis on Practical Pedagogy and Development of Efficient Intensive Short-Term Training Modules

4.2.1 Short-Term Crash Practical Teaching System

Focusing on efficiency and practical applicability, the research team has developed a “short-term crash” curriculum system. Relying on the dynamic China-Africa trade corpus covering all scenarios and processes and considering authentic communication protocols observed in trade exchanges between

China and Africa, the team sorts out key trade procedures, including procurement, inquiry, bargaining, contract signing, logistics coordination, payment settlement, and after-sales service. Frequently used business expressions and etiquette are extracted to form modular, lightweight, and progressive structured teaching content. Practice shows that learners can master 80% of core business communication skills within seven days. Compared with traditional courses, the system overcomes drawbacks like long learning cycles and over-emphasis on theoretical knowledge rather than hands-on practice.

4.2.2 Dual-Dimensional "Occupation + Industry" Curriculum System

Employing a dual-dimensional curriculum framework of "occupation + industry", the project has tailored teaching content for different professions such as business managers, marketing professionals, sales staff, translators, and financial practitioners, while simultaneously developing specialized training modules for various industries such as retail, manufacturing, and service. This management achieves precise, differentiated, and personalized teaching, conducive to cultivating professional talents.

4.2.3 The Integrated Teaching Model of "Learning-Practice-Application"

Guided by the principle of learning for application and reinforcing proficiency through practice, the program connects learning, training, and application to achieve mutual promotion, forming a closed loop of "learning — training — application — feedback — optimization". Rooted in real commercial scenarios and centered on practical tasks, the course engages learners in immersive practice to develop business cognition, intercultural communication competence, and risk judgment awareness. Since its launch, over 1,700 learners have passed Business Chinese examinations, and 148 of them have taken up positions in Chinese-funded enterprises.

4.3 Innovation of Theoretical Paradigm: "Industrial Scenarios + Generative AI" — Developing a New CSP Teaching Paradigm of Human-AI Collaboration

The program carries out theoretical explorations in two respects. For one thing, it explores new approaches to Business Chinese teaching by translating scenario-based pedagogy into the practice of Chinese for Specific Purposes (CSP), enriching the theories of CSP research. For another, it investigates how generative AI can support language education. The human-AI collaborative teaching adopted in Business Chinese classes offers insights and practical cases for studies on language teaching innovation in the intelligent era.

4.4 Innovation of Support System: Deepening Industry-Education Integration and Mobilizing Expert Resources from China and Abroad

4.4.1 Multi-party China-Africa Cooperation Network

Existing research suggests that the sustainable development of CSP calls for joint efforts from diverse stakeholders. It is necessary to attract industrial attention and corporate participation, and build a collaborative framework linking schools, industries, and enterprises to drive the development of CSP (Li, Y. H., & Li, Y. M., 2024). Guided by open co-construction, the program brings together governments, industries, and university research teams. It maintains long-term partnerships with Yiwu

China Commodity City Group, the Institute of African Studies of Zhejiang Normal University, and other institutions. Partners draw on their respective strengths and collaborate, fostering an interconnected ecosystem of industry, university, research, and application. So far, partnerships have been established with 18 African universities. The program has also received formal recognition and public backing from two foreign embassies in China, five local commerce authorities, and eight Confucius Institutes.

4.4.2 Three-Pillar Guarantee Framework: Technology, Brand, and Expertise

In terms of technology, the project has obtained five software copyrights and seven copyright registrations. Its core digital twin teaching technology has passed official quality assessment. In terms of brand, Yiwu Hansheng Network Technology Co., Ltd., with a registered capital of RMB 5 million, has been incorporated. Regarding expert cooperation, the project has received media coverage over 160 times from more than 110 media outlets. Distinguished experts, including Pei Dina, Liu Hongwu, and Rodrigo were invited as consultants, and written recommendations and professional guidance have been received from four domain experts, fostering high-level academic leadership and professional talent support.

5. Industry Insights from AIGC-Empowered Business Chinese Education

The deepening of business ties under the Belt and Road Initiative raises higher requirements for business Chinese education. “Chinese + Vocational Skills” oriented, business Chinese education aims to provide learners with practical linguistic skills for cross-border trade. However, according to the studies conducted by Chen Tianyang, Li Nuo’en, Liu Genqin, et al., research on Chinese-plus presents four major deficiencies: first, insufficient attention to individual learners, manifested as “generalized group-level analysis with neglect of individual developmental patterns”; second, inadequate emphasis on vocational competence, manifested as “fragmented mentions without in-depth exploration”; third, limited research into the application of digital technology, manifested as “restricted application and lack of innovation”; and fourth, insufficient focus on pedagogical innovation, manifested as “shallow exploration without systematic construction”. (Li, Y. H., & Li, Y. M., 2026) In the meantime, traditional business Chinese textbooks are updated slowly, and teaching is disconnected from real-world practice. In addition, learning is confined to textbook theories only, leading to the common phenomenon that learners “master textbook knowledge yet fail to make a good deal”. Centered on AIGC technologies and integrating proprietary corpora, digital twin tools, and intelligent digital humans, the “Silk Road Chinese Voice” project builds a human-AI collaborative teaching system that precisely responds to language demands in China-Africa trade under the Belt and Road Initiative. It offers multiple actionable industry insights for the innovative development of Chinese for Specific Purposes.

In terms of teaching content, the research team has systematically analyzed tens of thousands of authentic corpus texts collected through fieldwork at Yiwu International Trade City. After cleaning and

annotation with NLP, these corpus texts are fed into models to generate industry-specific and dynamically updated teaching materials with strong practicality and pertinence. At present, the database contains more than 120,000 valid corpus entries covering the full cross-border trade workflow, including procurement, inquiry, bargaining, contract signing, logistics coordination, payment settlement, and after-sales service, which are categorized by occupation and industry. It encompasses positions such as translation, sales management, and investment, as well as sectors ranging from manufacturing to retail.

As demonstrated in this whole workflow, AIGC acts as the critical driving force. It converts raw corpus resources into intelligent teaching resources and generates learning plans as needed, which would require enormous human labor input under traditional development modes.

The industry has therefore recognized that high-quality business Chinese teaching cannot rely merely on static printed textbooks. Vertical dynamic corpora must be constructed, and AIGC should be adopted to produce teaching materials tailored for different scenarios on a quarterly basis. In this way, the core contradiction between teaching and practice will be eased to a large extent.

In terms of teaching models, targeting pain points such as insufficient practical drills, limited linguistic performance, and lack of personalized learning, the project has built an immersive intelligent training system powered by AIGC and digital twins. Within the virtual space replicating the Trade City at a 1:1 scale, learners are able to complete full-process trade simulations without restrictions of place and time. Throughout the learning process, AIGC-driven digital teachers and AI learning companions are available to offer round-the-clock one-on-one learning companionship. Different learners can customize different learning plans according to their own needs. For instance, catering to office workers who have only fragmented learning time, the system can generate flexible learning schedules to help learners master core business communication skills within a short period. In this part, AIGC plays an important role in generating simulation scenarios and dialogues, providing round-the-clock tutoring and tailoring plans to support digital and differentiated teaching.

In terms of commercial operations, AIGC makes a multi-channel, replicable, and scalable promotion model available for business Chinese teaching. Targeting three major client groups—overseas individual learners, foreign trade enterprises, and local educational institutions—AIGC is able to produce personalized learning resource packages, corporate training solutions, and institutional teaching courses in a short period of time, cutting down content R&D costs.The rapid update of learning resources speeds up the localization of the learning platform. Thus it can effectively overcome the slow expansion limitation of traditional offline training with stronger risk resistance as well as greater development potential, which is helpful to adapt to diverse trade regions such as Southeast Asia and Central Asia,

To sum up, AIGC represents more than tool optimization, it signals the transformation of teaching modes and operational mechanisms. Balancing teaching quality and commercial sustainability, this project marks an important direction for the global development of Chinese for Specific Purposes

education in the AI era.

6. Conclusion

This paper takes the SiLu HuaSheng project as its research subject. Integrating AIGC and digital twin technologies into teaching, the project has developed a teaching platform equipped with AI digital teachers and AI learning companions to foster human-AI collaboration in teaching and learning. Drawing on real trading scenarios at Yiwu International Trade City, it has built a corpus containing more than 100,000 entries. It has not only developed a curriculum system that combines poccupation and industry, but also integrates learning, practice and application., enhancing the pertinence of teaching and improving learning efficiency. The outcomes of the project suggest that Business Chinese teaching should go beyond static teaching resources and leverage AIGC to reshape its pedagogical models and operational mechanisms. While the project offers both theoretical and practical references for international Chinese language education in the AI era, further work is needed to adapt its design to local commercial norms and cross-cultural conventions in different countries.

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