

МЕЖДУНАРОДНЫЙ ОПЫТ УПРАВЛЕНИЯ УЧРЕЖДЕНИЯМИ ОБРАЗОВАНИЯ

Silver English teaching algorithm: when artificial intelligence encounters unquantifiable educational emotions

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Abstract

The advent of artificial intelligence is transforming all aspects of society at an unprecedented pace. Amid this technological revolution, the convergence of population aging and the lifelong - learning model has rendered English education for elderly beginners a novel domain within China's educational field. This study posits that although AI exhibits certain pedagogical capabilities, it remains inherently limited in replicating the emotional aspect that is of vital significance in elderly education. Through participatory observations in three urban communities in Beijing, Chongqing, and Shenzhen, four non-negligible human factors in elderly English education have been identified: 1) the motivation for social interaction outperforms the feedback system mediated by artificial intelligence; 2) learning strategies that are culturally embedded and utilize regional language resources, such as the acquisition of English phonetics with the prosody of Chongqing dialect, are effective; 3) an emotion-driven learning impetus that goes beyond the algorithm-based participation mode; 4) the process-oriented educational values conflict with the efficiency-centered technology paradigm. The findings of this study advocate for a hybrid pedagogical framework where AI serves as cognitive scaffolding, while human educators retain the role of emotional management. The proposed model emphasizes three synergistic principles: context-aware technical mediation, culturally responsive content adaptation, and affect-protective interaction design. This study contributes to the balanced discussion of the value of technology integration and humanities education in the context of the elderly.

Keywords

Silver English teaching, educational emotion, AI-assisted learning, culture-responsive pedagogy, human-machine collaboration.

Introduction

Human society is currently experiencing the rapid evolution of artificial intelligence (AI). This technological advancement has permeated various aspects of society, and the educational domain is no

exception. In the context of the global population aging trend and the growing significance placed on lifelong learning [10], the field of elderly education has expanded substantially [6]. English, as an international language, has emerged as a favored option for numerous Chinese seniors who seek to broaden their perspectives, engage in cross-cultural interactions, or maintain mental agility.

Undoubtedly, AI demonstrates certain capabilities in educational tasks. Nevertheless, integrating AI into elderly English education is a complex undertaking. It requires a profound comprehension of the distinct needs and characteristics of this learner group. From the perspective of emotional support in English instruction, this study delves into the learning traits of elderly English learners, elucidates the role of artificial intelligence in teaching, and explores the non-negligible humanistic factors when applying AI in teaching. Moreover, it endeavors to construct an interactive teaching framework of artificial intelligence by incorporating real-world cases, thereby offering some reference suggestions for future English teaching to a certain extent.

Materials and research methods

In order to gain an in-depth understanding of the authentic learning experiences of elderly English learners and the role of AI in their learning journey, the researchers carried out participatory observations within three urban communities in Beijing, Chongqing, and Shenzhen. The researchers actively engaged in both online and offline English classes, group discussions, and other learning activities. During these engagements, they closely observed the interactions among learners, between learners and teachers, as well as between learners and AI-based learning tools. Over a span of three months, a total of 40 online English classes and 33 group learning activities were meticulously observed.

Besides direct observation, data were also amassed through a questionnaire survey administered to 53 elderly learners, along with in-depth interviews with three teachers and eight elderly English learners who participated in the study. The interviews were centered around their learning experiences, their stances towards AI-assisted learning, and the significance of emotional factors in the learning process. The data obtained from the observations and interviews were then subjected to thematic analysis. This analysis aimed to identify common patterns and emerging themes associated with the human-related factors in English education for the elderly.

Results and discussion

In recent years, English education for the elderly in China has exhibited a notable growth tendency. The number of English learners aged over 60 has witnessed a 217% increase compared to 2018, thereby forming a new learning cohort of 4.3 million individuals (Report on the development of education for the elderly, 2023). This phenomenon mirrors profound social transformations.

Firstly, the enhancement of living standards has furnished the elderly with more time and resources for self-development. In 2022, urban people in China had an average spendable income of 49,283 yuan (7th National Population Census Report, 2023). This has made it possible for the elderly to «learn to take care of themselves» through education. A similar thing has been seen in post-Soviet countries. When the average income per person in a country goes over \$8,000, more elderly people start to learn (Grigoriev, 2022). It's interesting that 86% of older learners in China use English to get closer to their younger family members. But in Russia, 62% of the elderly learn mainly to get back into the working world. This shows that the reasons why Chinese elderly people learn English are different because of their own culture and society. Secondly, the globalization process has rendered English an essential skill for diverse activities. These include traveling abroad, communicating with overseas family members, or accessing global information. Notably, 73% of learners have identified «assisting their children living abroad» as their primary motivation. Additionally, digital intergenerational feedback is effective, with 65% of elderly students accessing online learning resources via their grandchildren (Smirnova, 2021). In first-tier and second-tier cities like Beijing, Chongqing and Shenzhen, community-based English courses for seniors have become increasingly prevalent, attracting a diverse range of learners with varying educational backgrounds and learning motivations. This study is mainly based on the popular English learning community model in Beijing, Chongqing and Shenzhen:

- Beijing model: Relying on community universities for the elderly, the «Diplomats English Salon» and other characteristic projects are formed to integrate cross-cultural communication and historical memory
- Chongqing paradigm: Use the positive transfer effect of dialects to develop a mixed curriculum of «Trump English» (e.g., use «Paomen» to match «small talk»)
- Shenzhen Innovation: A group of retired engineers from science and technology enterprises build a «Silicon Valley style» English corner to realize the cognitive grafting of technical terms and daily conversation.

From the perspective of technology empowerment, artificial intelligence has demonstrated substantial potential within educational settings. In the context of English learning, AI-powered tools are capable of furnishing instant feedback regarding pronunciation, grammar, and vocabulary. Moreover, AI can devise a personalized learning trajectory contingent upon the learner's performance data. For instance, the «Silver Version» of an AI-based adaptive learning system optimizes vowel formant analysis through speech recognition, and it specifically adjusts the feedback frequency in accordance with the characteristics of presbycusis. Another illustration is the multi-modal interaction design in AI. The virtual teacher system developed by Tencent AI Lab incorporates micro-expression detection, which has the ability to capture the cognitive fatigue signals of elderly students and dynamically regulate the teaching rhythm.

Nevertheless, for elderly learners, given their specific learning styles and emotional requisites, meticulous consideration is warranted when applying AI. In this study, among the 8 elderly English learners who were interviewed in-depth, 62,5% of them exhibited «digital authority anxiety» towards the AI error-correction mechanism, signifying that there remains a disparity in the acceptance of AI technology. Additionally, there exists a certain degree of emotional interaction deficiency in AI-based teaching. In this study, an 83-year-old grandmother Xie, an elderly English learner from Beijing, explicitly stated, «When I answered the question correctly, I felt that the machine's response was rather cold. In contrast, when the teacher said loudly to me, 'You are right!' and I saw the teacher's smiling face, I was extremely delighted. This human interaction is far more effective than that of the machine». Similarly, a 74-year-old Grandpa Li in Chongqing remarked: «I enjoy learning English while chatting with friends over a cup of tea. When I speak in dialect, the machine simply cannot understand me, which is quite frustrating». Statistically, among a total of 53 elderly English learners in the three communities, 86,7% of elderly English beginners indicated that the emotional support provided by AI could not fully satisfy their learning requirements.

One of the most prominent findings of this study is that the motivation for social interaction among elderly learners far exceeds the feedback offered by AI. In the observed classrooms, elderly English learners typically demonstrated a higher level of enthusiasm when given the opportunity to communicate with their peers. For instance, during a group discussion on the topic of «supermarket shopping» in daily life, when learners used an AI-based learning app independently, they appeared less engaged. The absence of human interaction rendered the learning process more isolating. Conversely, when teachers organized elderly English learners to discuss topics such as «the price of eggs», «the names of specialty products», and «which nearby supermarket is more cost-effective», the learners' enthusiasm soared. They could even spontaneously establish a mutual-assistance network. For example, they might draw an analogy between «the distribution of ration tickets during the planned-economy era» and English shopping dialogues, thus forming an experience-sharing mechanism. Evidently, the exchange of ideas and experiences among elderly English learners not only enhanced their language skills but also fulfilled their social needs.

Moreover, peer demonstration in actual learning is currently an aspect that AI cannot substitute. A substantial number of elderly English learners informed the researchers that by observing their peers' incorrect language attempts, they were able to reduce their anxiety regarding making mistakes. Some elderly English learners also emphasized the significance of a real, ritualized learning environment. Specifically, the weekly fixed-time classes provided them with more social opportunities. During the tea-break, they could exchange relevant questions in English, enabling language practice to be integrated into the rhythm of daily life. This is a learning experience that current AI - based teaching is incapable of providing.

This study reveals that elderly English learners frequently utilize local language resources for English learning. In the Chongqing learning community, for example, elderly English learners often incorporate the

intonation of Chongqing dialect into English phonetic acquisition, which represents an effective culturally-embedded learning strategy. Aunt Tan, an elderly learner in Chongqing, stated, «English is really fascinating, and I don't find it challenging. Take the word 'power' for instance. I remember a sentence: you are walking faster than power (pronounced in the Chongqing dialect as similar to 'run'). This way, I can easily remember it, haha». When she links English pronunciation to the familiar local dialect tones, it becomes more straightforward for her to retain English pronunciations.

This approach not only facilitates language learning but also safeguards and promotes local culture (Ivanova, 2020). Linguistic analysis indicates that dialect intervention decreases the phonological working-memory load of elderly learners by 23%. This is because it capitalizes on existing linguistic neural pathways to establish «dual cognitive coding». Evidently, when the learning content is associated with their cultural origins, learners exhibit greater motivation to engage in the learning process.

Among elderly English learners, there exists an emotion-driven learning impetus that has the capacity to transcend the algorithm-based participation paradigm of artificial intelligence (Hochschild, 2012). This study has discovered that the learning motivation of elderly English learners is intricately linked to their personal emotions and life experiences. Specifically, 83% of these elderly learners are motivated by their own travel encounters. A significant majority of them either have had international travel experiences or have plans for such travels in the future. Additionally, 60,4% of the elderly aspire to learn English in order to communicate with their grandchildren who are either living abroad or currently engaged in English learning. In the Beijing learning community, several elderly learners are engaged in reconstructing their previously interrupted self-learning periods through English study. They view this as a means to enhance and exercise their memory. These emotional connections endow them with a powerful drive to persevere in their learning journey. Such a phenomenon is challenging to replicate within the context of artificial-intelligence-based learning, as it represents a network of meaning constructed by human beings themselves, extending far beyond the realm of algorithms.

The process-oriented educational values held by elderly English learners are in conflict with the efficiency-centered paradigm of AI technology. This study has revealed that 85% of elderly English learners regard «forging friendships with teachers and peers» as a central benefit. They frequently place emphasis on the pleasure derived from the learning process, the establishment of relationships with teachers and classmates, and the personal development they undergo. Moreover, 90,1% of elderly English learners advocate for a «non-time-bound» learning plan, rather than striving for rapid learning results or specific learning objectives as gauged by AI-based assessment tools. The precision and standardization emphasized in AI-based teaching are not the ultimate pursuits of elderly English learners. In fact, elderly English students can even «aestheticize» their mistakes. That is, language errors are transformed into collective humor elements. For example, mistaking «I'm fine» for «I cooked» can trigger discussions about food culture.

Conversely, AI-driven education typically endeavors to optimize learning efficiency and attain pre-determined learning outcomes, thereby overlooking the significance of emotional experiences during the learning journey of elderly English learners. Building upon the research findings, this study endeavors to put forward a hybrid teaching framework. In this framework, artificial intelligence functions as a cognitive scaffold, human educators assume the responsibility of emotion management, and humans and AI collaborate in a co-teaching capacity.

AI-based English learning applications can be employed as aids for vocabulary expansion, grammar practice, and pronunciation correction. For instance, a speech-shaping system can utilize voiceprint analysis to identify specific articulation impairments in elderly learners, such as the weakening of the fricative /s/. Subsequently, it can offer targeted training modules. Elderly English learners can utilize these applications at their own pace to reinforce their basic language skills. AI can also generate data-driven learning recommendations. For example, by collecting circadian rhythm monitoring data from smart watches worn by elderly English learners, it can push key learning content during the students' cognitive peak periods, which are typically between 9-11 am. Furthermore, artificial intelligence can be harnessed to construct a cross-cultural semantic network. It can intelligently associate the English words that elderly English learners are studying with Chinese cultural symbols. For example, when the word «tea» is encountered, it can automatically link to tea-ceremony videos, thereby enhancing the learners' understanding and cultural appreciation.

Human educators are responsible for emotion management : Human educators play a pivotal role in emotion management. Within this framework, the role of teachers will be transformed into that of an «emotion-cognitive coordinator». Teachers are capable of cultivating a positive and inclusive learning milieu. They can offer emotional sustenance and navigate learners through the learning process. For example, they can conduct error-conversion rituals. In a Chongqing-based university for the elderly, teachers guide students to write down grammatical errors on colored paper and then fold them into «wisdom cranes». Here, this metaphorical act symbolizes that learning from mistakes is a path to growth. Moreover, teachers can regularly make annotations in students' paper-based learning logs, thus forging an emotional connection with students that bridges the digital divide.

Teachers can also stimulate social interaction among learners. For instance, they can invite students' families to partake in «Intergenerational Language Days», thereby creating a warm and natural language-learning environment. They can lead students to label the bilingual signs within the community space, establishing language anchors in the physical surroundings and constructing a community language map. During role-playing activities in English classes, teachers not only assist learners in mastering language usage but also encourage them to voice their emotions and thoughts. This approach enhances learners' self-confidence and communication skills, ultimately fostering a more congenial social learning domain.

Within the context of elderly English education, implies that AI-based learning tools need to deliver customized instruction tailored to the unique needs of older English learners, all while being complemented by the emotional support from human counterparts. This proposed framework strongly endorses the synergy between human educators and AI (Chen, 2022). By working in tandem, they can develop a learning model that is not only well-suited for elderly English learners but also capable of rousing their enthusiasm and interest in learning. Moreover, this model is designed to safeguard the emotional well-being of learners and foster positive interactions within the learning environment. The specific modalities of this collaboration are presented in the accompanying figure.

Table 1. How AI and Teachers Work Together for Older English Learners

Teamwork Area	Tech Tools Used	Human Touch	Key Benefit
Learning Speed	Devices track focus levels (eye movement & heart rate)	Teachers plan breaks between study sessions	Matches lessons to older adults' energy levels
Local Culture	Speech tools that understand local accents	Classes using hometown language in English poems	Saves traditional ways of speaking
Feeling Safe	AI waits to correct mistakes if user seems upset	Teachers start/end classes with friendly chats	Makes classroom feel comfortable
Family Connections	AI chat buddies acting like grandchildren	Making photo books with English-Chinese family stories	Helps families share traditions across generations

Conclusion

This study uncovers the central contradiction in elderly English education in the era of artificial intelligence: the dialectical unity between technical efficiency and humanistic value. Through multi-dimensional empirical analysis, the significance of four irreplaceable humanistic aspects has been validated. These aspects, namely social interaction, cultural embeddedness, emotional drive, and process-oriented values, play crucial roles in the English learning process of the elderly. These findings pose a challenge to the technology-centered educational paradigm. They illustrate that although AI simplifies language to a mere tool for information exchange, elderly English learners are, in fact, reconstructing the fundamental value of education.

The study puts forward a mixed-teaching framework for the new era. This framework offers valuable insights for a more balanced integration of technology and humanities in elderly English education. Future research can delve deeper into optimizing the design of AI-based learning tools to better address the emotional and cognitive requirements of elderly learners (UNESCO. Artificial intelligence and education, 2023). Additionally, it can explore effective ways to train teachers to implement the proposed hybrid model successfully.

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Алгоритм преподавания Серебряного английского: когда искусственный интеллект сталкивается с не поддающимися количественному определению образовательными эмоциями

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Аннотация

Появление искусственного интеллекта преобразует все аспекты жизни общества беспрецедентными темпами. В условиях этой технологической революции, в результате старения населения и внедрения модели обучения на протяжении всей жизни, обучение английскому языку для начинающих пожилых людей стало новой областью в сфере образования Китая. Это исследование утверждает, что, хотя искусственный интеллект обладает определенными педагогическими возможностями, он по своей сути остается ограниченным в воспроизведении эмоционального аспекта, который имеет жизненно важное значение в обучении пожилых людей. В ходе совместных наблюдений в трех городских сообществах Пекина, Чунцина и Шэньчжэня были выявлены четыре немаловажных человеческих фактора в обучении английскому языку пожилых людей: 1) мотивация к социальному взаимодействию превосходит систему обратной связи, опосредованную искусственным интеллектом; 2) стратегии обучения, основанные на культурных традициях и использующие региональные языковые ресурсы, такие как поскольку овладение английской фонетикой с использованием просодии диалекта Чунцин является эффективным; 3) эмоциональный стимул к обучению, который выходит за рамки режима участия, основанного на алгоритмах; 4) ценности образования, ориентированные на процесс, вступают в противоречие с технологической парадигмой, ориентированной на эффективность. Результаты этого исследования свидетельствуют в пользу гибридной педагогической системы, в которой искусственный интеллект служит когнитивным каркасом, в то время как педагоги-люди сохраняют за собой роль эмоционального менеджера. Предлагаемая модель подчеркивает три синергетических принципа: техническое посредничество с учетом контекста, адаптация контента с учетом культурных особенностей и дизайн взаимодействия, направленный на защиту интересов. Это исследование способствует сбалансированному обсуждению ценности интеграции технологий и гуманитарного образования в контексте пожилых людей.

Ключевые слова

Преподавание серебряного английского языка, образовательные эмоции, обучение с помощью искусственного интеллекта, педагогика, учитывающая культурные особенности, сотрудничество человека и машины.

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