Full proposal: Using Artificial Intelligence in English Language Teaching: Designing and Evaluating Adaptive Learning Tools to Improve Speaking Proficiency in Senior Learners (50+)

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1. Introduction

The increasing importance of English as a global lingua franca has reinforced the role of English language proficiency as a key competence for participating in social interactions, lifelong learning, and professional engagement. While a considerable body of research has addressed English language teaching (ELT) across various educational stages, senior adults which is defined here as learners aged 50 and above, remain an underrepresented group within applied linguistics research and educational technology development. Despite consistent evidence of the cognitive, psychological, and social benefits associated with second language acquisition in later life (Pfenninger, Festman, & Singleton, 2023; Roehr-Brackin, Loaiza & Pavlekovic, 2023), participation rates among older learners remain low. According to Eurostat (2022), the proportion of EU adults who report knowledge of at least one foreign language declines steadily with age. Among individuals aged 25–34, 84.4% report knowing a foreign language, compared to 77.5% of those aged 35–44, 70.2% of those aged 45–54, and just 65.0% among those aged 55–64. These figures underscore the progressive disengagement from formal or informal language learning with increasing age, and they reinforce the need for pedagogical approaches specifically designed to re-engage senior learners in second language learning.

Meanwhile, the emergence of artificial intelligence (AI) and large language models (LLMs) has introduced new possibilities for the design of adaptive, interactive learning environments. AI-enabled conversational agents, which are capable of generating natural language and offering personalized feedback, have been steadily improving and increasingly integrated into language learning contexts, demonstrating promising results in promoting learner engagement and facilitating autonomous practice (Albadarin et al., 2023; Labadze et al., 2023). However, current research in this area remains primarily focused on younger learners or general adult populations, with minimal attention given to the specific cognitive, motivational, and technological needs of senior learners. At the same time, many AI-based tools lack alignment with established second language acquisition (SLA) theories, often prioritizing technological innovation over pedagogical coherence.

This research seeks to address these limitations through the design and empirical evaluation of the **AI English Teaching Assistant** a theory-informed, AI-powered speaking tutor specifically developed for senior English learners. The application, which is currently in the process of registration in the Comunidad de Madrid by the OTRI of the Complutense

University of Madrid, integrates different AI models for speech recognition and real time conversations. Distinctively, the tool's architecture aims to be grounded in key SLA theories, including:

- **Krashen's Input Hypothesis and Affective Filter Hypothesis**, which guide the provision of comprehensible input and the maintenance of a low-anxiety learning environment;
- **Schmidt's Noticing Hypothesis**, which informs the design of corrective feedback mechanisms that promote learner awareness of linguistic forms;
- **Swain's Output Hypothesis**, which supports the elicitation of spoken production through adaptive prompting strategies;
- **Long's Interaction Hypothesis**, which underpins the simulation of negotiation of meaning through clarification requests and interactive follow-up moves.
- **Bruner's concept of Scaffolding and Vygotsky's Zone of Proximal Development (ZPD)**, which emphasize the importance of contingent support provided within the learner's developmental range. These principles inform the app's design for gradual release of responsibility, enabling learners to build autonomy through appropriately mediated assistance and progressive challenge.

By making an effort to embed these theoretical constructs into the design of the AI English Teacher Assistant, the project aims to explore the extent to which adaptive, AI-mediated speaking practice can push the development of spoken English proficiency in senior learners. The research will investigate not only linguistic outcomes but also learner perceptions, engagement patterns, and the acceptability of AI-based language tools among senior learners.

The significance of this study lies in its potential to contribute to three key areas: (1) the empirical understanding of AI-driven language learning processes within senior learners; (2) the integration of SLA theory into the design of adaptive educational technologies; and (3) the development of pedagogical models that promote inclusivity and accessibility in lifelong language learning. In doing so, the project seeks to bridge the gap between technological

innovation and pedagogical research, offering a strong, theory justified approach to the application of AI in English language education for senior learners.

2. Research Questions

Main Research Question

1 -To what extent can an AI-powered, theory-informed adaptive speaking tool improve spoken English proficiency among senior learners (aged 50 and above)?

2 -How do second language acquisition (SLA) principles manifest within the learning processes and outcomes associated with its use?

Sub-questions

Design and Pedagogical Validity

- To what extent does practice with the AI English Teaching Assistant lead to measurable improvement in specific speaking skills (fluency, accuracy) in older adult learners?
- How does the system's adaptive feedback influence learners' ability to notice, repair, and consolidate linguistic forms?

Cultural and Motivational Factors

- How do motivational, cognitive, and cultural characteristics of older learners affect the adoption, sustained use, and perceived effectiveness of the ai english teacher assistant tool?
- To what degree does the integration of low-anxiety, supportive interaction (aligned with Affective Filter and Scaffolding theories) contribute to learner engagement and confidence in spoken English?

Stakeholder Expectations and User Experience

- What are the perceptions of senior learners and language educators regarding the usability, accessibility, and pedagogical value of the AI English Teacher Assistant?
- What design features are perceived as most helpful or necessary by senior learners and instructors for ensuring effective AI-mediated speaking practice?

3. Linguistic Theories

Krashen's Input Hypothesis and Affective Filter Hypothesis

Stephen Krashen's Input Hypothesis (1985) states that language acquisition happens when learners are exposed to comprehensible input that is slightly beyond their current level of competence (i+1). In parallel, the Affective Filter Hypothesis suggests that emotional variables, such as anxiety, motivation, and self-confidence, mediate the effectiveness of input. A high affective filter can negatively affect language acquisition, while a low affective filter facilitates it. The AI English Teacher Assistant incorporates these principles by adjusting the complexity of responses to the learner's level and maintaining a supportive, low-stress interactional climate through positive reinforcement and diplomatic error correction.

Schmidt's Noticing Hypothesis

Richard Schmidt (1990) emphasizes the role of consciousness and attention in language learning. According to the Noticing Hypothesis, for input to become intake, learners must consciously notice linguistic features. The AI English Teacher Assistant integrates this principle by explicitly highlighting target forms and providing immediate corrective feedback that draws the learner's attention to gaps between their production and the target language.

Swain's Output Hypothesis

Swain (1995) argues that language production itself plays a critical role in acquisition, particularly when learners are pushed to produce language beyond their current level of fluency. This "pushed output" encourages learners to test hypotheses about the language,

notice gaps in their knowledge, and refine their interlanguage. The AI English Teacher Assistant puts this concept into practice by prompting learners to extend their responses, clarify meanings, and reformulate statements.

Long's Interaction Hypothesis

Michael Long's Interaction Hypothesis (1996) proposes that interactional modifications, such as clarification requests, comprehension checks, and negotiation of meaning, promote language development by making input more comprehensible and encouraging active learner participation. Although the AI English Teacher Assistant is not a human interlocutor, its conversational design seeks to emulate these interactional dynamics by asking follow-up questions, prompting elaboration, and simulating negotiation strategies.

Bruner's Scaffolding and Vygotsky's Zone of Proximal Development (ZPD) and Sociocultural Theory

Bruner's concept of scaffolding and Lev Vygotsky's Zone of Proximal Development (ZPD) emphasize the importance of guided support within a learner's developmental range. In this framework, learning occurs most effectively when assistance is provided just beyond the learner's independent ability and gradually withdrawn as competence increases. The AI English Teacher Assistant attempts to integrate these ideas by offering adaptive support based on the learner's performance, facilitating gradual movement toward autonomous language use. Vygotsky's Sociocultural Theory further situates learning as a socially mediated process, which the AI English Teacher Assistant attempts to approximate through structured interaction and guided dialogue.

Language Learning in Older Adults

Recent research in SLA and gerontology (Pfenninger, Festman, & Singleton, 2023) highlights specific challenges and advantages associated with language learning in older adulthood. While implicit learning capacity tends to decline with age, older learners often compensate through well-developed metacognitive strategies, explicit learning preferences, and strong motivational factors. However, heightened anxiety about performance can hinder engagement, underscoring the importance of supportive, low-stress learning environments. Wolfson, Cavanagh, and Kraiger (2014) also emphasize that technology-based instruction for older adults should incorporate well structured

learning paths, adaptive feedback, simple and consistent user interfaces. These findings justify the design of the AI English Teacher assistant as an adaptive, low-anxiety tool that aligns with the cognitive profiles of senior learners.

By adding and integrating these SLA theories into the design of the AI English Teacher Assistant, the project aims to bridge the gap between linguistic research and technological innovation. Each of these principles shoudl inform specific features of the tool, from how it does feedback to scaffolding learner autonomy and promoting low-anxiety interaction. This theory-driven foundation aims to ensure that the AI application is not only technologically advanced but also pedagogically sound. Building upon this SLA-based framework, the next section explores how artificial intelligence can make these principles operational in order to create effective, personalized learning environments for senior English learners.

4. Artificial Intelligence in Language Education

AI Adaptive Systems and Chatbots for ELT

Recent developments in AI and natural language processing, particularly large language models and generative AI, are transforming the landscape of language education. AI chatbots, agents and adaptive systems now offer the possibility of more personalised, and scalable language practice with immediate feedback (Albadarin et al., 2023; Labadze et al., 2023). These tools have been shown to enhance learner engagement, increase opportunities for interaction, and provide consistent exposure to the target language outside traditional classroom settings.

Challenges and Benefits of AI for Senior Learners

Despite the potential of AI technologies, studies focusing on older learners indicate that generic AI-based tools may not fully address the usability, motivational, and accessibility needs of this group. Issues such as interface complexity, lack of cultural sensitivity, and limited adaptive feedback can reduce the effectiveness of AI-mediated learning experiences for seniors. However, when properly designed, AI tools can lower the

affective filter by offering non-judgmental practice environments, flexible pacing, and immediate support—features that align well with the needs of older adult learners.

Role of Personalization and Feedback Mechanisms

One of the key advantages of AI-based language learning systems lies in their capacity for personalization. Adaptive algorithms can tailor input, feedback, and interaction patterns based on learner performance, providing an individualized learning path (Yuen & Schlote, 2024). Feedback mechanisms informed by SLA theories, for example, noticing, scaffolding, output pushing, enhance learning effectiveness by ensuring that correction and support are targeted and pedagogically sound. The AI English Teacher Assistant integrates these capabilities by aligning its conversational behavior with established linguistic principles, offering both corrective and motivational feedback that fosters language development while maintaining learner engagement.

5. Methodology for the research

Type of Study

This research will adopt a **mixed-methods approach**, combining quantitative and qualitative data collection and analysis to provide a comprehensive understanding of the effectiveness, usability, and learner experience associated with the AI English Teaching Assistant (AI English Teacher Assistant. Using a mixed-methods approach will provide deeper insights into learner perceptions, motivation, and interaction with the tool.

Participants

The study will involve **senior learners aged 50 and above**, selected based on the following criteria:

- Learners of English as a foreign language (EFL);
- Minimum A2 level of spoken English proficiency according to the Common European Framework of Reference for Languages (CEFR);

Participants will be recruited mostly from adult language education centres. The target sample size for the quantitative component is **40–60 participants**, divided into an experimental group (using AI English Teacher Assistant) and a control group (receiving traditional, non-adaptive speaking practice). A smaller subsample of approximately 12–15 participants will be selected for the qualitative phase (interviews and focus groups). That will ensure that there is representation across a range of ages, genders, and prior language-learning experiences.

Following McKinley and Rose's (2017) guidance on small-scale applied linguistics research, quantitative data will be analyzed using descriptive statistics for example: means, medians, standard deviations, and simple inferential techniques if they are appropriate for the sample size and distribution. Qualitative data will be subjected to thematic analysis in order to allow for key patterns and categories to emerge naturally from the learners' experiences.

Artificial Intelligence Tools

The experiment will be carried out using the **AI English Teaching Assistant** a web-based application. The AI English Teacher assistant integrates generative AI models for conversational generation, and for speech recognition, providing both oral and written interaction. Crucially, the system's behaviour is guided by a pedagogical approach based on SLA theories, including the Input Hypothesis, Noticing Hypothesis, Output Hypothesis, Interaction Hypothesis, and principles of scaffolding and ZPD.

The AI English Teacher Assistant delivers adaptive, level-appropriate responses, corrective feedback, and prompts designed to encourage extended output and negotiation of meaning. The interface is designed with senior learners in mind, prioritizing simplicity, clarity, and accessibility, for example, large fonts, intuitive navigation, supportive tone.

6. Data Collection

Quantitative Data Collection:

- **Pre-test and post-test speaking assessments** based on CEFR-aligned oral production tasks, scored for fluency, accuracy, complexity, and interactional competence.
- **User logs** from the AI English Teacher Assistant application, capturing frequency of use, length of sessions, number of turns, and types of errors corrected.

Qualitative Data Collection:

- **Surveys** administered to all participants at the end of the experiment, focusing on perceived usefulness, usability, motivation, and engagement.
- **Semi-structured interviews** with a subsample of learners to explore personal experiences, perceptions of feedback, and challenges encountered.
- **Focus groups with language instructors** to gather insights on the pedagogical value, perceived effectiveness, and potential for integration into existing teaching contexts.

7. Ethical Considerations

The study will adhere to the ethical guidelines established by the Complutense University of Madrid and relevant European data protection regulations (GDPR). Key ethical considerations include:

- **Informed consent:** All participants will receive clear, accessible information about the study's purpose, procedures, risks, and benefits. Written consent will be obtained prior to participation.
- **Confidentiality and data privacy:** Participant identities will be anonymized in all data records and publications. Data will be securely stored on password-protected devices and encrypted servers.
- **Right to withdraw:** Participants will be informed of their right to withdraw from the study at any time without penalty.
- **Respect for vulnerable populations:** Given the age group involved, particular attention will be paid to ensuring that participation is fully voluntary and that information is provided in a clear and supportive manner.

This ethical framework seeks to ensure the protection, dignity, and autonomy of all participants while maintaining research integrity.

8. Contribution to Knowledge

The present study aims to generate evidence and theoretical insights by integrating second language acquisition (SLA) research, educational technology, and lifelong learning. By designing, implementing, and evaluating an AI-powered adaptive speaking tool explicitly informed by SLA theory, this research aims to contribute to three key areas of knowledge:

Bridging the Gap Between SLA Theory and AI-Powered Tools for Older Learners

While recent advancements in artificial intelligence have expanded the possibilities for language learning, many AI-based applications remain disconnected from established pedagogical frameworks. This study addresses this gap by embedding core SLA principles including comprehensible input, scaffolding, output promotion, interaction, and noticing into the conversational logic and feedback mechanisms of the AI English Teaching Assistant. The project is expected to demonstrate how linguistic theory can be integrated within adaptive AI systems, offering a model for theory-informed technological design in language education.

Designing and Evaluating an AI Tool for Spoken English Development in Senior Learners

By focusing on the development and empirical evaluation of an AI tool specifically tailored to the cognitive, motivational, and emotional profiles of senior adult learners, this research responds to a significant gap in current educational technology offerings. The study will provide data on the efficacy of adaptive feedback, level-appropriate scaffolding, and interactional strategies in promoting speaking proficiency among learners aged 50 and above. It will also offer evidence on user engagement, perceived usability, and acceptance of AI-mediated language practice in this demographic, contributing practical insights for future tool development.

Promoting Inclusion and Accessibility in Language Education

Senior adults represent an often-overlooked learner profile in both SLA research and EdTech innovation. By focusing on this population, the project aligns with the principles of inclusive education and lifelong learning, as advocated by the European Commission. The findings are expected to inform best practices for designing accessible, supportive, and motivating

learning environments for older learners, helping to reduce barriers to participation and promote equity in language education.

Through these contributions, the study seeks to advance both the theoretical understanding and practical implementation of AI-assisted language learning, with particular attention to underrepresented learner populations.

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