Project Summary for IAL Website

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Project Title:	Developing personalized Chatbots and evaluating their effectiveness as teaching assistants in adult learning
Project Number:	GA20-03
Year of Approval:	2021
Funding Source:	WDARF
Objectives and intended outcomes of the project:	Develop personalized Chatbot platform and design relevant training to equip adult learning educators to tap into new digital tools to support remote/online teaching and learning via effective use of Chatbot
Project Team	
Principal Investigator:	Dr Miao Huang

Summary of Project (up to 300 words)

Chatbots are conversational interfaces that answer questions and guide users to perform simple tasks, which have become our daily virtual assistants, capable of conversing, forming user-oriented responses, and retrieving information from search engines or curated databases. The project aims to use Chatbots to enhance the adult learning experiences, especially for remote or online courses, or a fast-paced upskill/reskill CET programs.

By creating an AI-based teaching assistant using a Chatbot, it will enable tutors to provide adult learners with individualized learning experiences and pathways. Chatbots will be able to access learning analytics data of learners to provide customized content based on their needs. For instance, the Chatbot identifies areas where academically slow-advancing CET learners require more assistance and refers them to more appropriate and relevant resources. The instantaneous and efficient communication allows the learner to ask questions, seek clarifications, and assistance without being judged for the volume or content of their inquiries. The Chatbot can also contain assessment or assignment information to help learners to prioritize their time.

A protocol is being developed for tutors to curate and validate a list of questions, suitable learning resources, and diagnose learning needs in order to program their Chatbots to provide personalized feedback and individualized coaching. Tutors with various levels of expertise in Infocomm technology readiness will participate in this study by developing subject-specific Chatbots and implementing them for their adult learners.

Perceptions from both tutors and learners would be gathered to draw insights on various factors that affect the benefits, as well as the major challenges of using Chatbots as the conversational pedagogical agent to support the attainment of learning outcomes for the adults.

Summary of Project Findings, Deliverables and Impacts (up to 500 words)

Project Overview

This research project developed and evaluated personalised AI chatbots as teaching assistants for adult learners in Continuous Education & Training (CET) programmes at Temasek Polytechnic. Two chatbots were developed: SOMABot for Social and Media Analytics and AiLin for Airline Management.

Key Findings

The study revealed that adult learners face unique challenges when adopting educational chatbots. Usage rates varied significantly between subjects. The majority of AiLin users were classified as "Explorers" who actively investigated multiple chatbot features, reflecting adult learners' self-directed nature.

Critical barriers to adoption included lack of familiarity with chatbot capabilities, unrealistic expectations about AI functionality, and preference for human tutors over automated assistance. However, learners appreciated specific features including curated learning menus, personalised feedback through "report cards," and 24/7 availability for immediate query resolution.

The research identified that successful chatbot implementation requires structured introduction and clear purpose definition. Adult learners particularly valued troubleshooting support and project-specific guidance over general knowledge delivery.

A significant outcome of the project was the development of Three-Stage Chatbot Design Model, a comprehensive design framework comprising:

1. Initiate the Access - Building awareness and lowering barriers to chatbot usage
2. Springboard the Learning - Active learning strategies to demonstrate chatbot effectiveness
3. Differentiate for Autonomy - Supporting self-regulated learning through personalised features

Deliverables Achieved

- Two fully functional AI chatbots deployed in CET courses
- Comprehensive learning analytics dashboard for educators
- No-code chatbot builder toolkit for non-technical staff
- Two invention disclosures for the educational chatbot framework
- More than 9 conference papers, 1 peer-reviewed journal article

Impact and Implications

The project demonstrated that whilst educational chatbots show promise for adult learning, successful implementation requires careful consideration of learner expectations and structured introduction processes. The personalised learning pathways and real-time feedback mechanisms proved valuable for supporting self-regulated learning amongst adult learners with diverse backgrounds and time constraints. Subject leaders reported positive return on investment, noting reduced repetitive queries and enhanced ability to provide personalised support through learning analytics. The chatbots particularly benefited learners studying during off-hours when human support was unavailable.

The research highlighted opportunities for integrating emerging AI tools to enhance chatbot intelligence and reduce development time. The design model also provides a foundation for broader implementation across adult education programmes, with recommendations for adoption of other digital technologies to enhance teaching and learning. This pioneering work establishes a framework for effective educational chatbot implementation in adult learning contexts, addressing the unique needs and challenges of CET learners whilst providing practical guidance for educators and institutions.