ID 15: PANDASPEAK: Human–AI Mobile Assisted Language Learning Application

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Highlights: PANDASPEAK is a human–AI mobile-assisted language learning application designed to address limited Chinese language speaking practice, delayed feedback, and low engagement among international learners of Chinese language. Innovation integrates generative AI-assisted speaking feedback, teacher facilitation, gamification, and authentic communication tasks within a PANDASPEAK-based virtual station rotation model. Building on an implemented PANDASPEAK blended-learning intervention, the PANDASPEAK supports continuous practice inside and outside the classroom. The foundational intervention produced meaningful improvements in learner motivation, engagement, participation, and spoken Chinese performance.

Keywords: Human–AI synergy; mobile-assisted language learning; PANDASPEAK; virtual station rotation; gamification; Chinese language

Introduction

International learners of Chinese frequently encounter difficulties with pronunciation, tones, fluency, vocabulary use, and participation in authentic communication. These challenges cannot be sufficiently addressed through occasional classroom speaking activities alone. Learners require deliberate practice, timely feedback, opportunities for social interaction, and structured support beyond scheduled class time. Although digital platforms make learning resources widely accessible, access alone does not ensure meaningful engagement; students often consume messages or download materials without actively practicing the target language. Concurrently, instructors struggle to provide continuous, individualized feedback especially when managing multiple voice recordings from each student.

To address these gaps, PANDASPEAK was designed as a structured mobile-assisted language learning (MALL) application rather than a conventional language drill app. Its pedagogical design is grounded in the Community of Inquiry (CoI) framework, integrating gamification principles, generative AI, and the station rotation model to support authentic, task-based cultural learning. Within this ecosystem, a generative-AI-assisted speaking layer provides real-time task feedback and a low-anxiety space for students to practice free from peer judgment, while instructors retain oversight for pedagogical decisions, feedback validation, and summative assessment.

Objectives

The innovation has five objectives:

- To increase international learners' opportunities to practice spoken Chinese inside and outside the classroom.
- To provide timely Generative AI-assisted feedback on pronunciation, tones, fluency, vocabulary, and task completion.
- To strengthen teaching, cognitive, and social presence within a PANDASPEAK-supported blended learning environment.
- To improve learner motivation, behavioural engagement, and confidence in authentic Chinese communication.
- To provide teachers with learning analytics that support targeted intervention and personalized teaching.

NALI Approach

Novelty

This innovation transforms PANDASPEAK from an informal learning tool into a structured mobile language learning ecosystem driven by human and artificial intelligence synergy. Unlike the conventional use of the platform, where instructors primarily broadcast materials and answer ad-hoc queries, PANDASPEAK scaffolds learning across four interconnected virtual stations: AI Speaking Coach, Gamification Interaction, Teacher Facilitation, and Real-World Challenge. Furthermore, the framework operationalizes the three core dimensions of the Community of Inquiry model through distinct pedagogical and technical

layers: generative artificial intelligence diagnostic feedback drives cognitive presence, targeted instructor intervention reinforces teaching presence, and gamified social interaction sustains social presence.

Creativity
Learners complete structured learning tasks and quests as they navigate the four virtual stations. Each learning cycle is anchored in an authentic communicative challenge, such as introducing oneself, planning a day tour, ordering food, asking for directions, or explaining a cultural tradition. To begin, students record an initial spoken response to generate an automated feedback report. They then refine their output through peer dialogue, targeted instructor guidance, and a culminating real-world performance task. Finally, learners compare their baseline and final recordings, submitting a concise reflection that justifies which suggestions they adopted, adapted, or dismissed. This iterative workflow trains learners to critically interrogate automated feedback rather than adopt it uncritically.

Innovativeness
PANDASPEAK incorporates gamified principles while keeping instructors in the loop. While generative artificial intelligence delivers immediate preliminary diagnostics, the instructor verifies critical pronunciation, pragmatic nuances, and cultural elements prior to summative assessment. This division of labor reduces repetitive evaluation workloads while preserving instructional quality. Instructors can create classes, assign targeted coursework to inactive learners, and monitor cohort leaderboards. Furthermore, PANDASPEAK leverages core game mechanics, including points, progression levels, achievement badges, and competitive leaderboards, to sustain engagement during independent practice. Learners experiencing pronunciation difficulties receive targeted phonetic tasks, whereas students demonstrate strong linguistic accuracy alongside constrained fluency advance to extended interactive communicative challenges.

Applicability
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Innovation Description, Process and Implementation

PANDASPEAK was engineered using the ADDIE framework: Analysis, Design, Development, Implementation, and Evaluation. During the analysis phase, learner needs were assessed across five key dimensions: mobile accessibility, speaking opportunities, teacher feedback mechanisms, peer interaction dynamics, and Chinese language resources. During the design phase, the Community of Inquiry framework, gamification principles, multimedia learning theory, and the virtual station rotation model were synthesized to align technological affordances with cognitive, teaching, and social presence. During the development phase, communicative channels, multimedia assets, asynchronous voice messaging, diagnostic quizzes, collaborative discussions, and learning quests were integrated into a unified instructional workflow. Within these quests, an artificial-intelligence speaking support engine generates automated transcripts, preliminary pronunciation diagnostics, fluency metrics, contextual vocabulary recommendations, and adaptive follow-up tasks.

Each instructional cycle proceeds through six structured stages:

1. Orientation: The instructor introduces the communicative objective and authentic real-world scenario.
2. Baseline Submission: The student records and submits an initial audio or video response.
3. Automated Diagnostic: The artificial intelligence engine generates a preliminary diagnostic report and recommends targeted practice.
4. Peer Collaboration: Students engage in peer dialogue, role-play activities, or collaborative problem-solving within PANDASPEAK.
5. Instructor Scaffolding: The instructor reviews aggregate cohort errors, validates machine feedback, and delivers targeted intervention.

6. Performance & Reflection: Students execute a culminating authentic task and submit a comparative reflection evaluating their progress.

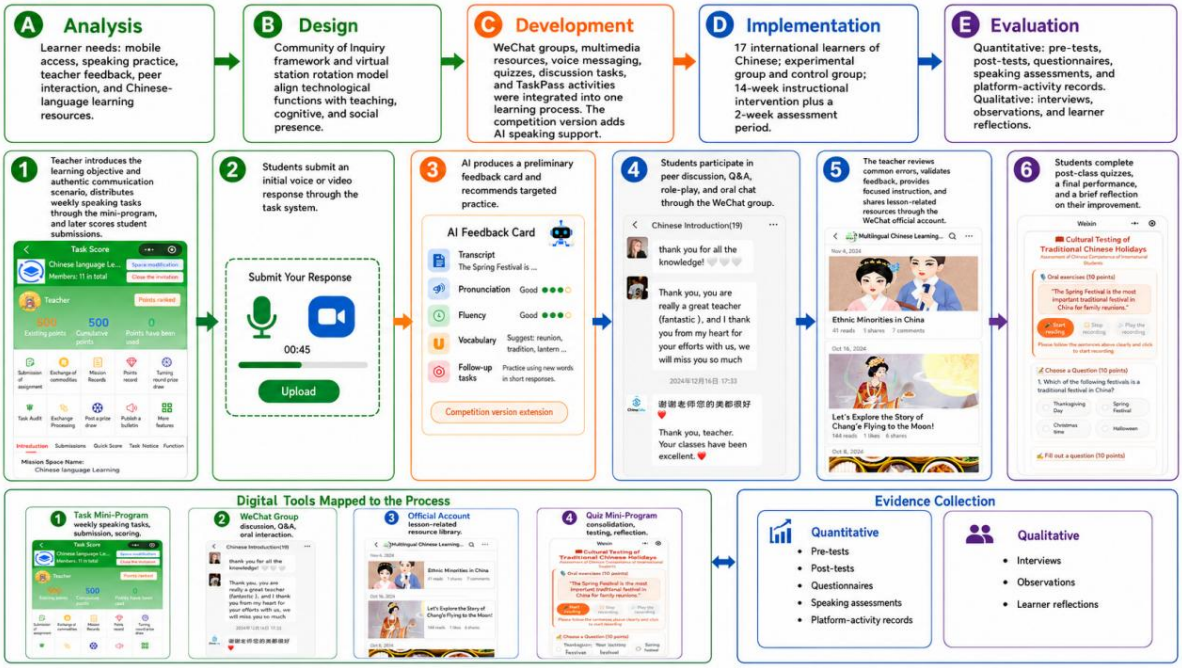


Figure 1: The PANDASPEAK-supported learning cycle (MALL) and platform functions

Figure 1 shows the foundational study involved 17 international learners of Chinese divided into an experimental group and a control group. The implementation comprised a 14-week instructional intervention followed by a two-week assessment period. Quantitative evidence was collected through pre-tests, post-tests, questionnaires, speaking assessments, and platform-activity records. Qualitative evidence was collected through interviews, observations, and learner reflections..

Key Findings

T The foundational PANDASPEAK-supported intervention produced improvements in motivation, engagement, platform participation, and speaking performance. The experimental group's motivation score increased from 3.63 to 4.15, while its engagement score increased from 3.62 to 4.10. The frequency of PANDASPEAK learning platform use increased from 3.55 to 4.10. The reported differences between the experimental and control conditions were statistically significant. Spoken Chinese performance in the experimental group increased from an average pre-test score of 68.8 to a post-test score of 85.5, representing an improvement of 16.7 points. The control group improved from 67.4 to 74.6. The reported between-group effect size for speaking performance was large. Activity records also indicated that learners in the experimental group spent more time engaging with learning materials, submitted more messages, and participated more frequently in spoken interaction than learners receiving conventional instruction. These results provide empirical support for the PANDASPEAK-based pedagogical foundation. A separate pilot evaluation will be conducted to determine the additional contribution of the AI-assisted feedback layer (see Table 1).

Table 1: Descriptive statistics and between-group comparisons for trial outcomes

Outcome	PANDASPEAK-supported M (SD)	Comparison M (SD)	Welch's t(df)		p	Hedges' g
Motivation, pre-test	3.63 (0.52)	3.57 (0.56)	0.23 (14.96)	.822	0.11	3.63 (0.52)
Motivation, post-test	4.15 (0.50)	3.79 (0.43)	1.58 (13.95)	.136	0.74	4.15 (0.50)
Engagement, pre-test	3.62 (0.51)	3.56 (0.49)	0.25 (14.60)	.809	0.11	3.62 (0.51)
Engagement, post-test	4.10 (0.44)	3.80 (0.41)	1.45 (14.45)	.169	0.67	4.10 (0.44)
Oral Chinese, pre-test	68.75 (4.30)	67.44 (2.30)	0.77 (10.42)	.459	0.37	68.75 (4.30)

Outcome	PANDASPEAK-supported M (SD)	Comparison M (SD)	Welch's t(df)		p	Hedges' g
Oral Chinese, post-test	85.50 (3.89)	74.56 (2.51)	6.80 (11.73)	< .001	3.22	85.50 (3.89)

Impact

For students, the environment increases opportunities for low-risk speaking practice and provides feedback before learners participate in more demanding real-time communication. The combination of asynchronous voice recording and synchronous interaction may reduce speaking anxiety while developing confidence and communicative competence.

For teachers, the AI-assisted layer reduces time spent on repetitive preliminary feedback and provides evidence for identifying learners who require targeted support. Teachers can therefore devote more time to complex language use, cultural appropriateness, interaction management, and personalized guidance.

For institutions, the model offers a relatively low-cost approach to extending classroom instruction without requiring a separate large-scale learning-management system. It also supports institutional goals related to digital learning, international education, learner-centered instruction, and responsible AI use.

Recommendations for Classroom Practice

Teachers should begin with clearly defined communication outcomes rather than introducing PANDASPEAK functions without a pedagogical purpose. Each online task should connect directly to an in-class activity or authentic communication performance.

AI feedback should be treated as formative rather than authoritative. Teachers should explain that speech recognition and generated feedback may contain errors, particularly when analyzing accents, tones, cultural meanings, or pragmatic language use.

Students should be required to document how they respond to AI feedback. A short reflection such as "accepted, rejected, or modified" can help learners develop AI literacy and avoid passive dependence.

For large classes, teachers may group learners according to common difficulties and provide targeted mini lessons. Peer assessment rubrics can also be used to increase interaction while maintaining manageable teacher workload.

Other Relevant Information

The project has potential for development as a PANDASPEAK Mini Program containing reusable speaking-task templates, AI feedback cards, learner portfolios, teacher analytics, and multilingual support. Future development will focus on improving speech-feedback accuracy, strengthening data privacy, designing teacher-control settings, and testing the model with larger and more diverse groups of international Chinese-language learners.

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