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TRANSFORMING EDUCATION, DRIVING INNOVATION AND
ADVANCING LIFELONG LEARNING FOR EMPOWERED WORLD

LINGUABRIDGE – ACADEMIC DIGITAL SCAFFOLD

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ABSTRACT

LinguaBridge is an innovative AI-enabled digital platform designed to enhance academic literacy among TESL (Teaching English as a Second Language) students. Integrating advanced natural language processing (NLP), adaptive learning algorithms, and collaborative tools, LinguaBridge effectively addresses the challenges TESL students face when navigating complex academic texts. Its key features include NLP-driven text simplification, contextual cues, dynamic glossaries, multimodal learning supports (videos, podcasts), spaced repetition quizzes, and real-time analytics. Preliminary pilot studies demonstrate that learners using LinguaBridge significantly improved reading comprehension scores (an average increase of 15%) and vocabulary retention (up to 20 percentage points higher) compared to traditional study methods. Remarkably, study time was reduced by 30–50%, enhancing learning efficiency. Furthermore, LinguaBridge promotes global teaching readiness by offering region-specific teaching examples and recommending targeted, high-impact ELT resources. The platform uniquely employs a hybrid AI-human scaffold approach, combining cognitive, social, and pedagogical support, fostering deeper comprehension and engagement. Overall, LinguaBridge represents a transformative approach to TESL teacher education, effectively bridging the gap between theory, practice, and cultural adaptability.

Keywords: TESL education, Adaptive learning, Natural Language Processing (NLP), Reading engagement, Cognitive load reduction.

INTRODUCTION

Navigating complex academic texts is a well-known challenge for students training to teach English as a Second Language (TESL). These students—often non-native English speakers—must grapple with dense theoretical literature and research papers to develop their pedagogical skills. Prior studies highlight that language learners and even trainee teachers can feel overwhelmed by specialised vocabulary and intricate syntax in academic readings (Johnson & Wang, 2020). There is a pressing

need for tools that bridge this academic literacy gap and prepare TESL students for global teaching contexts, including both English as a Second Language (ESL) and English as a Foreign Language (EFL) environment (Stein & Graham, 2021). **LinguaBridge** is an AI-enabled digital platform designed to address this need by providing an academic scaffold that helps TESL students comprehend and engage with complex texts more effectively. Blending natural language processing with pedagogical strategies, LinguaBridge offers adaptive support that simplifies reading while preserving content, aiming to enhance comprehension, retention, and overall learning efficiency (Wang, Liu, & Zhang, 2023).

This extended abstract presents the LinguaBridge platform and reports on preliminary evaluation results from pilot studies. We describe the platform's key features—including text simplification, contextual learning aids, and collaborative tools—grounded in current educational technology research (Smith & Reinders, 2021; Li & Dede, 2022). We also discuss how LinguaBridge targets global teaching readiness by addressing ESL/EFL contextual differences and by recommending high-impact English Language Teaching (ELT) resources. Early results demonstrate significant gains in reading comprehension and vocabulary retention, alongside substantial reductions in study time, highlighting the promise of this hybrid AI-human approach to teacher education.

METHODS

Pilot Implementation and Evaluation Design

We conducted two complementary pilot studies to evaluate LinguaBridge's effectiveness, employing both between-subject and within-subject designs to triangulate findings.

Study 1: Comparative Assessment (N=30)

The first study employed a controlled experimental design with 30 TESL undergraduates randomly assigned to either an experimental group (using LinguaBridge) or a control group (using traditional study methods). Participants were matched for English proficiency, prior academic performance, and demographic factors to minimise confounding variables. Over a 4-week period, both groups studied identical research articles on TESL methodologies, with the experimental group accessing content through the LinguaBridge platform while the control group used conventional reading approaches.

Assessment measures included:

- Pre- and post-intervention reading comprehension tests using validated instruments
- Vocabulary acquisition assessments with immediate and delayed (1-week) testing
- Time-tracking logs for all study activities
- Engagement surveys adapted from established educational engagement scales

Study 2: Experience Evaluation (N=15)

The second study employed a within-subject crossover design where 15 TESL graduate students alternated between LinguaBridge and traditional reading methods for different texts. This approach allowed participants to directly compare their experiences with each method while controlling for individual differences in reading ability and learning preferences.

Data collection included:

- Comparative surveys addressing perceived comprehension, effort, enjoyment, and usefulness
- Semi-structured interviews exploring user experiences in depth
- Think-aloud protocols during reading sessions
- Feature utilisation tracking to identify most valued platform elements
- Qualitative feedback on potential improvements and feature requests

Both studies incorporated rigorous controls for text difficulty, topic familiarity, and time constraints to ensure valid comparisons. Ethical approval was obtained from the institutional review board, and all participants provided informed consent with the option to withdraw at any point without consequence.

RESULTS AND DISCUSSION

Improved Comprehension and Retention

The pilot studies yielded encouraging results. Students using LinguaBridge demonstrated significantly higher comprehension scores compared to those in the control group ($p < 0.05$). On average, the LinguaBridge group scored about 15 points higher (out of 100) on reading comprehension tests than the control group, an improvement of over 20%. Vocabulary post-tests one week after study showed the LinguaBridge users could recall approximately 80% of new terms, versus 60% in the control, indicating a substantial boost in retention. These findings align with prior research that AI-mediated scaffolding can enhance language learning outcomes (Wang, Liu, & Zhang, 2023; Li & Dede, 2022). By simplifying complex text and providing just-in-time explanations, the platform likely lowered the cognitive barriers to understanding, allowing learners to focus on core ideas (Johnson & Wang, 2020). Additionally, the spaced repetition practice contributed to better memory consolidation of terminology, as expected from established benefits of spaced learning (Smith & Reinders, 2021).

Time Efficiency

One of the most notable results was the reduction in study time. Participants reported needing fewer hours to complete their readings when using LinguaBridge. Log data confirmed a **30–50% reduction** in total study time for the experimental group compared to the control group to achieve similar or better mastery of the material. For busy TESL students, this efficiency gain can be transformative – it means

they can cover more material in the same time or allocate saved time to other activities. The platform's features such as quick-access glossaries and summarisation of key points helped streamline the learning process without sacrificing depth. Table 1 summarises key quantitative outcomes from the pilot comparison, comparing Preliminary Pilot Results Comparing Traditional Reading vs. LinguaBridge.

Table 1.: Preliminary Pilot Results Comparing Traditional Reading vs. LinguaBridge

Metric	Traditional Reading	With LinguaBridge	Improvement
Reading Comprehension Score (0–100)	70 (average)	85 (average)	+15 points (+21%)
Vocabulary Retention (after 1 week)	60% of terms	80% of terms	+20 percentage points
Study Time per Week (hours)	10 hours	6 hours	–4 hours (–40%)

The qualitative feedback from students further illustrates the platform's impact. Many participants highlighted the dynamic glossaries and contextual videos as particularly useful for clarifying difficult concepts. They also appreciated the real-time annotation and discussion features, which made them feel less isolated when tackling challenging readings. This sense of peer support and instructor presence (even if virtual) addresses the social dimension of learning. As noted by Stein and Graham (2021), effective scaffolding often requires not just cognitive aids but also social and emotional support, which LinguaBridge's community features help provide.

Global Readiness and ESL/EFL Contexts

LinguaBridge was intentionally designed to prepare TESL trainees for diverse classroom environments. The platform tailors examples and case studies within the reading content to the user's regional context. For instance, a discussion of an English idiom in an article might be accompanied by a note explaining how that idiom could be taught differently in an ESL context (where students are immersed in English daily) versus an EFL context (where exposure to English outside class is limited). By providing these nuanced, region-specific annotations, the platform alerts future teachers to adjust their teaching strategies to local needs – a skill essential for global teaching readiness (Stein & Graham, 2021). Furthermore, LinguaBridge's resource recommendation engine suggests high-impact ELT resources (such as seminal papers, teaching guides, or proven classroom activities) relevant to the topics students are reading. This not only enriches their understanding but also familiarises them with go-to resources used by the international ELT community, thus bridging the gap between theory and practice.

Hybrid AI-Human Scaffolding

A distinctive aspect of LinguaBridge is how it merges automated support with human guidance. While the AI components handle instant simplifications, quick feedback, and data-driven adaptivity, human instructors or mentors remain in the loop. During the pilots, an instructor moderated the online discussion board and intervened when students had deeper pedagogical questions or needed reassurance. This hybrid model reflects a growing consensus that AI in education works best when augmenting, not replacing, human teachers (Li & Dede, 2022). The cognitive scaffolding provided by the AI (e.g., breaking down complex text) is reinforced by social scaffolding (peer discussion and mentor encouragement) and pedagogical scaffolding (expert guidance aligning with course outcomes). Such a multi-faceted support system can cater to learners' academic and emotional needs more holistically than either AI or human support alone.

CONCLUSION

LinguaBridge illustrates how an AI-enabled platform can serve as a powerful academic scaffold for TESL students, blending technology with pedagogy to overcome longstanding challenges in language teacher education. The introduction of adaptive text simplification, contextual glossaries, multimodal resources, and collaborative tools into the reading process enables deeper comprehension and more efficient learning. Preliminary results from pilot studies are promising and users of LinguaBridge achieved better understanding of complex texts, retained new vocabulary at higher rates, and saved considerable study time. These improvements not only enhance individual learning outcomes but also have broader implications – future English teachers who are more confident with academic content will be better equipped to translate theory into practice in their own classrooms.

The platform's design addresses both cognitive and practical aspects of teacher training. By accommodating ESL/EFL differences and providing exposure to global ELT resources, LinguaBridge helps prepare well-rounded, globally aware educators. At the same time, its hybrid AI-human support model ensures that the human element of mentorship and community is preserved, aligning with best practices in educational technology integration (Li & Dede, 2022).

While this work demonstrates clear benefits, ongoing research will seek to expand the platform's capabilities and validate its effectiveness on a larger scale. Future studies will involve more diverse participant groups, longer intervention periods, and an examination of how LinguaBridge usage translates into improved teaching performance during practicum or in-service training. Additionally, user feedback will guide new features – for example, integrating more interactive elements like quiz games or an AI chatbot to answer content questions.

In conclusion, LinguaBridge represents a step toward a new paradigm of technology-enhanced teacher education. By providing comprehensive scaffolding for academic literacy, it empowers TESL students to become more efficient learners and, ultimately, more effective English teachers in a global context. The convergence of AI and human support in this platform exemplifies a balanced approach to innovation in education, one that could be extended to other domains facing similar challenges.

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