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Bridging the Digital Divide: Scaffolding Postgraduate Academic English Proficiency Through AI-Powered Adaptive Learning Platforms

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INTRODUCTION & AIM

1 Background & Research Gap

Traditional postgraduate EAP instruction faces critical challenges:

* Large class sizes — individualized feedback is impractical
* Heterogeneous disciplinary discourse needs across faculties
* Heavy instructor workload leading to generic, delayed feedback

AI-driven adaptive platforms offer scalable, personalized instruction via NLP. Yet empirical studies on AI-enhanced EAP for high-level, heterogeneous postgraduate learners remain scarce, especially those combining mixed methods with clear pedagogical integration frameworks.

2 Research Questions

RQ1 Does the AI adaptive platform significantly improve academic writing & speaking proficiency?

RQ2 How does the platform affect learning engagement, anxiety, and metacognitive strategy use?

RQ3 How can a 'Teacher-AI-Student' collaborative model ensure effective and equitable learning?

3 Theoretical Framework

Vygotsky's Sociocultural Theory
Zone of Proximal Development + Scaffolding + Mediation
AI Platform = Digital Mediational Tool
The platform bridges learners' actual and potential development levels: it provides rule-based scaffolding (lexical hints, syntactic suggestions, citation formatting), while teachers deliver higher-order metacognitive guidance and affective support — tasks AI cannot replicate.

METHOD

Design	Exploratory sequential mixed-methods | 16-week semester
Sample	N = 85 Master's & PhD students (4 faculties, non-English major)
Platform	NLP-integrated: Intelligent Writing Assistant + Simulated Speaking Tasks + Adaptive Learning Path
Quant	Standardized pre/post-test (100-pt, 4 subscales) + platform log analytics
Qual	15 semi-structured interviews (stratified by gain) + weekly teacher reflection journal
Analysis	SPSS: paired t-test, multiple regression, ANOVA | Qualitative: thematic coding

RESULTS & DISCUSSION

5 Quantitative Findings

Overall Score Gain **Pre 70.3 -> Post 78.6** t(84)=7.89 p<.001 d=0.85	Text Organization **+4.5 pts (Largest Gain)** Writing | p < .01
Lexical Richness **+4.1 pts** Writing | p < .01	Speaking Fluency & Vocab **Significant Improvement** p < .05

Strongest Predictors of Writing Improvement:
Vocab/Syntax Feedback Freq. beta=.32 (p<.01) |
Iterative Revisions beta=.41 (p<.001)

Digital Divide [ANOVA F(2,82)=5.24 p<.01]
Low-proficiency group: +5.8 pts vs. High-proficiency group: +11.2 pts

6 Qualitative Themes

Empowerment & Anxiety Reduction

> "Practicing with the platform feels like a safe environment -- it tells me immediately when I am wrong and I can try again right away."

Passive Reception -> Active Exploration

> "I started questioning why a revision was better, and noticed connective usage in literature. My metacognitive awareness genuinely grew."

Craving Warm Mediation Amidst Cold Feedback

> "AI feedback is sometimes mechanical and decontextualised. Teacher guidance on disciplinary content remains irreplaceable."

7 Three-Tier Collaborative Scaffolding Model

AI Tier	Foundational / Immediate	Grammar, vocabulary, pronunciation, citation format Instant rule-based feedback at scale -- frees instructor capacity
Peer Tier	Social / Negotiated	Online forums & peer-review activities Idea exchange, content negotiation, observational learning
Teacher Tier	High-Order / Diagnostic	Learning designer & cognitive coach Disciplinary depth, critical thinking, digital feedback literacy

CONCLUSION

This semester's research verifies AI adaptive learning platforms are effective yet limited aids for postgraduate EAP teaching. AI boosts teaching efficiency and accuracy, while human teachers dominate in cognitive guidance, emotional care and learning motivation. Instructors need digital teaching skills to integrate AI into courses. Curriculum designers should clarify human-AI roles and optimize platform functions. Future research may conduct long-term tracking studies and discipline-specific AI feedback exploration. Technology complements rather than replaces teachers to support postgraduates' academic development.

FUTURE WORK / REFERENCES

Long-term longitudinal research is suggested to examine how the AI-enabled EAP learning model affects postgraduates' academic outcomes including paper publications and conference participation. Further studies can also explore the development of discipline-tailored AI feedback models for diversified academic groups.