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Engineering English through ICT Integration: A TPACK-Based Approach for Language Learning Enhancement

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Abstract

Information and Communication Technology (ICT) has gradually reshaped English language teaching by making classroom practices more interactive and learner-centred in higher education. In engineering education, this shift has created new opportunities to enhance students' language learning experience and encourage more active classroom engagement. This study is framed within the Technological Pedagogical Content Knowledge (TPACK) framework, which helps explain how ICT is integrated into engineering English classrooms and how it supports language learning through the combined influence of technology, pedagogy, and subject knowledge. A quantitative survey design was adopted, and data were collected from 86 engineering students using a structured Likert-scale questionnaire in selected higher educational institutions in India. The responses were analysed using IBM SPSS and Microsoft Excel. The findings suggest that ICT integration improves student engagement, provides better access to learning resources, and supports the gradual development of English language skills among engineering students in higher education.

Keywords: *Engineering English; ICT Integration; Language Learning; Technology-Enhanced Learning; TPACK Framework*

1. INTRODUCTION

Information and Communication Technology (ICT) has gradually reshaped English language teaching in higher education, encouraging more interactive and learner-centred classroom practices. Yet, the presence of technology alone does not ensure meaningful pedagogical change. In many cases, digital tools are simply added to traditional teaching methods without significantly altering instructional

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design, which limits their transformative potential. A range of technologies, such as mobile-assisted language learning (MALL), learning management systems (LMS), artificial intelligence (AI)-based applications, and multimedia resources, is now commonly used in English language classrooms. These tools are often linked with improved learner autonomy, wider access to authentic language input, and more flexible learning opportunities (Godwin-Jones, 2021; Stockwell, 2021; Hwang & Fu, 2021). However, their real impact depends less on their presence and more on how thoughtfully they are integrated into pedagogy. While earlier studies report benefits such as increased motivation, engagement, and self-directed learning, the findings are not always consistent, and many do not clearly explain how these outcomes are achieved in actual classroom practice (Li & Lalani, 2021; Wang & Derakhshan, 2022).

The Technological Pedagogical Content Knowledge (TPACK) framework helps address this gap by explaining effective teaching as the integration of technological, pedagogical, and content knowledge rather than isolated components (Mishra & Koehler, 2006; Koehler et al., 2013). In engineering education, English proficiency is essential for both academic success and professional communication. ICT-supported and blended learning environments provide valuable opportunities for strengthening language learning; however, their effectiveness continues to depend on teaching design and classroom implementation (Gao et al., 2022; Reinders & Hubbard, 2021). Despite increasing attention to digital pedagogy, there is still limited empirical research applying the TPACK framework in engineering English classrooms, particularly within the Indian higher education context. This gap highlights the need for closer investigation of how ICT integration actually shapes language learning outcomes in practice.

1.1. Research Objective

The study is guided by the following objectives:

1. The study examines how ICT is being used and practiced in English language learning among first-year engineering students.
2. The influence of technology-supported learning environments on student engagement and English language development is assessed.
3. Students' views on ICT-supported instruction and its role in improving their English language learning experience are explored.

Based on these objectives, the study addresses the following research questions:

RQ1: **How is ICT integrated into English language learning practices among tertiary-level engineering students?**

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RQ2: To what extent do ICT-supported learning environments contribute to student engagement and English language development in engineering education?

RQ3: How do engineering students perceive the effectiveness of ICT-supported instruction in enhancing their English language learning experiences?

1.2. Novelty of the Study

This study examines ICT integration in engineering English classrooms through the TPACK framework, set within the context of Indian higher education. The focus is not limited to the general benefits of digital tools. Instead, attention is given to how these tools are actually embedded in classroom practice alongside teaching strategies and subject knowledge. In real teaching situations, the interaction between technology, pedagogy, and content is considered more important than technology alone. For this reason, the study shifts away from viewing ICT as a standalone support tool. Greater emphasis is placed on students' learning experiences. In particular, the study explores how ICT influences their engagement in classroom activities and supports their language development over time. A practice-based perspective is adopted, highlighting how ICT functions in everyday teaching and learning. This aspect remains relatively less explored in existing research, especially in engineering English education within the Indian higher education setting.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The TPACK framework developed by Mishra and Koehler (2006) explains teaching as a process that emerges from the interaction of technology, pedagogy, and content knowledge rather than from these elements working in isolation. In language education, this framework has become widely used because it helps clarify how digital tools shape both classroom practices and teachers' instructional decisions (Zhang et al., 2023; Abbasi et al., 2025).

Technological Knowledge (TK) refers to teachers' ability to select and use digital tools such as learning management systems, mobile applications, artificial intelligence platforms, and multimedia resources. These tools are often associated with improved access to learning materials and greater exposure to varied language input (Liu, 2025). However, in many classrooms, technology is still used mainly for content delivery, which limits its role in transforming teaching practices (Zhang et al., 2023).

Pedagogical Knowledge (PK) involves instructional methods such as collaborative learning, task-based activities, communicative approaches, and blended learning. Although ICT is generally linked to higher student participation and learner independence (Alvunger, 2018), classroom practices often remain unchanged, as traditional teaching methods continue even after technology is introduced (Abbasi et al., 2025).

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Content Knowledge (CK) in engineering English includes technical vocabulary, academic writing skills, and discipline-specific communication. ICT supports this area by simplifying complex concepts through multimedia tools, visualisation, and AI-assisted learning environments (Liu, 2025). However, meaningful understanding depends on how effectively these tools are integrated with pedagogy.

Existing research shows that ICT can improve language learning by increasing access, personalising instruction, and responding to learner differences (Yang, 2025; Tolstykh & Oshchepkova, 2024). Multimedia resources also enhance motivation and provide more contextual learning experiences (Alzubi et al., 2025; Bower et al., 2024). At the same time, findings are inconsistent. When pedagogy does not change alongside technology use, learning gains tend to remain limited (Zhang et al., 2023). Similar issues appear in studies on automated feedback tools, where improvements in accuracy do not always lead to deeper learning without teacher support (Wang, 2023). Teachers are now expected to take on a more facilitative role by guiding learning and designing classroom experiences (Mouta et al., 2025). However, limited training and institutional constraints often affect effective implementation (Abbasi et al., 2025). Overall, successful ICT integration depends on a balanced development of technological, pedagogical, and content knowledge.

2.2. Research Gap

- First, although research on ICT in language learning has expanded considerably, most studies still look at technology use, pedagogy, and learning outcomes as separate parts rather than as a connected whole in classroom practice.
- Second, because of this fragmented view, the relationship between Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) is still not fully understood in real teaching situations.
- Third, this issue becomes more noticeable in engineering English classrooms, where students are expected to build both general English skills and discipline-specific technical communication abilities.
- Fourth, the existing literature does not clearly account for why results on ICT effectiveness differ across contexts, especially in terms of student engagement and language development.
- Fifth, there is still limited empirical work that examines ICT integration through the full TPACK framework in engineering education settings.

3. RESEARCH DESIGN AND METHODOLOGY

This study uses a quantitative survey design to explore how ICT is integrated into engineering English classrooms and how it influences student engagement, language development, and overall

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learning experiences. To gather data, a structured questionnaire based on a five-point Likert scale was used, allowing participants to provide standardized responses. The survey method was chosen because it helps collect consistent data on students' perceptions in an efficient and systematic way. For easy access and smooth administration, the questionnaire was distributed through Google Forms.

3.1. Sampling Technique and Participants

The study adopted convenience sampling due to participant availability and practical considerations. It was carried out among undergraduate engineering students at the University College of Engineering, Kanchipuram, India. Students were selected based on their exposure to ICT-supported English language learning environments. The questionnaire was shared through institutional communication channels and online platforms. A total of 86 valid responses were collected. Participation was completely voluntary, and informed consent was obtained after clearly explaining the purpose of the study to the participants.

3.2. Data Collection Instrument

Data were collected using a self-designed questionnaire consisting of four sections with 12 items in total. Responses were recorded on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). The instrument was developed after reviewing relevant literature on ICT integration and was guided by the TPACK framework. The first section gathered demographic details of the participants. The remaining sections focused on ICT integration practices, student engagement and language development, and perceptions of teaching effectiveness. Before final use, the questionnaire was reviewed by experts and pilot-tested to ensure clarity, relevance, and alignment with the study objectives.

3.3. Data Analysis and Reliability

The responses were first coded in Microsoft Excel and then analysed using IBM SPSS Statistics version 21. Descriptive statistical techniques, including frequency distribution, percentage analysis, and mean score calculations, were used to make sense of the data. These methods helped in identifying response patterns and provided a clearer understanding of participants' perceptions. To check the reliability of the instrument, Cronbach's alpha coefficient was used. Taber (2018) notes that values above 0.70 are generally considered acceptable, indicating good internal consistency. As presented in Table 2, all sections recorded values above this threshold. This confirms that the questionnaire was reliable and appropriate for measuring the variables used in the study.

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Table 1. Cronbach's Alpha.

Items	No. of items	Cronbach's alpha
Section 1 (Statements 1-5)	5	0.812
Section 2 (Statements 6-10)	5	0.834
Section 3 (Statements 11-15)	5	0.823

4. RESULTS

Table 2 shows that ICT is widely used in English language learning among engineering students, with mean scores ranging from 3.89 to 3.97. This reflects a generally positive level of technology integration in classroom practice. The highest mean score (M = 3.97) is linked to digital platforms such as LMS, mobile applications, and online tools, indicating that ICT is well established in instructional delivery. However, its use is largely supportive, with more emphasis placed on content delivery than on transforming teaching practices. Similar patterns are seen in multimedia use (M = 3.94) and access to digital learning resources (M = 3.95), showing consistent but functional use of technology. In contrast, the lowest mean score for interactive classroom activities (M = 3.89) suggests limited learner interaction, indicating that ICT use is still developing toward more student-centred and collaborative learning.

Table 2. ICT Engagement in English Language Learning

S.No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean
1	Digital platforms such as LMS, mobile applications, and online tools are used to support English language learning.	1.0%	4.3%	15.5%	55.2%	24.0%	3.97
2	English classes incorporate multimedia resources, including videos, audio materials, and presentations.	0.8%	5.0%	17.1%	54.0%	23.1%	3.94
3	Classroom activities are designed using ICT to encourage more interactive forms of English learning.	1.3%	5.5%	18.0%	52.9%	22.3%	3.89
4	Students are provided access to English learning materials through digital tools aligned with their academic needs and preferences	0.5%	4.8%	16.4%	55.6%	22.7%	3.95
5	**ICT-supported learning activities encourage active student participation and strengthen engagement in English language learning.**	0.8%	4.6%	16.8%	54.5%	23.3%	3.95

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Table 3 presents students' perceptions of ICT in relation to English language development, with mean scores ranging from 3.89 to 3.97. Reading comprehension records the highest score (M = 3.97), showing that ICT effectively supports receptive skills through exposure to digital texts and multimodal resources. Vocabulary and communication skills also show strong improvement (M = 3.96), mainly due to increased access to authentic language input through digital platforms. Writing skills receive a slightly lower rating (M = 3.93), suggesting that ICT is not fully utilised for structured writing practice or guided feedback. The lowest score is observed in confidence in academic English use (M = 3.89), highlighting a gap between language exposure and communicative confidence. Overall, ICT appears to support receptive skills more strongly than productive and expressive language abilities.

Table 3. ICT and English Language Development

S.No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean
1	Understanding of English reading materials is improved through ICT-supported learning activities.	0.8%	4.2%	16.1%	55.0%	23.9%	3.97
2	Technology-based learning tools contribute to the improvement of English writing skills.	1.0%	5.0%	17.0%	54.2%	22.8%	3.93
3	Vocabulary development and communication skills are strengthened through the use of digital learning resources.	0.5%	4.7%	15.8%	56.1%	22.9%	3.96
4	Continuous use of ICT in learning supports overall improvement in English language proficiency.	0.8%	4.5%	16.9%	54.0%	23.8%	3.95
5	**ICT-supported learning increases students' confidence in using English for academic tasks and classroom interaction.**	1.3%	5.3%	18.2%	52.7%	22.5%	3.89

Table 4 highlights students' perceptions of ICT in shaping their English learning experience, with mean scores ranging from 3.89 to 3.97. Motivation and interest receive the highest rating (M = 3.97),

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indicating that digital tools make learning more engaging through flexibility and interactive features. Students also report that ICT makes learning more enjoyable (M = 3.96) and improves overall classroom satisfaction (M = 3.95). Participation in classroom activities shows a slightly lower mean (M = 3.93), suggesting that increased engagement does not always lead to deeper interaction or collaboration. The lowest score again appears in confidence in academic English use (M = 3.89), reflecting a consistent limitation. Overall, ICT enhances motivation and engagement but has a weaker impact on academic confidence and communicative competence.

Table 4. **Learning Experience**

S.No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean
1	ICT-supported English instruction creates a more engaging and enjoyable learning experience.	0.8%	4.5%	15.9%	55.3%	23.5%	3.96
2	The integration of ICT into English teaching encourages greater student participation during classroom activities.	1.0%	5.0%	17.1%	53.8%	23.1%	3.93
3	ICT-based learning experiences strengthen students' confidence in using English for academic purposes.	1.2%	5.5%	18.4%	52.6%	22.3%	3.89
4	Students perceive that ICT-supported instruction improves their overall English learning experience.	0.5%	4.8%	16.3%	55.2%	23.2%	3.95
5	The use of ICT in English classrooms increases students' motivation and interest in language learning.	0.8%	4.3%	16.0%	54.7%	24.2%	3.97

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Table 5 shows that the overall mean scores across all constructs are very close, ranging from 3.94 to 3.95, which reflects consistently positive responses from the participants. ICT Engagement records the highest mean value (M = 3.95), while Language Development and Learning Experience both remain almost the same at 3.94. Taken together, the results indicate that ICT integration has a generally positive effect across all three areas, with a slightly greater influence on student engagement compared to the other dimensions.

Table 5. Overall Mean Scores

Constructs	N	Minimum	Maximum	Mean	Std. deviation
ICT Engagement	86	2.25	5.00	3.95	0.58
Language Development	86	2.00	5.00	3.94	0.61
Learning Experience	86	2.20	5.00	3.94	0.63

5. DISCUSSION

The study suggests that ICT is widely accepted in engineering English classrooms, but its use still remains largely at a surface level rather than bringing meaningful pedagogical change. Although students view ICT positively, it is mainly used for delivering content through digital platforms, mobile apps, and multimedia tools. In practice, this means technology often works as an additional support tool rather than reshaping how teaching and learning actually happen. As a result, opportunities for collaboration, learner independence, and richer classroom interaction are still limited.When looking at language development, ICT seems to support receptive skills like reading and vocabulary, mainly because students are exposed to more digital input. However, productive skills such as speaking and writing do not receive equal support, which creates an imbalance between understanding language and using it actively. Even though students report higher motivation and engagement, this does not always lead to greater confidence in using English for communication. Overall, ICT use appears positive but not fully aligned with deeper pedagogical goals.

6. CONCLUSION

In conclusion, ICT plays a valuable but uneven role in engineering English language learning. It clearly helps improve student motivation, access to learning materials, and basic comprehension, but its impact on communicative competence is still limited. This is mainly due to weak integration between technology, pedagogy, and content, as highlighted by the TPACK framework. ICT works best in developing receptive skills such as reading and vocabulary, but productive skills like writing and speaking need more structured practice, interaction, and continuous feedback. The study therefore

suggests that simply using technology is not enough; what matters is how it is designed and embedded into teaching practices. Stronger instructional planning, task-based activities, and collaborative learning strategies are needed to make ICT more effective. Teacher training also plays an important role in improving TPACK skills, while curriculum design should ensure better alignment between digital tools and learning outcomes. Overall, ICT is useful, but its effectiveness depends on thoughtful pedagogical integration.

REFERENCES

[1] A. Abbasi et al., "Technology integration and pedagogical transformation in higher education classrooms," *Journal of Educational Technology Research*, 2025.

[2] D. Alvunger, "Teacher agency and professional learning in digital education contexts," *Teaching and Teacher Education*, vol. 72, pp. 1–10, 2018.

[3] A. A. Alzubi, M. K. M. Singh, and A. Pandian, "Multimedia learning and language acquisition in ESL contexts," *International Journal of Language Education*, vol. 9, no. 1, pp. 45–60, 2025.

[4] M. Bower, M. J. W. Lee, and B. Dalgarno, "Learning design and immersive multimedia environments in higher education," *Computers & Education*, vol. 210, pp. 104–118, 2024.

[5] Y. Gao, L. Zhang, and X. Liu, "Blended learning in English language teaching: A systematic review," *Education and Information Technologies*, vol. 27, no. 6, pp. 7891–7912, 2022.

[6] R. Godwin-Jones, "Emerging technologies for language learning," *Language Learning & Technology*, vol. 25, no. 2, pp. 1–17, 2021.

[7] G. J. Hwang and Q. K. Fu, "Trends in mobile-assisted language learning research," *Interactive Learning Environments*, vol. 29, no. 5, pp. 789–805, 2021.

[8] M. J. Koehler, P. Mishra, and W. Cain, "What is technological pedagogical content knowledge (TPACK)?," *Journal of Education*, vol. 193, no. 3, pp. 13–19, 2013.

[9] C. Li and F. Lalani, "The COVID-19 pandemic and digital learning transformation," *World Economic Forum Reports*, 2021.

[10] M. Liu, "Artificial intelligence and multimodal learning in language education," *Journal of Computer Assisted Learning*, vol. 41, no. 1, pp. 22–35, 2025.

[11] P. Mishra and M. J. Koehler, "Technological pedagogical content knowledge: A framework for teacher knowledge," *Teachers College Record*, vol. 108, no. 6, pp. 1017–1054, 2006.

[12] A. Mouta et al., "Teacher roles in technology-enhanced learning environments," *Educational Technology & Society*, vol. 28, no. 1, pp. 112–125, 2025.

[13] H. Reinders and P. Hubbard, "CALL and learner autonomy: Theory and practice," *Language Teaching*, vol. 54, no. 4, pp. 489–503, 2021.

[14] G. Stockwell, "Mobile-assisted language learning: A meta-analysis," *ReCALL*, vol. 33, no. 2, pp. 134–150, 2021.

[15] T. Tolstykh and T. Oshchepkova, "Personalised learning systems in digital education," *Smart Learning Environments*, vol. 11, no. 3, 2024.

[16] Y. Wang, "Automated feedback systems in second language writing," *System*, vol. 117, 2023, Art. no. 102114.

[17] Y. Wang and A. Derakhshan, "Motivation and engagement in online learning environments," *Education Research International*, 2022.

[18] S. Yang, "Adaptive learning technologies in higher education," *Computers in Human Behavior*, vol. 152, 2025, Art. no. 107119.

[19] H. Zhang, Q. Liu, and J. Wang, "ICT integration and teaching transformation in language education," *Education and Information Technologies*, vol. 28, no. 4, pp. 4567–4589, 2023.

[20] O. Zawacki-Richter et al., "Systematic review of research on artificial intelligence in higher education," *International Journal of Educational Technology in Higher Education*, vol. 18, no. 1, 2021.

