

The Effect of TPACK on ESL Learners' Performance: An Investigation of Teacher Competency in Technology Integration in the Colombo District

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Abstract

Given the growing use of technology in education, it is essential to comprehend how Technological Pedagogical Content Knowledge (TPACK) contributes to teachers' successful learning. This study investigates how the TPACK of secondary-level English as a Second Language (ESL) teachers affects the performance of ESL students by analysing data gathered from secondary-level ESL teachers in seven schools in the Colombo District using a mixed-method approach. A closed-ended questionnaire was distributed among 52 teachers, and 10 teachers were selected randomly to participate in a semi-structured interview. The results show that teachers' TPACK and ESL learners' performance are significantly correlated, particularly when technology is incorporated into ESL instruction; the learners showed increased motivation, engagement, and language proficiency. Moreover, incorporating TPACK into instruction improved teacher agency, quality, and professional capital while decreasing teacher burnout and stagnation. These findings address Sri Lanka's educational needs, improve language learning outcomes, and highlight the value of professional development initiatives aimed at advancing ESL teachers' TPACK. By equipping teachers with the necessary skills to integrate technology effectively and by equipping the schools with the necessary technological devices, schools can improve ESL learner performance, thereby fostering better academic performance and language learning.

Key Words: ESL, Engagement, Motivation, Performance, Secondary Level, TPACK

Introduction

English language proficiency is increasingly recognized as essential for global communication and participation in the modern workforce. In Sri Lanka, English is taught as a Second Language, and proficiency in English is often linked with better educational and employment opportunities (Abeywickrama, 2021a; Abeywickrama, 2021b; Abeywickrama, 2020; Liyanage, 2021). However, effective ESL instruction requires more than just linguistic proficiency. It necessitates the integration of technology, pedagogy, and content knowledge (Ersanli, 2016; Harris, Mishra, & Koehler, 2009). The Technological Pedagogical Content Knowledge (TPACK) framework, which was proposed by Mishra and Koehler (2006), offers a comprehensive approach to understanding how teachers can effectively integrate technology into their teaching practices to enhance the language proficiency of English as a Second Language (ESL) learners. The introduction of technology has led many 21st-century students to become less engaged with conventional teaching methods. As Sahin (2011) claims, a teacher must grow personally in a variety of ways in order to succeed in their role. The TPACK framework created by Mishra and Koehler (2006) emphasizes the importance of teachers possessing technological knowledge, knowing how to successfully integrate

relevant technologies to improve student learning, in addition to content knowledge, what to teach) and pedagogical knowledge (how to teach). In addition to promoting better learning outcomes, this integration helps teachers grow personally. According to Tondeur et al. (2012), this kind of development is essential for improving teacher agency, instructional quality, and overall professional capital while lowering teacher burnout and stagnation.

In the context of Sri Lanka, traditional methods of ESL instruction are increasingly being supplemented or replaced by technology-enhanced approaches (Alles, 2023). However, for such integration to be effective, teachers must possess a well-developed understanding of how to combine technological tools with pedagogical strategies and content expertise, even though incorporating technology into the curriculum remains to be a complex task for educators (Garofalo et al., 2000; Hosseini & Kamal, 2013). This necessity is underscored by the fact that 21st-century learners are digital natives, the students who have grown up in a technologically saturated environment and therefore respond better to digitally mediated instruction (Gallardo-Echenique et al., 2015). ESL teachers must be able to adapt to these learners' preferences by incorporating educational software, multimedia resources, online platforms, and digital communication tools into their classroom practices (Lim, Din, NikMohamed, & Swanto, 2021).

Despite the increasing importance of technology in language learning, limited research has been done on how ESL teachers in Sri Lanka view and apply the TPACK framework in their lessons, particularly at the secondary level. By investigating how secondary-level ESL teachers' TPACK affects ESL students' performance, this study aims to address that gap by examining the dimensions of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), as well as their intersections in forms such as Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), and Technological Content Knowledge (TCK). This research aims to understand how these integrated domains affect teaching effectiveness and student outcomes. Finally, the current study will shed light on how teacher proficiency in the TPACK domains can improve the performance and engagement of ESL students. It is anticipated that the results will influence instructional design techniques and professional development programs that help ESL teachers successfully meet the demands of contemporary language instruction. By doing this, the study adds to the larger conversation about enhancing language learning results.

Methodology

Research Design

A mixed-methods approach was used to investigate how secondary-level ESL teachers perceive the influence of the TPACK framework on student performance. A comprehensive analysis, balancing statistical rigor with a deep comprehension of teachers' real-world experiences, was facilitated by the integration of qualitative and quantitative methods. Data were anonymized, and no identifying information was included in any part of the analysis or reporting.

Population and Sampling

Secondary-level ESL instructors working in government, semi-government, and international schools in the Colombo district, Sri Lanka, comprised the target population. To ensure representation across different school contexts, including urban, suburban, and rural areas, a purposive sampling technique was used. The purposive sampling method can be used to gain an in-depth understanding of participants and the context to which they belong (Savenye & Robinson, 2005; Patton, 2002). As such, the sampling method facilitated the researcher to gain a holistic understanding of Colombo District ESL teacher competency in technology integration. This means that the nature of the investigation and the degree to which the study examines "the complex in-depth phenomena" (Lichtman, 2013, p. 22) determine the validity of the study. Ten teachers participated in in-depth interviews lasting

between thirty and forty-five minutes, and fifty-two out of sixty teachers answered the structured questionnaire. Participants were chosen based on their use of digital tools in their teaching practices and their current involvement in ESL instruction.

Data Collection

Data was gathered over three weeks. Digital data was gathered and distributed through the WhatsApp channel. Participants in the virtual interviews were chosen from the questionnaire pool. Teachers' self-assessed competencies in the three main TPACK domains TPK, PCK, and TCK were measured using a structured Likert scale questionnaire. The questionnaire also included demographic questions and items related to perceived impacts on student performance.

Among the 52 teachers, to supplement quantitative data, 10 secondary-level ESL teachers were selected to conduct a semi-structured interview. These interviews aimed at exploring participants' understanding and application of TPACK as well as their perceptions of how these technological integrations influence student engagement and academic performance.

Analysis

SmartPLS 4 software was used to analyze the quantitative data from the survey. To determine the connection between the important variables, TPACK domains, and ESL learner performance, hypothesis testing was done. Microsoft Excel was used to generate charts and summaries. Additionally, the interview transcripts were analyzed using Thematic Analysis (TA) using manual coding techniques. Three categories that aligned with the TPACK framework had recurring themes. To strengthen the validity of interpretations, these thematic findings were integrated with quantitative findings.

Results and Discussion

ESL Practitioners' Awareness of TPACK

Although the secondary level ESL teachers integrated technology into language teaching and learning, it was assumed that they lacked an adequate understanding of the TPACK framework. As such, prior to gathering data, the researcher sought to identify ESL teachers' awareness of TPACK. The results showed that although most respondents are familiar with the term, the majority of those who demonstrated a satisfactory understanding were inexperienced teachers, as verified through interviews. Nine respondents reported that their awareness of the TPACK framework ranged from fair to poor, whereas 43 respondents mentioned that their awareness was satisfactory.

The Use of TPACK in ESL Classrooms

The results indicated how teaching and learning have changed due to the technology integration in the classroom, particularly in ESL settings. The TPACK framework provides a comprehensive model for understanding and implementing this integration effectively. Three fundamental elements, technology, pedagogy, content knowledge, intersect in TPACK. As reported, this framework is essential for developing dynamic, interesting, and successful learning experiences in the context of ESL instruction.

The Use of Technological Pedagogical Knowledge (TPK) on ESL Learner Performance

Approximately 80% of secondary-level ESL teachers reported using tools such as multimedia and instructional software in their classes, indicating that the most of them were confident in incorporating technology into their pedagogy. For instance, the interviewee 3 stated, "We started integrating technology into teaching often only after the COVID-19 pandemic. We had no option then. Since the students' engagement was higher when using technology, I sometimes use my smartphone at least to play music when I teach at school, too." However,

hypothesis testing did not provide statistical support for this perception. The lack of adequate school resources, especially in rural areas, was a major issue that forced teachers to rely on their personal devices, like laptops and smartphones, to help with technology integration. While TPK was widely acknowledged in practice, some teachers still lacked confidence, particularly in troubleshooting and adapting digital tools independently. Data gathered through interviews confirmed that novice teachers were more comfortable with technology, often learning independently or receiving support at home. Commonly cited examples of technology use included audio-visual learning, online games, and digital storytelling, especially in the post-pandemic period. Teachers observed improved student engagement when lessons incorporated technological elements, reinforcing the idea that TPK supports ESL performance, despite infrastructure gaps and varying levels of teacher readiness. The idea that TPK is essential to promoting ESL learning outcomes is supported by the teachers' consistent observations of higher student engagement when technology was used in the classroom. Nevertheless, the consistent and effective integration of technology in ESL classrooms remains constrained by challenges in infrastructure and teacher preparedness.

The Use of Technological Content Knowledge on ESL Learner Performance

Results showed that to improve lesson delivery and student engagement, ESL teachers frequently combine technology with subject-matter expertise. Most participants reported that they use digital resources designed specifically for ESL instruction and expressed confidence using technology to improve their vocabulary and grammatical competence. Teachers also utilized educational websites, multimedia content, and personal devices to enhance classroom instruction, as confirmed through interviews. The number of respondents (42) who agreed with the statement "I often engage ESL students in collaborative projects or activities using digital platforms such as Google Classroom, Zoom, and WhatsApp groups" is comparatively high. As reported, students were engaged beyond conventional approaches using collaborative tools such as Zoom and WhatsApp. When technology was incorporated into the delivery of content, particularly in digital labs or multimedia-supported lessons, teachers observed increased student interaction. These findings demonstrate that high TCK enhances engagement and comprehension, thereby improving ESL learner performance.

The Use of Pedagogical Content Knowledge on ESL Learner Performance

To improve learner outcomes, secondary-level ESL teachers successfully combined pedagogical strategies with subject knowledge, according to the analysis of Pedagogical Content Knowledge (PCK). Most respondents revealed that they frequently employ active learning techniques such as group discussions and cooperative projects, integrate real-world and cultural contexts into lessons, and use differentiated instruction to accommodate a range of language proficiency levels. These findings were validated by qualitative data, which highlighted innovative strategies such as incorporating familiar topics to increase vocabulary or employing role-playing to teach grammar. For instance, one participant explained how to reinforce the past tense by having students act out past events. One of the main components of PCK is the integration of teaching methodology and content mastery, which is demonstrated by such practices. With educators emphasizing engagement and participation through a variety of instructional strategies, the transition from traditional teacher-centered to learner-centered approaches was clear. Overall, the findings demonstrated that teachers possess and apply strong PCK, which has a major impact on the performance of ESL students.

Furthermore, the findings reinforced that teachers in the Colombo District effectively use TPACK, particularly the intersection of pedagogy and content, with technology to boost student comprehension and engagement. These practices underscore the need for sustained professional development to support continued innovation in ESL education.

The Impact of TPACK on ESL Learner Performance

The overarching aim of the study is to explore the impact of TPACK on ESL learner performance based on the secondary level ESL teachers' perceptions in Sri Lanka. Most ESL practitioners firmly confirmed that TPACK improves student performance. 79% of respondents agreed with the statement (as shown in Figure 1) that teachers' TPACK has a positive perceived impact on the outcomes of ESL students.

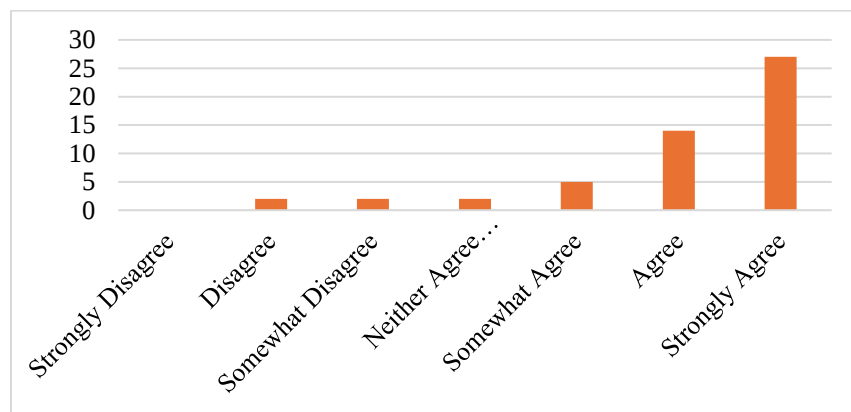


Figure 1

The Impact of Teachers' TPACK on ESL Learners' Performance

The study found that TPACK integration supports both teachers and ESL learners. Remarkably, 38% of respondents reported that TPACK decreased teacher stagnation, while 42% indicated that it alleviated teacher burnout. Furthermore, more than half of the participants reported improvements in teacher quality, agency, and particularly professional capital, the latter being the most widely acknowledged benefit. Despite these advantages, two major challenges were identified. Most importantly, insufficient school resources hindered technological integration, causing many teachers to rely on personal laptops and smartphones. Furthermore, experienced teachers struggled with technological integration, with only 25% strongly agreeing that they possessed adequate technological knowledge.

Conclusions and Recommendations

The key aim of this study was to investigate, from the perceptions of secondary-level teachers in Colombo District, how the TPACK framework, specifically, Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Pedagogical Content Knowledge (PCK), affects the performance of ESL learners. The study effectively addressed this aim through a mixed-methods approach. The first objective examined the relationship between TPK and performance. Despite teachers' recognition of the importance of incorporating technology into teaching practices, there was no statistically significant positive correlation found. On the other hand, the study discovered a statistically significant correlation between TCK and the performance of ESL learners, highlighting the significance of aligning appropriate technology with subject matter. Additionally, the findings demonstrated a positive relationship between PCK and student outcomes, highlighting the continuing significance of effective teaching. Strong pedagogical and subject content integration is still relevant today, as evidenced by the results, which also showed a positive correlation between PCK and learner outcomes. Overall, by offering empirical insights into how various TPACK framework components affect ESL learner performance, the study achieved its specific goals. The results confirm that while technology has the potential to transform language instruction, its impact is maximized when integrated effectively with pedagogy and content.

Implications of the Study

The findings have significant implications for professional development providers, syllabus designers, school administrators, and ESL teachers. To facilitate successful technology integration in ESL instruction, the research findings emphasize the necessity of targeted training in TPK, TCK, and PCK. Teachers can apply these insights to enhance instructional strategies, while administrators can justify investments in professional development. . Syllabus designers are encouraged to embed TPACK components into curricula to create more engaging ESL programs. Ultimately, the research underscores the importance of **collaborative efforts** among educators, researchers, and training providers to develop innovative, evidence-based approaches to teaching approaches.

Limitations and Future Research

The results may not be as generalizable throughout Sri Lanka because the study was restricted to five schools in the Colombo District and included a small sample size of 52 respondents, most of whom were inexperienced teachers. Furthermore, only 10 qualitative interviews were conducted, limiting the depth and diversity of insights. Moreover, most of the respondents were novice and younger teachers, and they could be biased towards the more favorable perception of technology integration as the generation gap between them and Gen Z learners is comparatively less. However, the findings of the current study demonstrated the need for future research areas such as the impact of TPACK on teacher development, including areas like burnout, professional agency, and teacher quality, which emerged as important themes during the interview. This study did not distinguish between online and physical teaching processes. Hence, future research could differentiate between online and physical environments to better understand how delivery methods affect the effectiveness of TPACK on the ESL classroom practices. Future researchers could expand the sample across multiple provinces to reflect a more representative national context, as Colombo itself is considered one of the cities that has easy access to technology.

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