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TPACK-Based ICT Integration to Promote Joyful Learning in EFL Classrooms under the Indonesia *Merdeka Curriculum*

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Abstract

This study investigates English as a Foreign Language (*EFL*) teachers' perceptions of *TPACK*-based *ICT* integration in promoting joyful learning within the implementation of the *Merdeka Curriculum* in Indonesia. Using a qualitative descriptive design, data were collected through semi-structured interviews with an English teacher at a private school who had participated in a *Deep Learning* workshop. The study explored how teachers integrated technological, pedagogical, and content knowledge (*TPACK*) to create meaningful and engaging classroom experiences. The findings revealed that *ICT*-based media, such as *PowerPoint* presentations and interactive learning applications, effectively increased students' attention, motivation, and classroom interaction. Teachers also employed pedagogical strategies, including project-based learning, group discussions, and educational games, to support joyful and student-centered learning. In addition, the study found that teachers' *TPACK* competencies developed through training and reflective practice, particularly in the areas of Technological Knowledge, Pedagogical Knowledge, and Content Knowledge. Despite limited school facilities, teachers demonstrated adaptability and creativity in designing contextual and interactive English learning activities. The study concludes that *TPACK*-based *ICT* integration effectively supports the implementation of joyful learning and highlights the importance of continuous professional development in strengthening teachers' competencies in technology-enhanced *EFL* instruction under the *Merdeka Curriculum*.

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INTRODUCTION

The implementation of the *Merdeka Curriculum* has reshaped Indonesia's educational landscape since its national rollout in 2022, with adoption rates rising from 66% of schools opting into the curriculum in at least one grade level within the first three months, climbing to 88% by late 2023 (Handayani et al., 2024; Nur'aini & Al Farisi, 2023). The curriculum positions *joyful learning* alongside mindful and meaningful learning as the three core dimensions of the *Deep Learning* approach (Sørensen et al., 2023), demanding that teachers shift from transmissive instruction toward flexible, student-centered practice (Marrhich et al., 2021). For EFL teachers, this shift is particularly demanding: English language instruction must now cultivate engagement and enjoyment while still meeting communicative competence standards, often without proportional investment in classroom infrastructure. The integration of Information and Communication Technology (ICT) is widely promoted as a vehicle for realizing these aims (Arif et al., 2025), yet recent evidence indicates that implementation fidelity remains uneven across Indonesia's decentralized education system, with schools varying widely in readiness and structured training support. This gap between policy ambition and classroom reality is precisely where the present study locates its inquiry.

Existing research on TPACK-based ICT integration in EFL contexts converges on three dominant themes. The first concerns *teacher enthusiasm versus pedagogical readiness*: Hermansyah (2025) found that Indonesian secondary-school EFL teachers display high motivation to integrate technology but continue to struggle with its pedagogical application, a pattern echoed across Southeast Asian contexts (Muhsin et al., 2023). The second theme is the *centrality of structured training*, with multiple studies arguing that TPACK competencies do not develop spontaneously but require deliberate professional development programs (Asri, 2024; Bariushaa & Balgan, 2024; Saeed & Aneesa, 2023). The third theme addresses the *alignment between TPACK and curriculum reform*: Susilo Aji & Hamid Anwar (2024) demonstrate that TPACK provides a coherent framework for the kind of contextual, creative learning the *Merdeka Curriculum* envisions, while Qu et al. (2022) emphasize its capacity to make EFL learning more engaging and meaningful. Despite their contributions, these studies tend to aggregate TPACK as a single composite competency and assume an institutional setting where curriculum reform has already taken hold.

Two important gaps remain. First, prior studies have not adequately examined what TPACK-based ICT integration looks like in schools that have *not yet* fully institutionalized the *Merdeka Curriculum*, despite this transitional moment being where the most consequential pedagogical negotiations occur. Most existing Indonesian TPACK studies sample fully implementing schools, leaving the pre-adoption phase empirically under-described. Second, the field has consistently treated TPACK as a unified construct, obscuring the question of whether its three components, Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), develop in lockstep or asymmetrically within the same teacher. The novelty of the present study lies in addressing both gaps simultaneously: it investigates TPACK practice during the transitional pre-adoption phase and disaggregates the analysis across the three TPACK components. Methodologically, it also extends the literature by examining the *post-workshop* trajectory of a teacher who participated in a *Deep Learning* training program facilitated by the research team, capturing how training translates, or fails to translate, into classroom practice.

This study therefore aims to explore how a single EFL teacher in a private school that has not yet fully adopted the *Merdeka Curriculum* perceives and applies TPACK-based ICT integration to support *joyful learning* in the English classroom, following participation in a *Deep Learning* workshop. The study pursues two specific objectives. First, it seeks to understand the teacher's perception of ICT integration through the TPACK lens, with particular attention to how technology is positioned strategically rather than ornamentally within instructional design. Second, it examines the teacher's TPACK competencies disaggregated by component, identifying the relative maturity of TK, PK, and CK and the conditions under which each develops. By doing so, the study contributes to TPACK scholarship in two ways: theoretically, by introducing component-level disaggregation as an analytical category; and practically, by generating evidence relevant to educational institutions designing teacher training for the ongoing *Merdeka Curriculum* rollout.

RESEARCH METHOD

This study employed a qualitative case study design to examine in depth how a single EFL teacher integrates ICT through the TPACK framework to cultivate *joyful learning* under the *Merdeka Curriculum* (Turnbull et al., 2021; Waghorn & Yelland, 2024; Wen Song, 2025). A case study was chosen because the research question concerns a contemporary phenomenon, namely TPACK-based ICT integration during a transitional curriculum period, that cannot be meaningfully separated from its real-world classroom context. The research was conducted at a private school in Malang, East Java, that had not yet fully adopted the *Merdeka Curriculum* at the time of the study, making it a particularly informative site for understanding how the curriculum's principles are negotiated before formal institutionalization. The qualitative approach was selected because the study seeks interpretive depth rather than statistical generalization (Birnbaum, 2022; Burgess et al., 2021; Liinamaa, 2026). The lived perspective of the teacher, rather than the frequency of practices,

constitutes the unit of analysis. This methodological orientation enables a thick description of how knowledge components within TPACK are mobilized in resource-limited conditions.

Data were collected through semi-structured interviews as the primary instrument, supported by classroom observation footage and photographs of teaching materials to enable methodological triangulation (Azulai, 2021; Gillings & Jaworska, 2025; Thompson, 2023). The interview protocol comprised 8 to 10 open-ended questions covering four areas: (1) Technological Knowledge, focusing on the teacher's use of digital tools such as interactive PowerPoint slides and offline learning applications; (2) Pedagogical Knowledge, addressing instructional strategies including project-based learning, group discussions, and educational games; (3) Content Knowledge, concerning subject-matter delivery and the integration of technology with content; and (4) the teacher's conceptualization of *joyful learning* under the *Merdeka Curriculum*. The researcher served as the primary instrument of inquiry, building rapport with the participant before the interview to encourage candid reflection. The study was conducted over a four-week period following a Deep Learning workshop facilitated by the research team. Informed consent was obtained from both the teacher and the school prior to data collection, and the participant's identity was anonymized through the use of an interview code. The credibility of the findings was strengthened through source triangulation involving interview data, observation footage, and material artifacts, as well as member checking, whereby the participant reviewed the interview transcript and the researcher's preliminary interpretations for accuracy.

The data were analyzed using thematic analysis following the six-phase procedure proposed by Braun and Clarke, which is well-suited to qualitative case study data because it permits both inductive coding and theoretically informed interpretation (Hole, 2024). The analytical process began with familiarization through repeated listening to the audio recordings and close reading of the verbatim transcripts. Initial codes were then generated around the three TPACK components, namely Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK), alongside emergent codes related to *joyful learning*. These codes were grouped into candidate themes, reviewed against the dataset to ensure internal coherence and external distinctiveness, and refined through iterative comparison with the supporting observation footage and material artifacts. Final themes were interpreted through the TPACK framework (Mishra & Koehler, 2006) and the *Deep Learning* concept of mindful, meaningful, and joyful learning. The credibility of the interpretation was reinforced through researcher reflexivity, peer debriefing among the research team, and source triangulation, ensuring that the findings reflect a rigorous and trustworthy reading of the participant's lived practice rather than the researcher's preconceptions.

RESULT AND DISCUSSION

Result

This section presents the *results* based on data drawn from semi-structured interviews with an EFL teacher at a private school who had previously participated in an ICT-focused *Deep Learning* workshop organized by the research team. Although the teacher's school had not yet fully adopted the *Merdeka Curriculum* at the time of the study, the teacher had begun applying its principles independently in English classroom practice. The *results* address two research questions, structured around the teacher's perception of TPACK-based ICT integration and the teacher's TPACK skills in supporting *joyful learning*, drawing on the theoretical framework of Mishra and Koehler (2006). Thematic analysis following Braun and Clarke (2014) revealed three major themes aligned with the TPACK framework: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). The data are presented descriptively under each research question.

How does an EFL teacher perceive the integration of TPACK-based ICT in supporting joyful learning under the Merdeka Curriculum?

Three key excerpts from the semi-structured interview revealed the teacher's perception

of ICT-based TPACK integration. These *results* were further corroborated by classroom observation footage and photographs of teaching materials collected as supporting data. The following section presents the teacher's responses, followed by descriptive analysis of each.

ICT as a medium for student engagement

> "In my opinion, this is quite interesting, the students' ability in receiving the material given through ICT, in terms of PPT, is engaging. It is seen from the perception of students at the end of the session."

The data shows that the teacher holds a positive view on the use of ICT in English language learning. The use of media such as PowerPoint (PPT) is considered to increase student engagement because students show more interest and attention during the learning process. This is consistent with classroom observation footage, which captured students responding actively to the slide-based material. The data reflects that technology helps create a more interesting and enjoyable learning atmosphere in line with the principle of *joyful learning* in the *Merdeka Curriculum*.

The importance of early ICT integration

> "It would be so supportive if it had been introduced and integrated from the beginning. It would have helped both teacher and students adapt more effectively."

This excerpt confirms the teacher's perception that ICT is highly supportive in fostering joyful learning. The teacher recognizes the benefits of technology in creating a more interactive learning process and expresses a desire for ICT-based TPACK to be implemented from the outset. This indicates that the teacher views technology not merely as an accessory, but as an integral part of effective learning strategies. The teacher's statement also reflects a critical awareness of the impact that delayed integration has had on the adaptation process for both teacher and students.

ICT features and student concentration

> "ICT-based media can trigger the students' intention and concentration during the ELT processes. This is highlighted by the students' interaction given from the media session (i.e., some features in the media, like question and answer, interactive dialogue of 'Greeting material')."

The teacher identifies that interactive features — such as question-and-answer sessions and interactive dialogues — trigger students' attention and concentration during the learning process. Photographs of teaching materials provided by the teacher show prepared interactive slides featuring greeting prompts and embedded question-and-answer activities, which support the teacher's statement. The data indicates that these features encourage students' direct engagement with learning materials, reflecting a student-centered approach in which students actively construct knowledge through interaction with the material, while diverse learning styles are accommodated.

How are the EFL teacher's TPACK skills applied in using ICT to create joyful learning in English classrooms?

Thematic analysis of the interview data revealed three sub-themes aligned with the three components of the TPACK framework: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). **Table 1** provides a summary of the identified indicators, key quotations, and the estimated level of mastery for each component, while Figure 1 visualizes the teacher's overall TPACK profile across the three components. The subsections that follow present the data and descriptive findings in detail.

Table 1. Summary of the Teacher's TPACK Profile

TPACK Component	Identified Indicators	Key Quotation	Level
Technological Knowledge (TK)	Ability to select and use digital media (PowerPoint, simple apps); awareness of pedagogical limitations; willingness to learn through institutional training.	*I got it from the workshop established earlier at our institution. The workshop matches my pedagogical limitations.*	Developing
Pedagogical Knowledge (PK)	Implementation of project-based learning, group discussions, and educational games; creative use of simple media to address infrastructure limitations.	*To ensure students stay engaged and enjoy learning English with ICT, I combine pedagogical strategies such as project-based learning, group discussions, and educational games.*	Proficient
Content Knowledge (CK)	Confidence in delivering content after training; commitment to continuous evaluation; focus on accessibility and comprehensibility of materials.	*We feel confident about the progress after conducting several training sessions… we are still looking for ways to improve.*	Developing

Figure 1 illustrates the teacher's mastery level across the three TPACK components based on thematic analysis of interview data, triangulated with classroom observation footage and photographs of teaching materials. PK reached the Proficient level, while TK and CK remained at the Developing level.

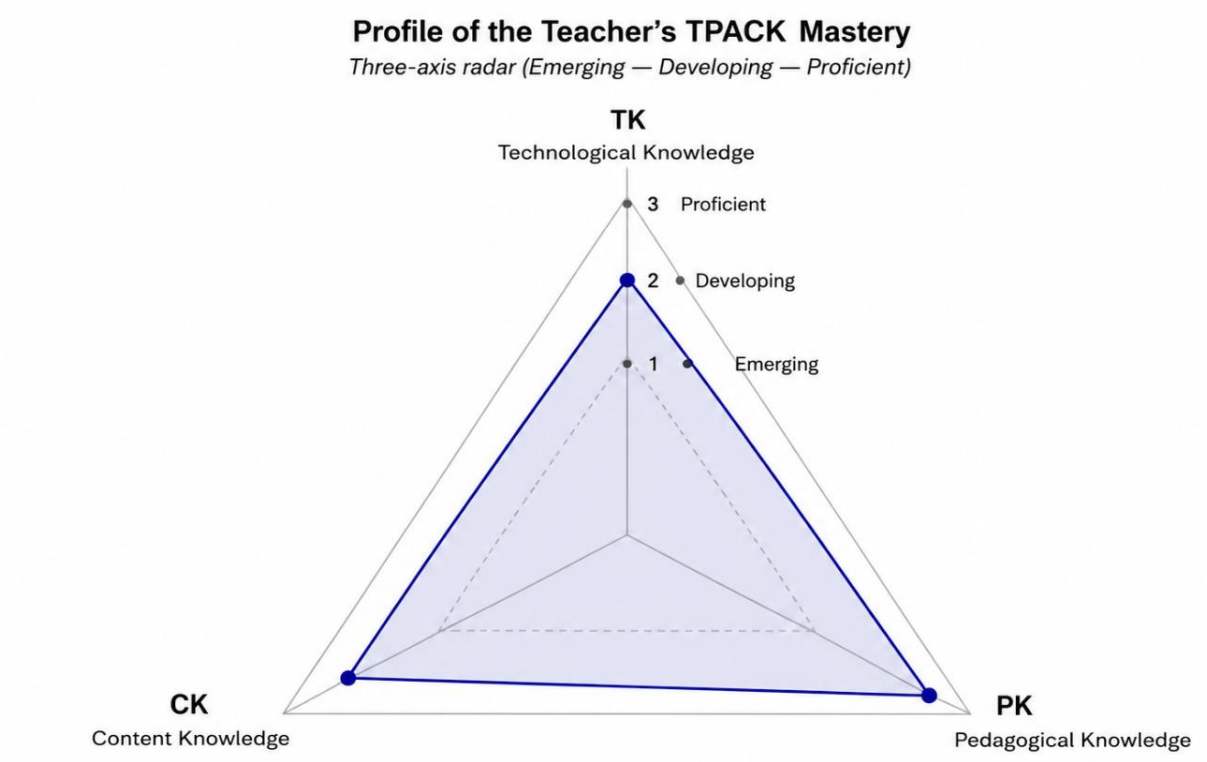

Figure 1. Profile of the Teacher's TPACK Mastery

Technological Knowledge (TK)

> "I got it from the workshop established earlier at our institution. The workshop matches my pedagogical limitations."

The teacher recognizes the importance of technological knowledge and reports gaining an understanding of the selection and use of digital media through institutional training and workshops. The workshop helped the teacher address pedagogical limitations in utilizing technology. This suggests that the teacher's technological skills developed as a result of structured training rather than from prior personal experience, allowing technology integration to be approached more deliberately.

Pedagogical Knowledge (PK)

> "To ensure students stay engaged and enjoy learning English with ICT, I combine pedagogical strategies such as project-based learning, group discussions, and educational games. Given the school's limited facilities, I also utilize simple yet effective media, such as offline applications or pre-prepared learning materials."

The data shows that the teacher has implemented pedagogical strategies that integrate technology to create engaging and interactive learning. Although limited facilities present a challenge, the teacher is able to adopt strategies such as project-based learning, group discussions, and educational games. Video recordings of classroom sessions further illustrate the teacher's use of group-based activities and educational games during the lesson. Additionally, the teacher creatively utilizes simple media — such as offline applications and pre-prepared materials — to maintain learning quality. This demonstrates adaptive pedagogical skills in integrating technology despite infrastructure limitations.

Content Knowledge (CK)

> "We feel confident about the progress after conducting several training sessions with the teachers. Until now, we're still monitoring how the learning process is going, especially after practicing with the media used in class. Of course, we are still looking for ways to improve and always try our best to ensure the ICT learning media works well and is easy to access and understand in the classroom."

The teacher demonstrates increased confidence in integrating ICT with content knowledge following several training sessions. The teacher also recognizes the importance of continuous evaluation to optimize the use of technology so that learning materials can be delivered more effectively. Ongoing monitoring and evaluation serve as evidence that the teacher remains open to continuous improvement, particularly in ensuring that ICT media are accessible and comprehensible to students.

Discussion

This study set out to examine how a single EFL teacher — working in a private school that had not yet fully adopted the *Merdeka Curriculum* — perceives and applies TPACK-based ICT integration to support *joyful learning*. Two findings stand out. First, the teacher's perception of ICT is unmistakably positive but conditional: the value of digital media such as PowerPoint and interactive features depends almost entirely on whether they are embedded into instruction from the outset, not bolted on midway. The teacher's own words — that earlier integration "would have helped both teacher and students adapt more effectively" — reveal a strategic, rather than ornamental, view of technology. Second, the teacher's TPACK competencies are demonstrably uneven: Pedagogical Knowledge has reached a proficient level through creative use of project-based learning, group discussions, and educational games, while Technological Knowledge and

Content Knowledge remain at a developing stage despite institutional workshops. This asymmetry, rather than the overall enthusiasm, is the more telling result of this study.

These findings both reinforce and complicate the existing literature on TPACK in Indonesian EFL contexts. The teacher's positive disposition toward ICT mirrors Andaya et al. (2025) observation that Indonesian secondary-school teachers display high enthusiasm for technology even when pedagogical mastery lags. Similarly, the centrality of training in shaping the teacher's TK aligns with the findings of Indiati (2022) and Varghese et al. (2025), who argued that structured TPACK programs are indispensable for meaningful classroom integration. However, this study departs from much of the existing literature in one important respect: rather than treating TPACK as a uniform competency, the data here show that TK, PK, and CK develop at markedly different paces within the same teacher. This nuance is largely absent from prior Indonesian studies (Susilo Aji & Hamid Anwar, 2024), which tend to aggregate TPACK into a single composite score. The present case thus exposes a gap — the assumption of uniform TPACK growth — that future research should address through component-disaggregated analysis.

A closer reading of the data suggests that PK reached proficiency precisely because it could be exercised even when technology was scarce. Project-based learning, peer discussions, and educational games do not require advanced infrastructure; they require pedagogical imagination. TK and CK, by contrast, depend on continuous exposure to digital tools and structured content scaffolding — both of which were intermittent in the participant's school context. This pattern suggests that TPACK development in resource-limited settings is not simply slower across the board; it is structurally biased toward pedagogical components. Qu et al. (2022) made a related point about the importance of ongoing evaluation, but the present finding pushes further: where infrastructure is uneven, PK becomes a substitute for, rather than a partner with, TK and CK. This is not necessarily a deficiency. It may represent a legitimate adaptive strategy — what one might call "pedagogy-led TPACK" — that deserves recognition as a distinct mode of integration rather than being read as incomplete TPACK.

This study makes three contributions. First, it extends the TPACK literature by foregrounding *componential asymmetry* — the uneven maturation of TK, PK, and CK within a single teacher — as an analytical category, complementing the aggregated treatments common (Juharyanto et al., 2023). Second, it provides empirical evidence from a transitional implementation context: a school not yet fully aligned with the *Merdeka Curriculum*, where the teacher applies its principles independently. Most existing studies sample schools where the curriculum is already institutionalized; this study captures what TPACK looks like before formal adoption, which is arguably the more consequential moment for policy. Third, the study contributes to *Deep Learning* pedagogy by showing that *joyful learning* in EFL classrooms can be cultivated through pedagogical creativity even when technological resources are limited — a finding with direct relevance for the many Indonesian schools still operating under infrastructural constraints during the curriculum rollout.

Taken together, the findings reframe a question that has dominated the Indonesian TPACK conversation. The pressing issue is not whether teachers are enthusiastic about ICT — they overwhelmingly are — but whether the supporting ecosystem allows the three TPACK components to develop in concert. This study suggests it often does not, and that pedagogical creativity is currently doing the heavy lifting that technological infrastructure and content scaffolding ought to share. The implications are concrete. Workshops should move beyond generic technology orientation toward targeted, component-specific mentoring, with particular attention to TK and CK in resource-limited schools. Policymakers driving the *Merdeka Curriculum* rollout should consider whether ICT integration is being treated as a curriculum prerequisite or an afterthought; the teacher's own reflection points unambiguously to the former. Future research should expand beyond single-case designs and trace TPACK development longitudinally across multiple teachers and school types — particularly during the transitional period before full curriculum adoption, where this study locates its most valuable contribution.

CONCLUSION

The question that motivated this study was deceptively simple: in a school where the *Merdeka Curriculum* has not yet been fully institutionalized, can TPACK-based ICT integration genuinely support *joyful learning* in the EFL classroom? The evidence gathered from one teacher's classroom suggests that it can, but only when pedagogical creativity is allowed to compensate for what technology and content scaffolding cannot yet provide. The teacher's perception of ICT was strategic rather than ornamental, and her TPACK competencies developed unevenly — Pedagogical Knowledge reached a proficient level through project-based learning, group discussions, and educational games, while Technological and Content Knowledge remained in formation. For teachers in resource-limited Indonesian schools, this offers a measured reassurance that pedagogical imagination can sustain student engagement even when infrastructure lags behind policy ambition; for institutions and policymakers, it carries a less comfortable message — that workshops treating TPACK as a single composite competency risk overlooking the component asymmetries that determine whether classroom integration actually takes root. Future research should follow multiple teachers across different school types throughout the curriculum rollout, paying particular attention to how TK, PK, and CK mature independently rather than in lockstep, since the transitional moment — before a curriculum becomes routine — is precisely where the most consequential TPACK practices are being negotiated.

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