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INTRAPERSONAL TECHNOLOGY INTEGRATION AS A MEDIATOR BETWEEN TEACHING COMPETENCE AND STUDENT ENGAGEMENT

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Abstract:
This study investigates the relationship between teaching competence and student engagement, with intrapersonal technology integration as a mediating variable. Grounded in the Technology Acceptance Model (TAM) and Social Cognitive Career Theory (SCCT), the study employed a quantitative, non-experimental design using stratified sampling to survey 400 college students in the Davao Region. Descriptive statistics revealed high levels of intrapersonal technology integration and very high teaching competence, alongside generally high student engagement. Correlational analysis showed that both teaching competence and intrapersonal technology integration were positively and significantly associated with all dimensions of student engagement, with particularly strong correlations observed for online and cognitive engagement. Mediation analysis using Hayes' PROCESS model confirmed a partial mediation effect, with 54.5% of the total effect of teaching competence on student engagement transmitted through intrapersonal technology integration. These findings underscore the dual pathway of influence, affirming that while teaching competence independently drives student engagement, its impact is significantly amplified when educators possess internal motivation, confidence, and interest in using educational technology. The study contributes to the literature by offering a comprehensive, theory-driven model of engagement, and highlights the need for teacher development programs that cultivate both pedagogical skills and intrapersonal readiness for technology integration.

Keywords: student engagement, teaching competence, intrapersonal technology integration, TPACK, higher education, mediation analysis, teacher self-efficacy

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1. Introduction

Student engagement has emerged as a cornerstone of academic success in higher education, directly influencing learning outcomes, student retention, and the cultivation of lifelong skills essential in contemporary society (Ajabnoor & Fatima, 2024). Despite this recognized importance, sustaining engagement remains a persistent challenge, particularly as students increasingly exhibit passive classroom behaviors, diminished motivation for autonomous study, and limited inclination to engage in learning activities beyond minimal academic requirements (Sugiharto *et al.*, 2023). This disengagement threatens not only academic performance but also the development of higher-order skills such as critical thinking, collaboration, and adaptive problem-solving (Greener, 2022).

This issue has been widely documented across diverse educational contexts, both globally and locally. In the Philippines, Buenviaje, Dizon, and Magat (2023) reported that even students with high online attendance demonstrated low motivation and interaction levels, highlighting the critical role of instructional quality in maintaining engagement (Buenviaje *et al.*, 2023). Internationally, Kahu *et al.* (2020) underscored that student engagement is multidimensional—encompassing academic, cognitive, social, and affective domains—and noted that many students underperform particularly in the affective and cognitive components, reflecting a lack of deep learning and emotional investment (Kahu *et al.*, 2020). Furthermore, Ajabnoor and Fatima (2024) revealed that many learners perceive educational technology as an obstacle rather than a learning aid, particularly when faculty fail to integrate it meaningfully (Ajabnoor & Fatima, 2024).

The imperative to address engagement is reinforced by its well-established association with academic persistence, skill acquisition, and institutional reputation. As shown in a scoping review of medical education, student engagement—defined in cognitive, behavioral, and emotional terms—plays a critical role in academic performance and long-term learning outcomes (Kassab *et al.*, 2022). Institutions that effectively promote engagement benefit from improved retention rates and student satisfaction, both of which serve as markers for quality assurance and accreditation standards (Appleton *et al.*, 2023). On a macro level, engaged graduates are more likely to possess the adaptability and soft skills required for participation in knowledge economies and democratic societies (Castro, 2024).

A critical factor in this equation is teaching competence, which encompasses not only subject mastery but also pedagogical agility, especially in technology integration. Teachers who exhibit strong intrapersonal beliefs—such as self-efficacy, intrinsic motivation, and positive outcome expectations—are more likely to employ digital tools in ways that activate student interest and sustain engagement (Lu, 2020). Within this framework, teaching competence serves as the foundational input, intrapersonal technology integration as the mediating mechanism, and student engagement as the resultant outcome, forming a dynamic instructional ecosystem (Afzal & Crawford, 2022).

Recent empirical work substantiates these linkages. For example, Günüç (2022) found that strategic use of educational technologies in higher education settings significantly elevated students' perceived relevance of course content and boosted classroom participation (Günüç, 2022). Complementary findings by Sugiharto *et al.* (2023) demonstrated that more than half of nursing students engaged in online learning reported low levels of interaction and motivation, emphasizing the importance of instructor-mediated environments (Sugiharto *et al.*, 2023). Moreover, Appleton *et al.* (2023) highlighted that initial levels of student engagement and teacher-student relationships were significant predictors of sustained motivation, particularly during the disruptions of the COVID-19 pandemic (Appleton *et al.*, 2023). Yet despite these advances, most studies have examined competence, technology integration, and engagement in isolation, leaving a critical gap in understanding how these constructs interact within a mediated framework (Castro, 2024).

Although ample research supports the positive effects of teaching competence and student engagement, few investigations have unpacked the mechanisms by which one leads to the other. The current literature often conceptualizes these variables as direct correlates, with limited focus on the mediating processes that explain how competent instruction is translated into meaningful student involvement, particularly in resource-constrained or developing country contexts such as the Philippines (Picton & Baik, 2024), (Ajabnoor & Fatima, 2024). As noted by Appleton *et al.* (2023), the pandemic has magnified disparities in digital readiness among educators, amplifying the need to understand how instructors' internal orientations toward technology affect pedagogical efficacy (Appleton *et al.*, 2023). This study addresses that gap by positing intrapersonal technology integration—comprising self-efficacy, outcome expectations, and interest—as a critical mediator in the relationship between teaching competence and student engagement. Research on online learning environments supports this proposition, showing that students engage more actively when instructors demonstrate confidence, fluency, and pedagogical intentionality in the use of digital tools (Afzal & Crawford, 2022), (Sugiharto *et al.*, 2023). However, these instructor-level variables are frequently omitted from existing engagement frameworks, limiting the explanatory power of previous models.

The theoretical underpinning of this study is rooted in Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 2002), which postulates that personal agency—mediated through self-efficacy, outcome expectations, and interests—guides behavioral outcomes across varied domains. Applied to the teaching context, SCCT suggests that when educators perceive themselves as competent, this self-perception catalyzes positive beliefs about their ability to integrate technology, which in turn drives student engagement. This pathway is reinforced by Bandura's (1986) Social Cognitive Theory, underscoring the centrality of self-efficacy in goal-directed behavior in educational environments. Complementing these perspectives, the Technology Acceptance Model (TAM; Davis, 1989) asserts that perceived usefulness and ease of use shape willingness to adopt instructional technologies—factors closely tied to teachers' beliefs and attitudes.

Crucially, the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) specifies the integrated knowledge base teachers need to enact effective technology-supported instruction, linking technological knowledge with pedagogy and content. Together, SCCT/SCT explain the motivational mechanisms (e.g., self-efficacy), TAM clarifies adoption judgments (usefulness, ease of use), and TPACK delineates the enacted instructional competence that makes integration effective. Collectively, these theories support a mediation model in which teaching competence initiates a cognitive–affective chain that culminates in observable student engagement through intrapersonal technology integration. This interactionist perspective mirrors recent calls to adopt integrated, theory-driven approaches to unpack engagement processes in higher education (e.g., Castro, 2024; Picton & Baik, 2024) and extends existing knowledge by highlighting the psychological and knowledge-structural mechanisms through which teacher competence translates into meaningful student engagement.

The objectives of this study are to determine the levels of teaching competence, intrapersonal technology integration, and student engagement among college students; to examine the direct relationship between teaching competence and student engagement; and to analyze the mediating role of intrapersonal technology integration on this relationship. The significance of this study is multifaceted. At the global level, it aligns with the Sustainable Development Goals' emphasis on inclusive and quality education by addressing the need for effective engagement strategies. At the institutional level, findings will provide school administrators and faculty with insights for teacher training, focusing on strengthening both competence and intrapersonal factors in technology integration. At the student level, the study underscores how engagement can be enhanced when teachers translate competence into effective and technology-supported practices. Finally, for researchers, this study contributes empirical evidence on mediation mechanisms in engagement research, filling an important gap in the Philippine higher education setting.

2. Methods

This study employed a quantitative, non-experimental approach using a correlational and predictive causation technique, specifically mediation analysis. This design was deemed appropriate because it not only determined the direct effect of teaching competence on engagement but also tested the indirect effect through intrapersonal technology integration, thereby uncovering the mechanism underlying the relationship. The procedure involved securing permission from institutional administrators, distributing questionnaires during scheduled class hours, and collecting responses anonymously. Data were coded and entered into Jamovi statistical software (version 2.6.26), with Hayes' PROCESS macro used for mediation analysis. Descriptive statistics summarized participant demographics, Pearson's r determined correlations, and mediation analysis tested the indirect effect. Ethical considerations included informed

consent from students, assurance of confidentiality and anonymity, voluntary participation, and the right to withdraw at any point.

The participants of this study were college students enrolled in second to fourth year levels in selected higher education institutions in the Davao Region. Inclusion criteria consisted of being full-time students with at least one semester of exposure to their current faculty, while first-year students and those with less than one semester of exposure were excluded to ensure sufficient experience in evaluating teaching competence. The sampling technique followed stratified random sampling, ensuring representation across year levels and program clusters. Based on the recommended ratio for mediation analysis, a minimum of 400 students were recruited, providing adequate statistical power for the analysis.

The study utilized adopted questionnaires. Teaching competence was measured using the Teaching Competencies Scale (TCS) developed by Swank, Houseknecht, and Liu (2020), which consisted of 48 items across four domains: instruction and evaluation, knowledge and preparation, dispositions, and behaviors with technology use, with a reported reliability of .96 overall and subscales ranging from .79 to .95. Intrapersonal technology integration was measured using the Intrapersonal Technology Integration Scale (ITIS) by Niederhauser and Perkmen (2008), comprising 25 items organized into self-efficacy, outcome expectations, interest, and behavioral intentions, with Cronbach's alpha coefficients ranging from .89 to .93 and an overall alpha of .96. Student engagement was measured using the Higher Education Student Engagement Scale (HESES) developed by Maričić (2024), which included 28 items covering academic, online, cognitive, social, beyond-class, and affective engagement, with an overall reliability of .94 and subscales above .80. All instruments used a five-point Likert scale ranging from strongly disagree to strongly agree, with higher scores indicating stronger competence, integration, or engagement. Reliability and validity had been established in prior studies, and a pilot test was conducted with 30 respondents locally to confirm reliability, with Cronbach's alpha coefficients of 0.70 or higher considered acceptable.

3. Findings

The results in Table 1 indicate that respondents demonstrated a high level of intrapersonal technology integration ($\bar{x}$= 4.07, SD = 0.55), with the highest-rated subdimension being performance expectations ($\bar{x}$= 4.21), interpreted as very high. This suggests that teachers not only believe in their capability to use technology effectively (self-efficacy, $\bar{x}$ = 4.12) but also anticipate positive outcomes from doing so. Such findings reflect the growing body of research showing that self-efficacy in technology integration plays a critical role in shaping teachers' use of digital tools in pedagogically meaningful ways (Phan *et al.*, 2024; Thomas & Chukhlomin, 2020). Similarly, interest and behavioral intentions ($\bar{x}$ = 4.06) scored high, suggesting that educators are intrinsically motivated to explore and apply educational technologies in their classrooms—a vital factor in fostering sustainable technology use (Wang, 2022)

Table 1: Level of Intrapersonal Technology Integration

	Mean	SD	Interpretation
Self-Efficacy	4.12	0.62	High
Performance Expectations	4.21	0.63	Very High
Social Outcomes Expectation	3.88	0.75	High
Interest and Behavioral Intentions	4.06	0.65	High
Intrapersonal Technology Integration	4.07	0.55	High

Table 2 presents an overwhelmingly very high level of teaching competence ($\bar{x}$ = 4.34, SD = 0.52) across all components. The highest-rated domain, behavior and technology use ($\bar{x}$= 4.41), suggests that teachers are actively applying technology in instruction, aligning with the goals of the TPACK framework that emphasizes the integrated use of technology, pedagogy, and content knowledge (Singh & Malik, 2024). Equally high scores in dispositions, instruction and evaluation, and knowledge, ethics, and preparation further reinforce that these educators are not only skilled in planning and delivering instruction but also guided by ethical, professional standards and a deep knowledge base. Prior studies have established that high teaching competence is positively associated with student engagement and improved learning outcomes (Marissa & Allahji, 2021)

Table 2: Level of Teaching Competence

	Mean	SD	Interpretation
Instruction and Evaluation	4.31	0.56	Very High
Knowledge, Ethics, and Preparations	4.29	0.57	Very High
Dispositions	4.36	0.57	Very High
Behavior and Technology Use	4.41	0.59	Very High
Teaching Competence	4.34	0.52	Very High

In Table 3, the overall level of student engagement was reported as high ($\bar{x}$ = 4.03, SD = 0.56), with the highest score in online engagement ($\bar{x}$ = 4.32), which was interpreted as very high. This reflects a learning environment where digital tools are effectively used to foster participation and interaction—critical in today's hybrid and online education contexts. Other forms of engagement, including cognitive, affective, and social engagement with teachers and peers, all scored in the high range, highlighting a well-rounded engagement profile. These results support previous findings that link student engagement to both the quality of instruction and the teacher's capacity to use technology to personalize and enrich learning experiences (Zhou *et al.*, 2025; Kardiyem & Kusmuriyanto, 2022).

Table 3: Level of Student Engagement

	Mean	SD	Interpretation
Academic Engagement	3.83	0.72	High
Online Engagement	4.32	0.62	Very High
Cognitive Engagement	4.11	0.69	High
Social Engagement with Teachers	4.13	0.78	High
Social Engagement with Peers	3.84	0.86	High
Beyond Class Engagement	3.90	0.76	High
Affective Engagement	4.10	0.76	High
Student Engagement	4.03	0.56	High

3.1 Correlation Analysis

In Table 4, the correlation results reveal that all components of intrapersonal technology integration—self-efficacy, performance expectations, social outcomes expectation, and interest and behavioral intentions—are positively and significantly correlated with all dimensions of student engagement ($p < .001$). Among these, the overall intrapersonal technology integration score showed the strongest association with total student engagement ($r = 0.587$), indicating that teachers who are internally confident, motivated, and goal-oriented in their use of educational technology are more likely to foster highly engaged learners. This supports the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the role of teacher beliefs and capabilities in shaping interactive and responsive learning environments (Singh & Malik, 2024).

At the component level, interest and behavioral intentions ($r = 0.551$) and performance expectations ($r = 0.477$) exhibited the strongest relationships with overall student engagement, suggesting that when teachers are intrinsically motivated and anticipate positive outcomes from technology use, they are better positioned to create engaging classroom experiences. These findings are consistent with Wang (2022), who emphasized that teacher interest and future-oriented thinking are critical in sustaining effective technology integration (Wang, 2022). Self-efficacy ($r = 0.484$) was also strongly correlated, particularly with cognitive ($r = 0.439$) and online engagement ($r = 0.435$), reinforcing the idea that teachers who feel capable of integrating technology effectively are more likely to inspire deeper thinking and digital participation in students (Zhou *et al.*, 2022). While social outcomes expectation showed slightly lower correlations (ranging from 0.289 to 0.44), it still played a meaningful role, indicating that teachers' anticipation of social validation or recognition from using technology can modestly enhance student engagement.

Table 4: Test of significant correlation between Intrapersonal Technology Integration and Student Engagement

Variable	Self-Efficacy	Performance Expectations	Social Outcomes Expectation	Interest and Behavioral Intentions	Intrapersonal Technology Integration
Academic Engagement	0.34	0.335	0.289	0.409	0.413
	< .001	< .001	< .001	< .001	< .001
Online Engagement	0.435	0.465	0.323	0.466	0.502
	< .001	< .001	< .001	< .001	< .001
Cognitive Engagement	0.439	0.416	0.351	0.452	0.498
	< .001	< .001	< .001	< .001	< .001
Social Engagement with Teachers	0.364	0.328	0.337	0.383	0.425
	< .001	< .001	< .001	< .001	< .001
Social Engagement with Peers	0.286	0.326	0.354	0.375	0.406
	< .001	< .001	< .001	< .001	< .001
Beyond Class Engagement	0.356	0.349	0.345	0.425	0.445
	< .001	< .001	< .001	< .001	< .001
Affective Engagement	0.377	0.346	0.332	0.435	0.447
	< .001	< .001	< .001	< .001	< .001
Student Engagement	0.484	0.477	0.44	0.551	0.587
	< .001	< .001	< .001	< .001	< .001

Notably, online engagement (r = 0.502) and cognitive engagement (r = 0.498) were most strongly associated with intrapersonal technology integration overall, suggesting that students are particularly responsive to technology-enhanced learning environments when guided by teachers who are both competent and motivated to use digital tools. This aligns with findings from Marissa and Allahji (2021), who showed that teachers with high TPACK foster greater student investment in online and cognitively demanding tasks (Marissa & Allahji, 2021). Furthermore, significant relationships were also found with affective engagement (r = 0.447), social engagement with peers and teachers (r = 0.406 and r = 0.425, respectively), and beyond class engagement (r = 0.445), highlighting the broad impact of teachers' internal readiness on students' emotional connection, interpersonal interactions, and extended involvement in learning.

The correlation analysis revealed consistently positive and statistically significant relationships ($p < .001$) between all subcomponents of teaching competence and the various dimensions of student engagement, with overall teaching competence showing a strong correlation with overall student engagement (r = 0.665). Among the subdomains, Knowledge, Ethics, and Preparation (r = 0.664) and Dispositions (r = 0.623) demonstrated particularly strong associations, highlighting the importance of both professional integrity and teacher attitudes in shaping engaging learning environments. These findings align with the TPACK framework, which emphasizes the role of well-prepared, ethically grounded educators in designing effective, student-centered instruction (Singh & Malik, 2024), as well as with studies linking teacher mindset and ethical competence to deeper student involvement (Phan *et al.*, 2024).

Table 5: Test of significant correlation between Teaching Competence and Student Engagement

Variable	Instruction and Evaluation	Knowledge, Ethics, and Preparations	Dispositions	Behavior and Technology Use	Teaching Competence
Academic Engagement	0.333	0.404	0.35	0.291	0.379
	< .001	< .001	< .001	< .001	< .001
Online Engagement	0.516	0.561	0.542	0.504	0.585
	< .001	< .001	< .001	< .001	< .001
Cognitive Engagement	0.504	0.524	0.493	0.419	0.534
	< .001	< .001	< .001	< .001	< .001
Social Engagement with Teachers	0.551	0.588	0.573	0.507	0.611
	< .001	< .001	< .001	< .001	< .001
Social Engagement with Peers	0.439	0.454	0.429	0.273	0.438
	< .001	< .001	< .001	< .001	< .001
Beyond Class Engagement	0.448	0.47	0.441	0.352	0.471
	< .001	< .001	< .001	< .001	< .001
Affective Engagement	0.516	0.536	0.494	0.382	0.53
	< .001	< .001	< .001	< .001	< .001
Student Engagement	0.621	0.664	0.623	0.507	0.665
	< .001	< .001	< .001	< .001	< .001

Instruction and Evaluation, while slightly lower (r = 0.621), still demonstrated a strong connection with engagement, especially with cognitive (r = 0.504) and online engagement (r = 0.516). This indicates that when teachers implement structured, clear, and technologically informed instruction and assessments, students are more intellectually and digitally engaged—consistent with the findings of Marissa and Allahji (2021), who emphasized the cognitive benefits of well-integrated instruction in digital platforms (Marissa & Allahji, 2021). The Behavior and Technology Use dimension, although slightly lower than other domains (r = 0.507 with overall engagement), still had meaningful correlations with all engagement types—most notably with online engagement (r = 0.504) and social engagement with teachers (r = 0.507). These results suggest that actual classroom practices—especially those involving digital tools—have a tangible impact on how connected students feel to their teachers and to the learning process. This aligns with research indicating that teacher use of educational technology not only supports content delivery but also promotes relational and emotional bonds in the classroom (Zhou *et al.*, 2022).

Across individual engagement domains, the strongest correlations with overall teaching competence were found in social engagement with teachers (r = 0.611), affective engagement (r = 0.53), and online engagement (r = 0.585), indicating that when teachers demonstrate strong competence—particularly in planning, ethics, and student relationships—students are more likely to feel emotionally connected and socially involved. These findings reinforce the idea that teacher quality extends beyond

knowledge delivery to include relational and affective elements that are critical to student engagement (Kardiyem & Kusmuriyanto, 2022).

In Table 6, the findings from the mediation analysis provide robust evidence that teaching competence significantly influences student engagement, both directly and indirectly through intrapersonal technology integration. The statistically significant indirect effect ($a \times b = 0.327$, $p < .001$), which accounts for 54.50% of the total effect, underscores the critical role of teachers' internalized technological beliefs, attitudes, and self-efficacy in mediating the link between pedagogical skill and student involvement. This suggests that teaching competence alone is not sufficient; rather, its impact is amplified when educators also possess the confidence and personal commitment to effectively integrate technology into their instructional practices.

In Table 5, the findings reveal that among the examined variables, intrapersonal technology integration emerged as the strongest predictor of teaching competence across all domains, with correlations ranging from 0.534 to 0.652. This suggests that when teachers personally internalize and effectively use technology in their instructional practices, it significantly enhances their instructional abilities, knowledge, ethical practices, behavioral engagement, and overall teaching competence. This supports prior research emphasizing the transformative power of internalized digital integration on pedagogical effectiveness (Aytaç *et al.*, 2024; Kölemen, 2023).

Closely following this, interest and behavioral intentions also showed high correlations—particularly with knowledge, ethics, and preparation ($r = 0.637$) and teaching competence ($r = 0.614$). This highlights that teachers' intrinsic motivation and willingness to use technology significantly shape their professional readiness and instructional performance. This aligns with previous findings that behavioral intention is a consistent predictor of meaningful technology use in classrooms (Bejasa & Yango, 2023). Performance expectations and self-efficacy also showed strong correlations with teaching competence ($r = 0.578$ and $r = 0.553$, respectively), reinforcing the idea that when teachers believe in their abilities and expect success, they are more likely to adopt effective and innovative teaching strategies. This is consistent with literature showing that self-efficacy significantly influences classroom practice and technology adoption (Gomez & Gardose, 2025).

Table 6: Test of significant correlation between Teaching Competence and Intrapersonal Technology Integration

Variable	Instruction and Evaluation	Knowledge, Ethics, and Preparations	Dispositions	Behavior and Technology Use	Teaching Competence
Self-Efficacy	0.54	0.538	0.452	0.477	0.553
	< .001	< .001	< .001	< .001	< .001
Performance Expectations	0.571	0.563	0.478	0.487	0.578
	< .001	< .001	< .001	< .001	< .001
Social Outcomes Expectation	0.429	0.434	0.38	0.354	0.44
	< .001	< .001	< .001	< .001	< .001
Interest and Behavioral Intentions	0.601	0.637	0.52	0.475	0.614
	< .001	< .001	< .001	< .001	< .001
Intrapersonal Technology Integration	0.639	0.647	0.547	0.534	0.652
	< .001	< .001	< .001	< .001	< .001

On the other hand, social outcome expectations had the weakest correlations, ranging from 0.354 to 0.44. Although still significant, this suggests that external social approval or pressure has less influence on teachers' integration of technology and teaching competence compared to personal motivation and internalized beliefs. This finding mirrors existing research that intrinsic factors such as self-efficacy and personal interest play a more decisive role in driving educational technology use than social influences (Pan, 2008).

3.2 Mediation Analysis

Table 7 presents result from a **mediation analysis,** assessing how much of the total effect of an independent variable on a dependent variable is explained through a mediating variable. The mediation analysis revealed a statistically significant indirect effect of the independent variable on the dependent variable through the mediator ($a \times b = 0.327$, SE = 0.0358, 95% CI [0.257, 0.397], $Z = 9.14$, $p < .001$). This indicates that the mediator substantially contributes to explaining the relationship between the two variables. This finding aligns with a growing body of research highlighting the importance of technology-related self-efficacy in driving student engagement. Teachers who feel competent in their ability to use technology are more likely to design interactive and student-centered learning environments, which foster higher levels of cognitive and emotional engagement (Li *et al.*, 2019). Similarly, research by Tondeur *et al.* (2017) emphasized that internal factors, such as teachers' beliefs, motivation, and reflective attitudes toward technology use, are stronger predictors of classroom technology integration than access to external resources (Tondeur *et al.*, 2017). Furthermore, Inan and Lowther (2010) found that teachers' intrinsic readiness and confidence with technology significantly affect how successfully technology is used to promote student learning and engagement in real-world classrooms (Inan & Lowther, 2010).

Table 7: Mediation Analysis Summary Table

Effect	Label	Estimate	SE	95% Confidence Interval		Z	p	% Mediation
				Lower	Upper			
Indirect	a × b	0.327	0.0358	0.257	0.397	9.14	< .001	54.50
Direct	c	0.273	0.047	0.18	0.365	5.79	< .001	45.50
Total	**c + a × b**	**0.6**	**0.0402**	**0.521**	**0.678**	**14.93**	**< .001**	**100.00**

The statistically significant direct effect (c = 0.273, p < .001), accounting for 45.50% of the total effect, provides strong evidence for partial mediation. This implies that while intrapersonal technology integration mediates a substantial portion of the relationship, teaching competence also has a direct and independent influence on student engagement. This direct pathway may be attributed to core instructional competencies such as pedagogical clarity, responsiveness to student needs, emotional support, and effective classroom management. These foundational teaching skills remain impactful regardless of technological mediation. Empirical studies have consistently shown that highly competent teachers foster student engagement through structured lesson delivery, clear instructional goals, and a supportive classroom climate, even in resource-constrained or low-tech environments (Stronge *et al.*, 2011). Moreover, pedagogical content knowledge (PCK)—a core element of teaching competence—has been found to directly enhance students' cognitive and emotional engagement by aligning instructional methods with learner needs (Shulman, 1986). Research also suggests that emotionally supportive teacher-student relationships, built through teacher empathy and responsiveness, are strongly predictive of student engagement outcomes (Roorda *et al.*, 2011).

The total effect (0.600, p < .001) confirms a strong and meaningful overall relationship between teaching competence and student engagement, highlighting a dual pathway of influence. These findings are consistent with the Technological Pedagogical Content Knowledge (TPACK) framework, which asserts that effective teaching in the 21st century requires the integration of content knowledge, pedagogical skills, and technological proficiency (Koehler & Mishra, 2009). Empirical studies reinforce this view, showing that educators with high TPACK are more capable of designing engaging, effective learning environments, especially in online or technology-enhanced contexts (Phan *et al.*, 2024; Thomas & Chukhlomin, 2020). Moreover, higher student engagement has been found to mediate the relationship between teaching methods and the development of TPACK and global competencies, suggesting that student engagement plays an active role in reinforcing teaching competence (Kardiyem & Kusmuriyanto, 2022). Teachers with advanced technology integration skills are better equipped to craft interactive and personalized learning experiences, which significantly enhance student engagement and academic performance (Lai *et al.*, 2021; Marissa & Allahji, 2021).

Shown in Figure 1 is the estimate plot of direct, indirect, and total effects. The visualized mediation model illustrates the total, direct, and indirect effects of intrapersonal technology integration on student engagement, offering clear evidence of a statistically significant relationship across all pathways. The total effect is approximately 0.60, with a confidence interval that does not include zero, indicating a

strong and meaningful overall influence of intrapersonal technology integration on student engagement. This suggests that teachers who possess higher levels of internal motivation, self-efficacy, and expectations regarding technology use are more likely to foster greater student engagement.

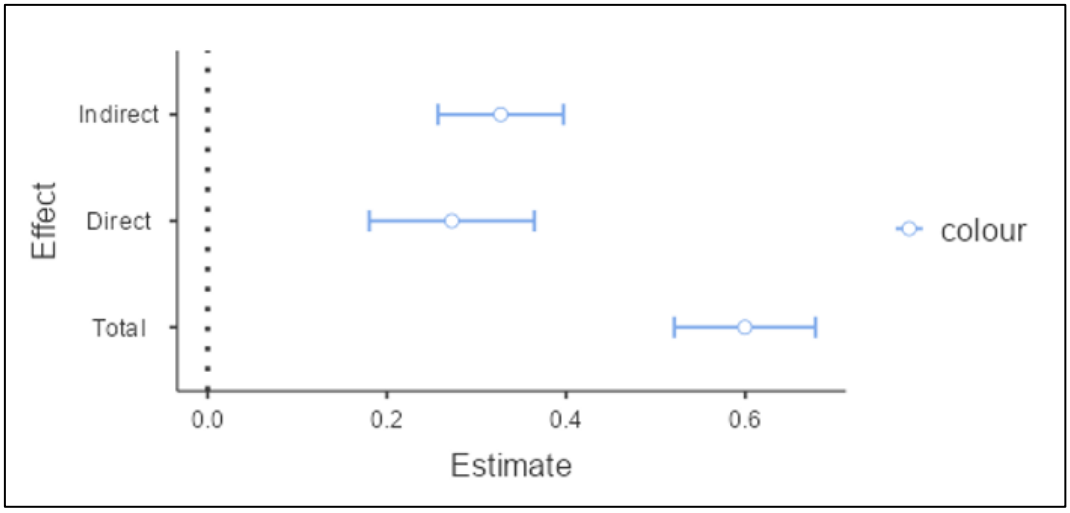

Figure 1: Estimate plot of direct, indirect, and total effects

Breaking down the total effect, the direct effect is approximately 0.27, also statistically significant. This means that even without accounting for mediating variables, intrapersonal technology integration has a positive and substantial influence on student engagement. In other words, teachers who are intrinsically motivated and confident in their use of technology can independently drive student participation and involvement in learning activities.

The indirect effect, estimated at around 0.33, is also significant, indicating that part of the influence of intrapersonal technology integration operates through a mediating variable—likely teaching competence, based on related data. This implies a partial mediation model, where intrapersonal technology integration not only affects student engagement directly but also enhances it indirectly by improving the teacher's competence. This finding is consistent with the Technological Pedagogical Content Knowledge (TPACK) framework, which posits that internal teacher capacities related to technology use can shape instructional quality and, in turn, promote more engaging learning environments (Phan *et al.*, 2024; Marissa & Allahji, 2021).

4. Conclusion

The findings of this study collectively highlight the pivotal role of intrapersonal technology integration and teaching competence in promoting student engagement. Descriptive analysis revealed that participants demonstrated high levels of intrapersonal technology integration, particularly in performance expectations and behavioral intentions, and very high levels of teaching competence across all dimensions, notably in

behavior and technology use. Students also reported generally high engagement, especially in online and cognitive domains. Correlation analyses further confirmed that both intrapersonal technology integration and teaching competence were positively and significantly associated with all forms of student engagement, with the strongest relationships observed for online, cognitive, and social engagement with teachers. Notably, mediation analysis revealed a partial mediation model, indicating that intrapersonal technology integration affects student engagement both directly and indirectly through teaching competence. This dual pathway reinforces the TPACK framework, which emphasizes that effective teaching in the digital age depends not only on technological skills but also on the internal motivation, confidence, and pedagogical integration capacity of the teacher (Phan *et al.*, 2024; Marissa & Allahji, 2021). In conclusion, enhancing teachers' intrapersonal capacities for technology use—such as self-efficacy, expectations, and interest—not only improves their instructional competence but also significantly fosters student engagement, suggesting a key focus area for future professional development programs.

Conflict of Interest Statement
The author declares no conflicts of interest.

About the Author
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