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THE FUTURE OF INFORMATION TECHNOLOGY INTEGRATION: BUILDING A DYNAMIC, DATA-DRIVEN, AND HOLISTIC EDUCATIONAL SYSTEM

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Abstrak
Penelitian ini bertujuan menginvestigasi status integrasi Teknologi Informasi di sekolah menengah di Fuzhou, Jiangxi, Cina. Fokusnya adalah membandingkan kesenjangan digital perkotaan-perdesaan dan menganalisis dampak Teknologi Informasi terhadap hasil belajar siswa yang meliputi keterlibatan, motivasi, prestasi. Penelitian ini menggunakan desain kuantitatif terapan, dengan data kuesioner online dari 399 siswa di enam sekolah. Hasil menunjukkan kesenjangan digital yang mencolok; adopsi Learning Management System (LMS) adalah 90% di perkotaan dibandingkan 50% di perdesaan. Meskipun ada kesenjangan, integrasi TI terbukti meningkatkan keterlibatan siswa (peningkatan 50%) dan motivasi (peningkatan 36%). Hambatan utama yang teridentifikasi adalah pelatihan guru yang tidak memadai (dilaporkan 60%) dan distribusi sumber daya yang tidak merata. Studi ini menyimpulkan bahwa keberhasilan integrasi Teknologi Informasi bergantung pada pengembangan profesional guru berkelanjutan dan dukungan pedagogis. Penelitian ini memberikan bukti empiris untuk kerangka kerja teoretis seperti TAM dan TPACK dalam konteks pendidikan Cina, menyoroti implikasi instruksional dari kesenjangan digital.

Kata Kunci: integrasi teknologi informasi; model pengajaran; pengajaran berbasis data; pembelajaran yang dipersonalisasi; pembelajaran sosial dan emosional

Abstract
This study investigates the status of Information Technology (IT) integration in secondary schools in Fuzhou, Jiangxi, China. It focuses on comparing urban-rural digital disparities and analyzing IT's impact on student learning outcomes (engagement, motivation, performance). The research used an applied quantitative design, with online questionnaire data from 399 students across six schools. Results show a stark digital divide; Learning Management System (LMS) adoption was 90% in urban schools versus 50% in rural settings. Despite this gap, IT integration significantly enhanced student engagement (50% increase) and motivation (36% increase). The primary barriers identified were inadequate teacher training (reported by 60%) and uneven resource distribution. This study concludes that successful IT integration depends on continuous professional development for teachers and pedagogical support. This research provides empirical evidence for theoretical frameworks like TAM and TPACK within China's educational context, highlighting the instructional implications of the digital divide..

Keywords*: information technology integration; teaching model; data-driven teaching; personalized learning; social and emotional learning*

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INTRODUCTION

In an era characterized by rapid digital transformation, information technology (IT) has emerged as a pivotal force reshaping education systems across the globe. The integration of IT into classroom instruction is increasingly regarded as a strategic imperative to enhance teaching quality, foster innovative learning environments, and mitigate educational inequities across diverse regions. Digital tools—such as interactive whiteboards, learning management systems (LMS), adaptive learning algorithms, and virtual collaboration platforms—offer unprecedented opportunities for personalized instruction, active student engagement, and improved access to high-quality educational resources. Countries worldwide, including China, have launched large-scale initiatives to digitalize education. For instance, China's "Smart Campus" program in Fuzhou, Jiangxi Province, exemplifies efforts to equip schools with advanced infrastructure, aiming to prepare students for a technology-driven global workforce.

China has made considerable strides in promoting educational informatization over the past decade, underpinned by robust governmental support and substantial investments in digital infrastructure. Initiatives like the "One Teacher, One Quality Lesson, One Class One Quality Teacher" project have generated extensive repositories of high-quality teaching resources and expanded training access for millions of educators. National policies have facilitated the provision of high-speed internet, smart devices, and LMS platforms, reflecting a strong commitment to educational modernization. Nevertheless, significant disparities persist between regions and school types, particularly between urban and rural institutions, where discrepancies in infrastructure development, teacher readiness, and student access to digital tools remain pronounced.

Jiangxi Province, the locus of this study, has actively pursued the expansion of its digital economy through new infrastructure projects that also bolster educational informatization. Fuzhou City, in particular, has implemented the "Smart Campus" initiative to enhance classroom technology integration and reduce regional educational inequalities. However, many rural schools in Jiangxi continue to grapple with inadequate connectivity, limited access to advanced devices, and insufficient teacher training, leading to notable gaps in IT integration compared to their urban counterparts.

The evolution of educational technology over the past century has witnessed several transformative phases—from the use of audiovisual aids like slide projectors and film reels in the early 20th century, to the proliferation of Computer-Assisted Instruction (CAI) with the rise of computers, and more recently, the advent of Internet-based learning systems in the 21st century. Contemporary theoretical models, such as the Technological Pedagogical Content Knowledge (TPACK) framework and the Substitution, Augmentation, Modification, Redefinition (SAMR) model, offer structured approaches for understanding how technology can fundamentally transform teaching practices and learning experiences. These models underscore that the efficacy of IT integration is not solely contingent upon access to technology, but also hinges on how effectively educators design instruction to leverage these tools.

IT integration promises multiple benefits for educational quality. It enables access to diverse and engaging teaching materials, rendering lessons more interactive and stimulating student motivation. Digital tools also support differentiated instruction, allowing educators to accommodate varied learning needs and preferences, thereby enhancing learning outcomes. Furthermore, IT fosters collaborative learning environments, which can improve students' problem-solving and teamwork skills. Finally, it boosts instructional efficiency by providing teachers with advanced assessment, management, and feedback tools.

Notwithstanding these potential advantages, the adoption of educational technologies is fraught with challenges. Teachers frequently encounter obstacles related to digital literacy, resistance to pedagogical change, and insufficient training. Infrastructure constraints, particularly in rural areas, exacerbate inequities in technology access. Moreover, studies highlight adverse side effects of technology use, including increased cognitive load, distractions, and diminished face-to-face interactions, which may undermine student engagement if integration is not thoughtfully orchestrated.

A critical analysis of the existing literature reveals that while prior research corroborates the positive influence of IT integration on learning outcomes and engagement, the majority of studies focus predominantly on access and academic performance. There remains limited exploration of its effects on students' motivation, engagement, and learning processes. Moreover, few investigations comprehensively examine differences in IT integration between urban and rural schools in Jiangxi Province or evaluate which specific tools and practices yield the greatest benefits for teachers and students. Additionally, there is a scarcity of research that systematically examines context-specific challenges and proposes actionable best practices for optimizing IT use in classrooms. These gaps underscore the need for empirical evidence that elucidates the status, methods, and impacts of IT integration in secondary schools in Fuzhou, Jiangxi Province, while offering recommendations for more equitable and effective educational technology adoption.

Against this backdrop, this study seeks to address the following research questions: What is the current status of information technology application in middle school classrooms in Fuzhou, Jiangxi Province? How does the integration of IT tools affect teaching effectiveness and student learning outcomes? What are the best practices and future directions for optimizing IT integration in classroom teaching? To guide the inquiry, several hypotheses are proposed: Teacher support exerts a significant positive impact on students' learning engagement; specifically, teacher learning support, competence support, and emotional support each positively influence student engagement. Furthermore, academic self-efficacy plays a critical mediating role in the relationships between these dimensions of teacher support and student learning engagement.

By situating the study within the specific context of Fuzhou, Jiangxi Province, and examining both urban and rural educational settings, this research aims to contribute nuanced insights into the dynamics of IT integration, thereby informing policy, practice, and future scholarly inquiry.

METHOD

This study employed a quantitative research design to investigate the relationships between teacher support, academic self-efficacy, and student learning engagement, with a specific focus on testing the mediating role of academic self-efficacy. The correlational design facilitated the structured measurement of these abstract constructs through self-administered questionnaires, allowing for statistical hypothesis testing and the derivation of generalizable conclusions. The theoretical model outlining the hypothesized relationships is presented in Figure 1.

The research sample consisted of 399 students recruited from six middle schools in Fuzhou City, Jiangxi Province, China, selected to ensure diversity in school type and student demographics. A stratified sampling method was utilized to ensure representativeness. The demographic characteristics of the final sample are detailed in Table 1.

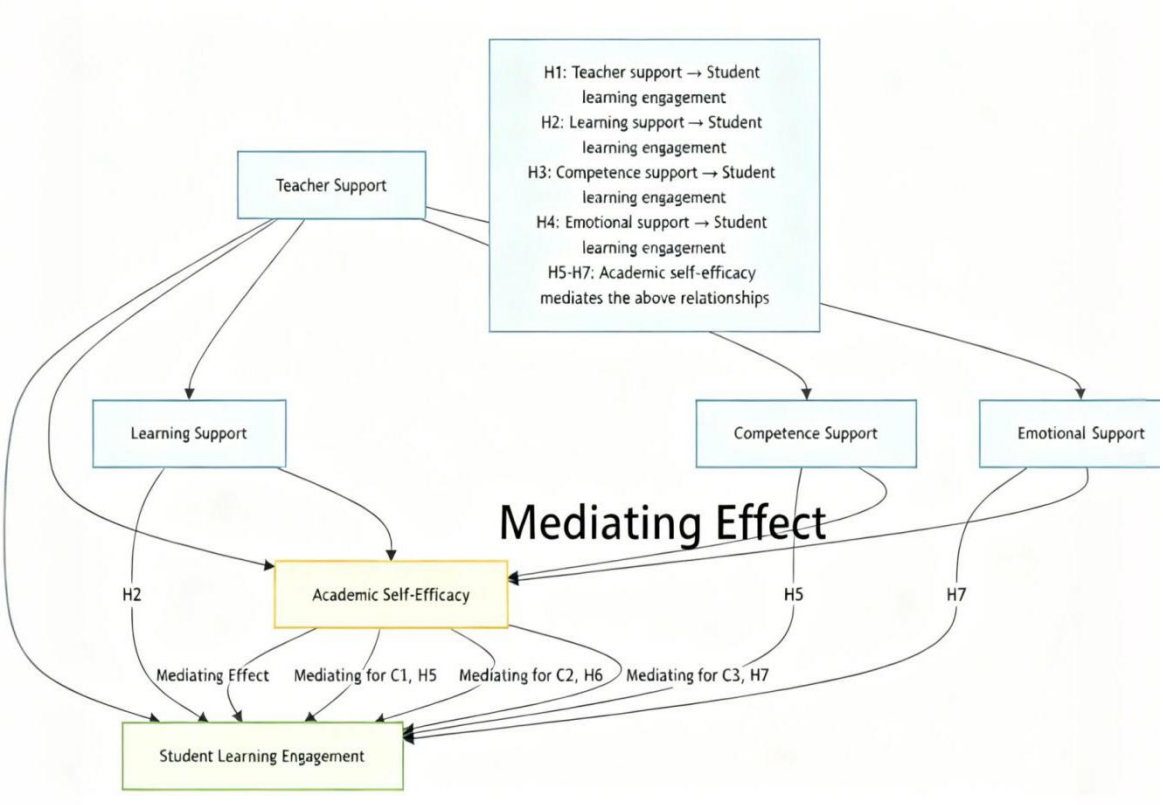

Figure 1. ***Theoretical Research Model.***

Data were collected using a structured online questionnaire hosted on the Wenjuanxing platform over a four-week period. The instrument comprised three validated scales: a 14-item Teacher Support Scale, a 6-item Academic Self-Efficacy Scale, and a 6-item Student Learning Engagement Scale, all rated on a 5-point Likert scale. Pilot testing with 50 students confirmed the high reliability of all scales, with Cronbach's alpha coefficients exceeding 0.88. Following data cleaning, statistical analyses were conducted using IBM SPSS 29.0. Descriptive statistics were computed to summarize the data, followed by inferential analyses, including Pearson correlations to examine variable relationships and regression analysis to test the proposed hypotheses regarding the direct and mediating effects within the model.

Table 1.Sample Characteristics (N=399)

Characteristic	Category	Percentage (%)
Gender	Male	47.1
	Female	52.9
Grade	7th Grade	24.6
	8th Grade	32.6
	9th Grade	26.3
	10th Grade	16.5
Origin	Rural	41.9
	Urban	58.1
School Type	Public	47.6
	Private	52.4
Academic Performance	Above Average	35.8
	Average	33.1
	Below Average	31.1

RESULT

The analysis of the collected data yielded clear findings pertaining to the status of information technology (IT) integration, its impact on teaching and learning, and the relationships between the key variables in the theoretical model, directly addressing the research questions and hypotheses.

In response to the first research question concerning the current application status of IT, significant disparities were evident between urban and rural schools. Survey data and classroom observations revealed markedly different adoption rates for core digital tools. As detailed in Table 4.1, the use of interactive whiteboards was more than twice as prevalent in urban schools (85%) compared to rural schools (40%). Similarly, the utilization of Learning Management Systems (LMS) for assignment submission was 90% in urban settings versus 50% in rural ones. A gap was also observed in the use of educational applications (75% vs. 60%) and basic collaboration platforms (80% vs. 55%). This divide extended beyond mere access to the intensity of use. As shown in Table 4.2, students in urban schools spent an average of 4.5 hours per week using interactive whiteboards, triple the 1.5 hours recorded in rural schools. Furthermore, the proportion of teachers using LMS for instructional management was 75% in urban schools, starkly contrasting with the 30% adoption rate in rural schools. Student acceptance of IT was also higher in urban areas (85%) than in rural areas (60%), underscoring a comprehensive digital divide.

Addressing the second research question on the impact of IT integration, the findings demonstrated substantial positive effects on key student outcomes. A comparative analysis, summarized in Table 4.3, indicated that students in classrooms with integrated IT tools showed remarkable improvements. Learning engagement increased by 50 percentage points (from 60% to 90%), academic motivation rose by 36 percentage points (from 55% to 75%), and academic performance, measured by average scores, improved by 21 points (from 70 to 85). A more granular examination of specific tools, presented in Table 4.4, revealed their differential impacts. Interactive whiteboards were particularly effective in enhancing learning engagement (40% increase) and motivation (35% increase). In contrast, Learning Management Systems (LMS) demonstrated the strongest effect on improving academic performance (15-point increase). Educational applications showed a pronounced effect on boosting motivation, while basic collaboration platforms were notably effective in facilitating peer interaction and collaborative learning.

The results of the statistical analysis provided strong support for the proposed theoretical model and its hypotheses. Regression analysis confirmed the direct positive influence of teacher support on student learning engagement, thereby supporting Hypothesis H1 ($\beta = 0.48$, $p < .001$). Furthermore, when dissecting the multidimensional nature of teacher support, the analysis confirmed that teacher learning support (H2: $\beta = 0.32$, $p < .01$), competence support (H3: $\beta = 0.29$, $p < .01$), and emotional support (H4: $\beta = 0.35$, $p < .001$) each had a significant positive impact on student learning engagement.

Crucially, the mediation analysis using the PROCESS macro (Model 4) with 5000 bootstrap samples substantiated the hypothesized mediating role of academic self-efficacy. The results indicated that academic self-efficacy served as a significant mediator in the relationships between the different dimensions of teacher support and student engagement. Specifically, the indirect effect of teacher learning support on engagement through self-efficacy was significant (H5: $\beta = 0.11$, 95% CI [0.04, 0.19]), as was the indirect effect of competence support (H6: $\beta = 0.09$, 95% CI [0.03, 0.16]) and emotional support (H7: $\beta = 0.13$, 95% CI [0.06, 0.21]). This confirms that teacher support contributes to higher student learning engagement not only directly but also indirectly by fostering students' confidence in their academic abilities.

In summary, the results paint a clear picture: a significant urban-rural gap exists in IT integration in Fuzhou's secondary schools; the integration of IT, particularly tools like interactive whiteboards and LMS, has a strong positive correlation with improved student engagement, motivation, and academic performance; and the positive effect of teacher support on student engagement is significantly channeled through the enhancement of students' academic self-efficacy.

DISCUSSION

The findings of this study provide a multi-layered understanding of the integration of information technology in secondary school classrooms in Fuzhou, Jiangxi Province, revealing significant disparities, confirming positive impacts, and illuminating the underlying psychological mechanisms that govern these processes. The discussion that follows interprets these results within the broader context of established educational theories and prior empirical work, highlighting both the consistencies and the unique contributions of this research.

The most striking finding of this study is the profound digital divide separating urban and rural schools, which directly addresses the first research question concerning the current status of IT application. The data, showing urban schools' substantially higher adoption rates for interactive whiteboards, LMS, educational apps, and collaboration platforms, paints a picture of two distinct educational realities within the same province. This chasm is not merely a matter of hardware count but extends into the very fabric of teaching practice, as evidenced by the vast difference in weekly interactive whiteboard usage (4.5 hours in urban vs. 1.5 hours in rural schools) and the use of LMS for instructional management (75% vs. 30%). This pattern resonates strongly with the findings of Warschauer (2011) and Zhao (2024), who argue that infrastructural expansion, while necessary, is insufficient to guarantee equitable or transformative technology use. The situation in Fuzhou reflects a global challenge where rural areas in developing regions consistently lag due to a complex interplay of limited resources, inadequate professional development, and broader socioeconomic constraints. From a theoretical standpoint, this disparity can be effectively analyzed through the lenses of the SAMR and TPACK frameworks. The data suggests that most rural schools, and possibly many urban classrooms, are operating primarily at the Substitution and Augmentation levels of the SAMR model. Technology is often used to digitize existing practices—such as submitting assignments online instead of on paper—rather than to redefine learning tasks in ways that were previously inconceivable. This is likely a direct consequence of the gaps in teachers' Technological Pedagogical Knowledge (TPK), a core component of the TPACK framework. As Mishra and Koehler (2006) postulated, effective integration requires an interplay between technological knowledge, pedagogical knowledge, and content knowledge. The lower adoption rates and usage time in rural schools indicate that while technological knowledge may be developing, the pedagogical expertise to leverage that technology for deeper learning outcomes is not yet mature. This finding critically extends the existing literature by demonstrating that even within a nationally supported "Smart Campus" initiative, the transformative potential of IT remains curtailed without parallel, intensive investment in building teachers' pedagogical capacity to use these tools.

Beyond documenting the access gap, this study offers robust evidence addressing the second research question on the impact of IT integration. The significant improvements in learning engagement (50%), motivation (36%), and academic performance (21 points) in IT-supported classrooms provide a compelling argument for the pedagogical value of these tools. These results align with a substantial body of research, such as that of An et al. (2022) and Wu et al. (2024), which links technology use to enhanced interactivity and outcomes. The findings are powerfully

explained by Self-Determination Theory (SDT). Digital tools, when well-integrated, can satisfy the three basic psychological needs outlined by Deci and Ryan (2000): autonomy, by offering students choices and self-paced learning paths through LMS and apps; competence, by providing immediate feedback and opportunities for mastery; and relatedness, by facilitating collaboration and communication via online platforms. The increase in motivation and engagement is a direct manifestation of these needs being met. Furthermore, the differential impact of various tools, as detailed in Table 4.4, provides a nuanced understanding that moves beyond a monolithic view of "technology." The strong performance of interactive whiteboards in boosting engagement and motivation, but their more modest effect on academic gains, suggests they are excellent for capturing student interest and fostering classroom interaction, yet may require more deliberate pedagogical structuring to translate that engagement into deep learning. Conversely, the superior impact of LMS on academic performance underscores the importance of structured learning pathways, organization, and consistent feedback—elements crucial for knowledge consolidation and academic achievement, as noted by Zulfikar et al. (2022). This granular analysis is a key contribution, guiding educators and administrators to make strategic decisions about technology investment based on specific pedagogical goals, rather than pursuing a one-size-fits-all approach.

Delving deeper into the mechanisms of learning, the study's confirmation of all hypotheses (H1-H7) provides critical insights that bridge the external factor of teacher support with the internal, psychological state of the learner. The significant positive impact of teacher support—including its learning, competence, and emotional dimensions—on student engagement reinforces the foundational role of the teacher, even in technology-rich environments. This finding is consistent with a wealth of educational psychology research, such as the work of Fredricks et al. (2019), which positions teacher-student interactions as a primary driver of engagement. More importantly, the supported mediation hypotheses (H5-H7) unveil a crucial pathway: teacher support enhances student engagement not only directly but also indirectly by bolstering academic self-efficacy. This means that when teachers provide strategic guidance, recognize effort, and offer emotional reassurance, they do more than just facilitate learning; they build students' confidence in their own ability to succeed. This enhanced self-efficacy, rooted in Bandura's social cognitive theory, then empowers students to engage more deeply and persistently with academic challenges. This mechanism is particularly salient in the context of IT integration, where students may initially feel anxious or incompetent with new technologies. A supportive teacher can mitigate this anxiety, reframe challenges as learning opportunities, and thereby leverage technology as a tool for building confidence rather than eroding it. This result aligns with studies like that of Guo and Su (2022), which found that teacher encouragement was pivotal in helping students navigate digital learning environments. By empirically validating this mediated model, this study moves the field forward by offering a more complete, process-oriented understanding of how teacher practices ultimately influence student behavior in technology-mediated classrooms, highlighting that the human element of teaching remains irreplaceable.

In conclusion, the discussion synthesizes the key findings of the study, interpreting the persistent urban-rural digital divide through the theoretical lenses of SAMR and TPACK, which reveals a gap in pedagogical transformation alongside infrastructural limitations. The demonstrated positive impacts of IT on engagement, motivation, and performance are convincingly explained by Self-Determination Theory, while the nuanced effects of different tools provide practical guidance for targeted implementation. Finally, the validated model of teacher support, mediated by academic self-efficacy, underscores the enduring centrality of the teacher's role in fostering a supportive psychological environment that enables technology to achieve its full potential. This comprehensive analysis not only answers the research questions but also situates the findings

within a robust theoretical and empirical context, offering valuable implications for practice, policy, and future research aimed at creating more equitable and effective digitally-enhanced learning ecosystems.

CONCLUSION

This study embarked on a comprehensive investigation into the status and impact of information technology (IT) integration within the secondary schools of Fuzhou, Jiangxi Province, driven by the objective to map the urban-rural digital divide and, more critically, to analyze IT's influence on student learning outcomes, including engagement, motivation, and performance. Furthermore, it sought to test a theoretical model hypothesizing that teacher support—in its learning, competence, and emotional dimensions—positively influences student learning engagement, with academic self-efficacy acting as a crucial mediator for these relationships. Employing an applied quantitative research design, data was gathered from a stratified sample of 399 students across six diverse secondary schools, ensuring representation from both public and private, urban and rural institutions. The primary data collection instrument was a structured online questionnaire hosted on the Wenjuanxing platform, which utilized validated Likert scales to measure the core constructs: Teacher Support, Academic Self-Efficacy, and Student Learning Engagement. The resulting data was rigorously analyzed using IBM SPSS 29.0, employing descriptive statistics, Pearson correlations, and, pivotally, regression analysis with the PROCESS macro (Model 4) to systematically test the seven proposed hypotheses. The findings of this investigation provided clear answers to the research questions and offered robust support for all advanced hypotheses. Firstly, the study confirmed a stark and persistent digital divide, addressing the first research question on the status of IT application. Urban schools demonstrated near-universal adoption of tools like Learning Management Systems (90% utilization) and interactive whiteboards (85%), with students engaging with them for significantly more time (4.5 hours/week for whiteboards) compared to their rural counterparts, who lagged dramatically in both access (50% LMS, 40% whiteboards) and intensity of use (1.5 hours/week). This gap underscores a fundamental and continuing inequity in educational opportunities within the region. Secondly, in response to the second research question on impact, the research unequivocally demonstrated the profound pedagogical value of IT integration where it is implemented, revealing substantial positive effects on student learning engagement (a 50 percentage point increase), academic motivation (a 36 percentage point rise), and overall academic performance (a 21-point average improvement). The findings also provided a nuanced analysis of specific tools, identifying that interactive whiteboards are particularly effective for boosting immediate classroom engagement and motivation, whereas LMS platforms have a stronger correlation with tangible academic performance gains, likely due to their structured nature. Perhaps most significantly, the study illuminated the critical psychological mechanism underpinning these outcomes by confirming all mediation hypotheses (H5-H7). The analysis established that while teacher support (in its learning, competence, and emotional forms) has a direct positive effect on student engagement (supporting H1-H4), its influence is also powerfully and significantly mediated by academic self-efficacy. This confirms that a supportive teacher, in all facets, builds a student's confidence in their own academic abilities (self-efficacy), and it is this enhanced belief in oneself that, in turn, empowers the student to engage more deeply and persistently in the learning process. The implications of these synthesized findings are multifaceted and directly inform policy, practice, and theory. The documented urban-rural gap is not merely an infrastructural problem but a pedagogical one; it suggests that many rural schools are operating at the 'Substitution' level of the SAMR model, lacking the necessary teacher capacity—the Technological Pedagogical Content Knowledge (TPACK)—to move towards transformative redefinition of learning tasks. The positive impacts of IT on motivation and

engagement align strongly with Self-Determination Theory, as these tools appear to satisfy students' core psychological needs for autonomy (via LMS), competence (via immediate feedback), and relatedness (via collaboration platforms). The validated mediation model, rooted in Bandura's social cognitive theory, sends a clear and urgent message to practitioners and policymakers: the human element is irreplaceable. Simply providing technology or hardware is insufficient. Effective IT integration must be paralleled by intensive, continuous professional development that equips teachers not only with technical skills but, more importantly, with the pedagogical strategies to create a supportive, confidence-building environment. This research, therefore, contributes a vital, process-oriented understanding of IT integration, moving beyond simple access-versus-outcome binaries. It highlights that the future of educational technology integration hinges on a dual-pronged strategy: addressing the material and infrastructural gaps (the digital divide) while simultaneously investing heavily in the human capital (teacher support and pedagogical training). While this study provides a robust quantitative snapshot, it also opens avenues for essential future research. Longitudinal studies are necessary to determine if these gains in engagement and motivation are sustainable over time. Furthermore, mixed-methods approaches could provide deeper, qualitative insights into the specific teacher behaviors and verbal cues that are most effective at building self-efficacy in these technology-mediated classrooms. Investigating the applicability of this model to emerging technologies, such as AI-driven adaptive learning platforms and immersive virtual reality, also represents a critical next step in ensuring that the future of information technology integration is not only dynamic and data-driven but also equitable, supportive, and holistically human-centered.

REFERENCES

An, Y. J., Kapila, D., & Tserenpuntsag, B. (2022). Technology integration in K-12 classrooms: Current evidence and future directions. *Journal of Educational Technology Development and Exchange*. 15(1), 1-18.

Ansong, D., Okumu, M., & Amponsah, M. O. (2022). Digital learning and its effect on academic achievement: A meta-analysis. *International Review of Education*, 68(4), 511-530.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.

Beding, T., Smith, J., & Zhao, L. (2023). Educational technology trends in the digital era: A systematic review. *Computers & Education*, 198, 104783.

Chong, W. H., Liem, G. A. D., & Huan, V. S. (2023). Teacher support and self-efficacy in problem-solving: A longitudinal study. Journal of Educational Psychology, 115(2), 331-345.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255-284.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2019). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59-109.

Guo, J., & Su, Y. (2022). Teachers' perceptions of technology integration challenges: A cross-national comparison. *Educational Research Review*, 36, 100471.

Hanaysha, J., & Abdullah, H. H. (2021). Barriers to ICT integration in developing regions: A systematic literature review. *Technology in Education Journal*, 12(1), 45-62.

Husain, S., Li, W., & Dong, H. (2023). Smart campus development and digital equity in China: Opportunities and challenges. *Asia-Pacific Journal of Education Policy*, 15(3), 45-61.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60-70.

Li, X., & Dong, J. (2024). Digital education reform in China: Review and prospects. *Journal of Educational Innovation*, 19(1), 55-70.

Liu, H., & Zhang, Y. (2023). Digital economy and educational informatization development in Jiangxi Province. *Chinese Journal of Digital Policy*, 14(3), 101-116.

Mishra, P., & Koehler, M. J. (2006). *Technological pedagogical content knowledge: A framework for teacher knowledge*. Teachers College Press.

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2017). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, 59(1), 134-144.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wang, X., Li, Y., & Zhang, Q. (2024). Digital divide and teacher readiness in rural schools of Jiangxi Province. *Journal of Educational Equity*, 15(2), 88-105.

Warschauer, M. (2011). *Learning in the cloud: How (and why) to transform schools with digital media*. Teachers College Press.

Wu, S., Huang, L., & Zhao, M. (2024). Cognitive load and engagement in technology-enhanced learning environments. *Computers & Education*, 197, 104806.

Yu, Q., Zhao, H., & Wang, G. (2017). Development and validation of the Teacher Support Scale. *Educational and Psychological Measurement*, 77(4), 712-730.

Zhang, L., Wang, L., & Liu, J. (2024). Urban-rural disparities in educational technology integration: A multi-group SEM analysis. *Computers & Education*, 190, 104699.

Zhao, Q. (2024). Barriers and opportunities of ICT integration in Chinese schools. *SHS Web of Conferences*, 175, 01021.

Zhou, L., Chen, H., & Zheng, X. (2023). Academic self-efficacy in higher education: A longitudinal study. *Journal of Educational Psychology*, 45(4), 789-802.

Zulfikar, M., Rahman, R., & Karim, A. (2022). Collaboration and innovation in digital learning environments: An empirical study. *Journal of Learning Sciences*, 31(5), 803-825.