SERUMPUN : Journal of Education, Politic, and Social Humaniora
E-ISSN : 2988-7232
Vol. 3, No. 2, Juli - Desember 2025
https://husin.id/index.php/serumpun/index
DOI : 10.61590/srp.v3i2.210

TEACHERS AS DIGITAL FACILITATORS: A QUALITATIVE STUDY ON PROFESSIONAL ADAPTATION IN TECHNOLOGY-BASED CURRICULUM

Garry Brumadyadisty[1], Siska Armawati Sufa[2], Gardena Smoro Laksmi[3], Suprayitno[4]

Universitas Islam Syekh Yusuf, Tangerang, West Java, Indonesia[1]
Universitas Dr. Soetomo, Surabaya, East Java, Indonesia[2]
SMP Negeri 2 Buduran, Sidoarjo, East Java, Indonesia[3,4]
[1] garrybrumadyadisty@gmail.com, [2] siska.armawati@unitomo.ac.id,
[3] slgardena@gmail.com, [4] mayprashitnew@gmail.com

ARTICLE INFO

Article History

Published : 31 Dec 2025

Keywords

Identitas Profesional, Fasilitator Digital, Efikasi Diri, Kolaborasi Antar Rekan, Pendidikan Digital

Professional Identity, Digital Facilitator, Self-Efficacy, Peer Collaboration, Digital Education

ABSTRACT

Perkembangan teknologi digital mendorong perubahan signifikan dalam praktik pendidikan, khususnya pada peran guru yang bertransformasi dari penyampai pengetahuan menjadi fasilitator digital. Penelitian ini berangkat dari masalah rendahnya kesiapan pedagogis dan dukungan institusional yang dialami guru dalam menghadapi tuntutan pembelajaran berbasis teknologi. Tujuan penelitian ini adalah untuk menganalisis proses rekonstruksi identitas profesional guru, faktor pendukung dan penghambat, serta implikasinya terhadap praktik pedagogis di era digital. Metodologi penelitian menggunakan pendekatan kualitatif dengan analisis tematik berbantuan NVivo, melibatkan wawancara mendalam dengan guru dari berbagai konteks sekolah. Hasil penelitian menunjukkan bahwa perubahan peran guru menuntut penyesuaian kognitif, emosional, dan sosial. Efikasi diri terbukti menjadi faktor sentral dalam keberhasilan adaptasi, sementara keterbatasan infrastruktur dan kebijakan administratif yang ambigu menimbulkan tekanan emosional. Kolaborasi sejawat dan praktik reflektif menjadi penguat resiliensi serta sumber inovasi pedagogis. Kesimpulan penelitian ini menegaskan bahwa adaptasi digital bukan sekadar keterampilan teknis, melainkan proses rekonstruksi identitas pedagogis yang dipengaruhi agensi internal, struktur sosial, dan dukungan institusional.

The development of digital technology has driven significant changes in educational practices, particularly in the role of teachers, who have transformed from knowledge deliverers to digital facilitators. This study stems from the problem of low pedagogical readiness and institutional support experienced by teachers in facing the demands of technology-based learning. The purpose of this study is to analyze the process of reconstructing teachers' professional identities, supporting and inhibiting factors, and their implications for pedagogical practices in the digital era. The research methodology used a qualitative approach with NVivo-assisted thematic analysis, involving in-depth interviews with teachers from various school contexts. The results show that the changing role of teachers requires cognitive, emotional, and social adjustments. Self-efficacy proved to be a central factor in successful adaptation, while infrastructure limitations and ambiguous administrative policies caused emotional stress. Peer collaboration and reflective practices strengthen resilience and serve as sources of pedagogical innovation. The study concludes that digital adaptation is not merely a technical skill, but a process of reconstructing pedagogical identity influenced by internal agency, social structures, and institutional support.

INTRODUCTION

The global economy is undergoing rapid digital transformation, driven by advancements in technology and the demands of Industry 4.0. This shift has created a pressing need for a digitally skilled workforce that can adapt to evolving industry requirements.[1] The advent of the digital age has led to transformative changes in the global business landscape.[2]

The State Civil Apparatus (ASN) in Indonesia plays a crucial role in delivering public services and ensuring effective governance. To address performance challenges, the Indonesian government introduced the BerAKHLAK core values *Berkualitas* (Quality), *Akuntabel* (Accountability), *Harmonis* (Harmonious), *Loyal*, *Adaptif* (Adaptive), and *Kolaboratif* (Collaborative) to enhance professionalism and organizational effectiveness.[3]

The integration of digital technology into educational practice has fundamentally redefined the professional roles of teachers. No longer positioned solely as transmitters of knowledge, educators are now expected to serve as digital facilitators who guide student learning within a technologically enriched curriculum.[4] This shift demands not only technical fluency but also a pedagogical transformation that emphasizes collaboration, autonomy, and adaptive learning environments. The transformation of teacher identity in this context is an evolving process shaped by institutional, technological, and sociocultural factors. Numerous studies have addressed the potential of digital learning environments, yet the nuanced experiences of educators navigating this transformation remain underexplored.[5]

The digitalization of education has precipitated a fundamental redefinition of teacher identity. Teachers are increasingly expected to function not merely as knowledge transmitters but as digital facilitators who cultivate learning environments enriched with technology.[6] This transformation aligns with broader global educational frameworks advocating for pedagogical models that support student-centered learning and foster digital literacy.[7] The concept of the teacher as a digital facilitator introduces

---

[1] Susanto Soekiman et al., *Facing Digital Transformation : The Role of the Prakerja Program in Enhancing Indonesian Workforce Competencies*, no. July (2025), https://doi.org/10.31941/pj.v24i2.6380.

[2] Eri Mardiani et al., "Online Marketing Strategy and Customer Loyalty in E-Commerce-Based Asian Business: The Case of Tokopedia and Shopee," *West Science Journal Economic and Entrepreneurship* 1, no. 04 (2023): 129–36, https://doi.org/10.58812/wsjee.v1i04.389.

[3] Garry Brumadyadisty, "Implementation of Core Values 'BerAKHLAK' In Improving Professionalism and Performance of State Civil Apparatus," *Journal of Business Management and Economic Development* 3, no. 01 (2025): 216–35, https://doi.org/10.59653/jbmed.v3i01.1351.

[4] P Bazeley et al., "Qualitative Data Analysis with NVivo," *Qualitative Research in Psychology* 3, no. 2 (2013), https://doi.org/10.1191/1478088706qp063oa.

[5] OECD, *Kajian Kebijakan Investasi OECD Indonesia 2020*, in *2020 Orange Book of Results - Volume 3* (2023), https://doi.org/10.18356/9789210057738c063; UNESCO, "Global Education Monitoring Report, 2020: Inclusion and Education: All Means All," UNESCO, 2020, https://unesdoc.unesco.org/notice?id=p::usmarcdef_0000373718.

[6] Peggy A Ertmer and Anne T Ottenbreit-Leftwich, "Teacher Technology Change," *Journal of Research on Technology in Education* 42, no. 3 (2010): 255–84, https://doi.org/10.1080/15391523.2010.10782551.

[7] OECD, *Kajian Kebijakan Investasi OECD Indonesia 2020*; UNESCO, "Global Education Monitoring Report, 2020: Inclusion and Education: All Means All."

a more dynamic and flexible role, where educators are responsible for orchestrating collaboration, self-directed learning, and digital problem-solving. The expectation to embrace this role transformation is particularly challenging in diverse educational contexts, such as Indonesia, where disparities in infrastructure and support are substantial.[8] As Creswell and Poth argue, qualitative research is especially suited to understanding these kinds of complex, situated experiences.[9] Phenomenological approaches allow for in-depth exploration of how teachers internalize and enact these new responsibilities, especially when their professional adaptation is influenced by both external pressures and internal sense-making processes. This study builds on this qualitative tradition to examine how Indonesian teachers construct their evolving professional identities amid technological shifts.

Qualitative inquiries into educational technology have increasingly emphasized the importance of understanding how educators interpret and respond to these shifts. Creswell and Poth advocate for qualitative research when investigating lived experiences, particularly when social and emotional complexities are central to the research objectives.[10] In the Indonesian context characterized by geographical diversity and significant technological disparities teachers encounter unique challenges in adapting to a digital role. Prior research has often emphasized system-level infrastructure and student outcomes, leaving a gap in our understanding of how teachers personally experience and respond to digital transformation in their professional practices.[11]

This study seeks to address this gap by applying a phenomenological lens to explore the professional adaptation of Indonesian teachers operating within technology-based curricula. Through in-depth interviews and thematic analysis, the research illuminates how teachers reconstruct their pedagogical identities and strategies in response to shifting curricular demands. The exploration of these adaptive processes contributes to a richer understanding of the sociopedagogical dimensions of digital education, especially within the context of a developing country where systemic and infrastructural constraints shape the adaptation experience.

Despite the global acceleration of digital integration in education, empirical insights into the subjective experiences of teachers undergoing this transformation remain limited. Most existing research tends to focus on quantitative indicators such as student performance, teacher ICT proficiency, or infrastructure readiness.[12] However, these approaches overlook the experiential and contextual

[8] S Ridhuan et al., "Flesibilitas Pembelajaran Online Era Revolusi Industri 4.0," *Eduscience: Jurnal Ilmu Pendidikan*, 2020.

[9] J W Creswell and J D Creswell, *Research Design: Qualitative, Quantitative and Mixed Methods Approach*, 5th ed., ed. H Salmon (SAGE Publications Ltd, 2018).

[10] Creswell and Creswell, *Research Design: Qualitative, Quantitative and Mixed Methods Approach*.

[11] C Hennessy et al., "Social Media and Anatomy Education: Using Twitter to Enhance the Student Learning Experience in Anatomy," *Anatomical Sciences Education* 9, no. 6 (2016): 505–15, https://doi.org/10.1002/ase.1610.

[12] E Baran et al., "Investigating the Impact of Teacher Education Strategies on Preservice Teachers' TPACK," *British Journal of Educational Technology* 50, no. 1 (2017): 357–70, https://doi.org/10.1111/bjet.12565.

dimensions of how teachers navigate the complex shift from traditional instructors to digital facilitators. As schools increasingly implement blended or fully digital curricula, there is a pressing need to understand the internal and external dynamics that shape teachers' professional adaptation.

This study offers a qualitative solution by exploring the lived experiences of teachers in Indonesia a country with diverse educational contexts and varying degrees of technological access. By applying a phenomenological approach and utilizing NVivo for thematic analysis, this research aims to capture the emotional, pedagogical, and institutional dimensions of professional transformation. The study addresses a key void in the literature by focusing not only on what teachers do with technology, but how they experience the shift in role, identity, and pedagogical mindset. This holistic inquiry contributes to a more grounded understanding of professional development in the digital age.

Several theoretical frameworks have been proposed to explain how teachers integrate technology into their practice, with the Technological Pedagogical Content Knowledge (TPACK) model being among the most widely adopted. TPACK posits that effective digital teaching arises from the dynamic interplay between content knowledge, pedagogical strategies, and technological tools.[13] This model has informed various teacher training programs, yet empirical research shows that knowing the components is not enough teachers must internalize and reconfigure these domains within their own contextual realities.[14]

Beyond TPACK, the SAMR model (Substitution, Augmentation, Modification, Redefinition) introduced by Puentedura offers a framework to evaluate the depth of technology integration.[15] While many educators may begin at the substitution level merely replacing traditional tools with digital ones the goal is to reach the redefinitional level where learning tasks are transformed in ways previously inconceivable. Yet, empirical studies suggest that moving through these stages is neither linear nor universally attainable, particularly in contexts with limited resources.[16]

From a psychological perspective, transformative learning theory is often invoked to understand how educators undergo deep shifts in worldview.[17] In this view, professional adaptation involves critical reflection and a redefinition of one's identity. Teachers who adapt successfully often report a sense of

[13] I Irdalisa et al., "Implementation of Technology-Based Guided Inquiry to Improve TPACK Among Prospective Biology Teachers," *International Journal of Instruction* 13, no. 2 (2020): 33–44, https://doi.org/10.29333/iji.2020.1323a.

[14] D Castellanos-Reyes et al., "The I-Sun Process to Use Social Learning Analytics: A Conceptual Framework to Research Online Learning Interaction Supported by Social Presence," *Frontiers in Communication* 8 (2023), https://doi.org/10.3389/fcomm.2023.1212324.

[15] R Puentedura, *SAMR and TPCK: Intro to Advanced Practice*, 2010, http://hippasus.com/resources/sweden2010/SAMR_TPCK_IntroToAdvancedPractice.pdf.

[16] A Carrick and C Hamilton, "Heated Behaviour in the Classroom for Children With FASD: The Relationship Between Characteristics Associated With ADHD, ODD and ASD, Hot Executive Function and Classroom Based Reward Systems," *Children* 10, no. 4 (2023): 685, https://doi.org/10.3390/children10040685.

[17] J Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*, in *Journal of Physical Therapy Education*, vol. 18 (CA: Jossey-Bass, 2000), https://doi.org/10.1097/00001416-200407000-00021.

empowerment and renewed purpose. However, this transformation is rarely spontaneous; it is facilitated through ongoing dialogue, institutional support, and access to reflective practices.[18] This study builds on these frameworks to explore how teachers' lived experiences reflect and at times challenge these theoretical expectations.

A growing body of literature has explored the integration of digital technologies in education, focusing predominantly on infrastructural preparedness, student engagement, and teacher training effectiveness.[19] However, there is limited research that qualitatively captures the internal process of professional transformation, particularly in non-Western contexts. Most studies have adopted quantitative designs, overlooking the emotional and pedagogical complexities that teachers face when transitioning into digital roles. Even when qualitative approaches are used, the emphasis often remains on observable outcomes rather than the deep, interpretive processes of change.[20]

Furthermore, existing studies frequently center on well-resourced schools in urban or suburban settings, leaving rural and underfunded institutions underrepresented. In Indonesia, for instance, digital adoption is unevenly distributed, with significant disparities in connectivity, access to devices, and institutional support.[21] Studies that fail to account for these contextual differences risk producing skewed or overly generalized conclusions. This misalignment points to the need for location-specific investigations that acknowledge the structural and sociocultural realities faced by educators.

Digital competence has emerged as a core prerequisite for effective technology integration in pedagogy. However, recent findings underscore that digital skills alone are insufficient to drive transformation unless accompanied by strong teacher self-efficacy.[22] Teachers with high self-efficacy are more likely to overcome technological barriers, design learner-centered digital activities, and adapt instruction to diverse learning contexts. This sense of personal competence becomes even more critical when institutional support is inconsistent or inadequate, as is often the case in developing nations. Moreover, teacher self-efficacy is closely linked to their engagement in continuous professional development. When teachers are provided with opportunities to reflect on and experiment with digital pedagogies in low-stakes environments, their confidence and agency increase.[23] This relationship

[18] Knud Illeris, "What Do We Actually Mean by Experiential Learning?," *Human Resource Development Review* 6, no. 1 (2007): 84–95, https://doi.org/10.1177/1534484306296828.

[19] Baran et al., "Investigating the Impact of Teacher Education Strategies on Preservice Teachers' TPACK."

[20] T Suryani et al., "Enhancing Brand Image in the Digital Era: Evidence From Small and Medium-Sized Enterprises (SMEs) in Indonesia," *Gadjah Mada International Journal of Business*, ahead of print, 2021, https://doi.org/10.22146/gamaijb.51886.

[21] Ridhuan et al., "Flesibilitas Pembelajaran Online Era Revolusi Industri 4.0."

[22] Z. Wang and Z Chu, "Examination of Higher Education Teachers' Self-Perception of Digital Competence, Self-Efficacy, and Facilitating Conditions: An Empirical Study in the Context of ChinA," *Sustainability* 15, no. Article 10945 (2023), https://doi.org/10.3390/su151410945.

[23] J. Fraillon et al., "Preparing for Study, Life in a Digital World: The IEA International Computer and Infor-Mation Literacy 71, COMPUTERS IN THE SCHOOLS Educational," *International Association for the Evaluation of Educational Achievement (IEA)*, 2018, 1–299.

suggests that training programs must go beyond technical instruction to foster reflective practice and peer learning. In this regard, the role of institutional culture becomes central not only in providing resources but also in legitimizing risk-taking and innovation in digital teaching.

The shift toward student-centered digital learning has required educators to reimagine pedagogical strategies. According to Binar et al., effective digital facilitation is underpinned by flexible instructional practices that promote autonomy, collaboration, and critical inquiry.[24] This shift represents a deeper epistemological change where the teacher's authority is repositioned as a co-constructor of knowledge. As Olofsson et al. note, this transition demands significant psychological and philosophical adjustments, especially for teachers socialized in more didactic traditions.[25] These adjustments are not purely technical but involve identity negotiation. Teachers must reconcile established beliefs about teaching with new expectations imposed by digital curricula. This process aligns with Mezirow's transformative learning theory, which posits that genuine professional change occurs through critical reflection and identity transformation.[26] Illeris adds that such transformation is often catalyzed by disorienting dilemmas such as the abrupt shift to online learning during the COVID-19 pandemic where educators are compelled to rethink their roles in the face of uncertainty.[27]

Although the potential of technology in education is widely recognized, multiple barriers continue to inhibit its widespread and meaningful use. Ogodo et al. identify a range of challenges, including inadequate training, insufficient infrastructure, and lack of administrative support, all of which disproportionately affect educators in under-resourced settings.[28] In Indonesia, such disparities are amplified by geographical diversity and uneven policy implementation.[29] These structural constraints not only limit access to digital tools but also restrict opportunities for sustained professional learning. Furthermore, even when digital tools are available, their use tends to remain at superficial levels of integration. Hamilton et al. point out that educators often struggle to progress beyond basic substitution

[24] Kurnia Binar et al., "Online Scientific Creativity Learning (OSCL) in Science Education to Improve Students' Scientific Creativity in Covid-19 Pandemic," *Journal of Turkish Science Education* 18 (August 2021): 77–90, https://doi.org/10.36681/tused.2021.73.

[25] Anders D Olofsson et al., "A Study of the Use of Digital Technology and Its Conditions with a View to Understanding What 'adequate Digital Competence' May Mean in a National Policy Initiative," *Educational Studies* 46 (August 2019): 1–17, https://doi.org/10.1080/03055698.2019.1651694.

[26] Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*

[27] Illeris, "What Do We Actually Mean by Experiential Learning?"

[28] Justina Ogodo et al., "Examining K-12 Teachers' Digital Competency and Technology Self-Efficacy During COVID-19 Pandemic," *Journal of Higher Education Theory and Practice* 21 (November 2021): 13–27, https://doi.org/10.33423/jhetp.v21i11.4660.

[29] Sucahyo Mas'an Al Wahid et al., "Persepsi Mahasiswa Dalam Penggunaan Ragam Platform Pembelajaran Daring," *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)* 8 (September 2020): 170–78, https://doi.org/10.22219/jp2sd.v8i2.15030; Suryani et al., "Enhancing Brand Image in the Digital Era: Evidence From Small and Medium-Sized Enterprises (SMEs) in Indonesia."

or augmentation of traditional tasks.[30] This observation aligns with critiques of the SAMR model Puentedura, which, although useful for conceptualizing technology use, lacks sensitivity to contextual and pedagogical complexity.[31] Therefore, teacher adaptation must be analyzed through models that incorporate both systemic support and individualized meaning-making processes.

Much of the existing literature on digital integration has been quantitative, prioritizing metrics such as infrastructure readiness, ICT skills, and student performance.[32] However, these studies often neglect the nuanced, emotional, and interpretive dimensions of teachers' lived experiences particularly in developing nations. Suryani et al. argue for more qualitative approaches to illuminate how teachers experience the tensions, uncertainties, and aspirations tied to digital transformation.[33]

This study addresses these gaps by adopting a phenomenological lens to examine how Indonesian teachers perceive and perform their evolving roles. By focusing on underrepresented contexts rural schools, underfunded institutions, and teachers with varying degrees of digital exposure the research foregrounds the personal and contextual factors that mediate professional adaptation. This focus enables a richer understanding of how identity, pedagogy, and digital competence intersect within real-world classrooms and informs the design of more equitable and responsive professional development strategies.

Crucially, few studies have focused on how teachers redefine their professional identity in light of digital mandates. Questions about how educators interpret their evolving roles, cope with uncertainty, and negotiate institutional expectations remain largely unanswered. By centering on teachers' lived experiences across diverse Indonesian contexts, this study addresses a significant research gap, offering novel insights into how pedagogical identities are reconstructed in the digital age.

The primary objective of this study is to explore how teachers in Indonesia experience and interpret their evolving role as digital facilitators within a technology-based curriculum. By employing a phenomenological qualitative approach, the study seeks to understand the internal, pedagogical, and institutional dimensions of professional adaptation. The focus is placed on teachers' narratives concerning the emotional, strategic, and practical adjustments they undergo, emphasizing the contextual

[30] Erica Hamilton et al., "The Substitution Augmentation Modification Redefinition (SAMR) Model: A Critical Review and Suggestions for Its Use," *TechTrends* 60 (May 2016), https://doi.org/10.1007/s11528-016-0091-y.

[31] Puentedura, *SAMR and TPCK: Intro to Advanced Practice*.

[32] Khe Hew and Thomas Brush, "Integrating Technology into K-12 Teaching and Learning: Current Knowledge Gaps and Recommendations for Future Research," *Educational Technology Research and Development* 55 (May 2006): 223–52, https://doi.org/10.1007/s11423-006-9022-5; Jo Tondeur et al., "Understanding the Relationship between Teachers' Pedagogical Beliefs and Technology Use in Education: A Systematic Review of Qualitative Evidence," *Educational Technology Research and Development* 65 (September 2016), https://doi.org/10.1007/s11423-016-9481-2.

[33] Suryani et al., "Enhancing Brand Image in the Digital Era: Evidence From Small and Medium-Sized Enterprises (SMEs) in Indonesia."

nature of their experiences. This allows for a holistic view of teacher transformation within the dynamic landscape of digital education.

This research contributes novelty by shifting the focus from external technological factors to the internal processes of professional identity reconstruction. Unlike prior studies that predominantly measure technological competence or system readiness, this study delves into the meaning-making processes of teachers as they navigate role transformation. Through its emphasis on phenomenological inquiry and the use of NVivo for systematic thematic analysis, the study offers a rigorous and context-sensitive examination of digital facilitation. The scope is intentionally confined to the Indonesian setting, with attention to geographical diversity and infrastructural disparity, making it particularly relevant for policy and pedagogical reforms in developing nations.

RESEARCH METHODS

This study employed a qualitative phenomenological design grounded in the interpretivist paradigm, emphasizing the lived experiences of 15 purposively selected Indonesian junior secondary school teachers who had at least two years of experience integrating digital tools into their teaching practices.[34] Data were collected through semi-structured interviews, lasting between 45 and 90 minutes, and supplemented with field notes to capture contextual and non-verbal cues. Transcripts were analyzed thematically using Braun and Clarke's six-phase framework, supported by NVivo 12 software, which enabled systematic coding, visualization, and cross-case thematic comparison.[35] Key nodes included themes such as "pedagogical transformation," "digital identity," and "emotional response." Member checking, peer debriefing, and analytic memos were employed to enhance trustworthiness, following Lincoln and Guba's criteria for credibility, dependability, transferability, and confirmability.[36] The inclusion of participants from diverse technological and geographic settings across Java ensured a rich contextual basis for understanding how educators reconstruct their professional identities and instructional strategies within technology-based curricular frameworks.

RESULTS AND DISCUSSION

Redefining Professional Identity as Digital Facilitators

One of the most prominent themes to emerge from the data was the redefinition of professional identity. Participants consistently described a profound shift from their traditional role as knowledge transmitters to becoming enablers of learning through digital facilitation. Teachers reported initially

[34] Y.S. Lincoln and E.G Guba, *Naturalistic Inquiry* (Sage, 1985), http://dx.doi.org/10.1016/0147-1767(85)90062-8; M van Manen, *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy* (State University of New York Press, 1990).

[35] Virginia Braun and Victoria Clarke, "Using Thematic Analysis in Psychology," *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101, https://doi.org/10.1191/1478088706qp063oa.

[36] Lincoln and Guba, *Naturalistic Inquiry*.

feeling uncertain or even resistant, but over time, many articulated a process of internal transformation, expressing a renewed sense of purpose once they embraced the facilitator role.

"I used to be the center of everything. Now, I am guiding students to explore and think for themselves. It's not easy, but it's rewarding." (Participant 7)

This identity shift was not merely technical; it entailed cognitive and emotional recalibration. Teachers spoke of navigating tensions between old pedagogical habits and the demands of digital teaching. The transformation aligns with Mezirow's transformative learning theory, whereby critical reflection on practice leads to a revised self-concept.[37] For many participants, this process was catalyzed by the external pressure of the pandemic and sustained by ongoing experience and peer interaction.

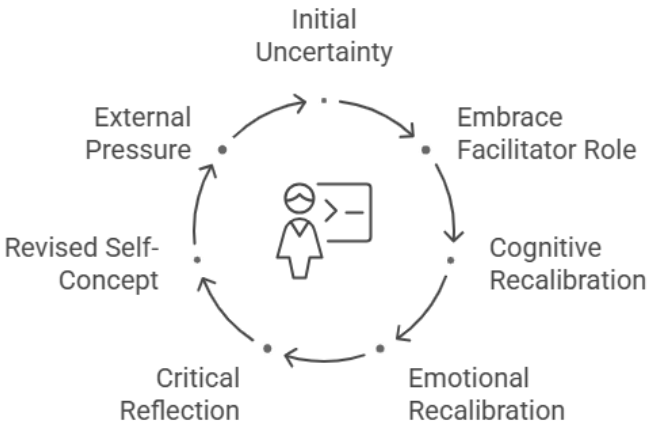

Figure 1. Cycle of Professional Identity Transformation

NVivo coding nodes such as *"teacher as learner," "pedagogical role conflict,"* and *"digital confidence"* clustered under this theme. Notably, teachers who experienced institutional recognition and collaborative support were more likely to articulate this transformation positively.

Pedagogical Shifts and Flexibility in Digital Classrooms

Another major theme centered on pedagogical flexibility, a necessary adaptation for teaching in technology-mediated environments. Educational strategies that are able to accommodate and capitalize on the nation's multilingualism are required because of the nation's linguistic diversity, which is characterized by a number of native languages and widespread bilingualism. A unified curriculum that accommodates the multilingual and multicultural context of Indonesia is crucial (Suhartawan Budianto).[38] Teachers reported that successful digital facilitation required significant adjustments in instructional strategy, content delivery, and student engagement practices. Many adopted blended

[37] Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*

[38] Suhartawan Budianto et al., "The Use Of Songs As A Tool For Language Education In Multilingual Populations," *Eralingua: Jurnal Pendidikan Bahasa Asing Dan Sastra* 8, no. 2 (2024): 332, https://doi.org/10.26858/eralingua.v8i2.59597.

learning models and integrated tools such as Google Classroom, Zoom, and WhatsApp to manage both synchronous and asynchronous learning.

"Before, I delivered everything directly. Now, I use breakout rooms, assign digital tasks, and let students present their findings. It's more interactive." (Participant 3)

Teachers highlighted the importance of flexibility not only in instructional methods but also in mindset emphasizing trial and error, student feedback, and responsiveness to changing technological conditions. Some faced initial setbacks, particularly with bandwidth limitations or unfamiliar software, but gradually developed confidence in customizing lessons.

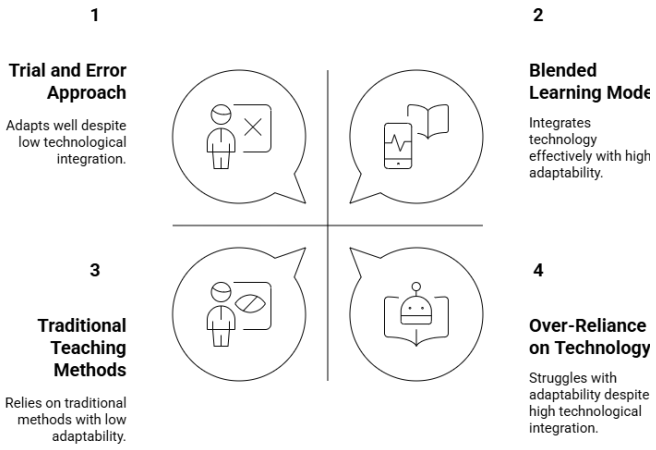

Figure 2. Pedagogical Flexibility in Digital Classrooms

The thematic codes contributing to this theme included *"lesson redesign," "blended strategy," "student-centered tasks,"* and *"adaptive teaching."* These findings are consistent with the literature on the SAMR model, particularly the transition from substitution to modification and redefinition.[39] However, participants also underscored that such transitions are nonlinear and shaped by local infrastructural and institutional support.

Institutional Constraints and Emotional Strain

Despite individual efforts to adapt, teachers frequently cited institutional constraints as barriers to effective digital facilitation. Participants reported challenges such as inadequate access to devices, inconsistent internet, lack of clear administrative policies, and minimal professional development support. These limitations were especially pronounced in rural or semi-urban areas.

"Sometimes I prepare everything for online teaching, but the Wi-Fi in the school or at students' homes just doesn't work. It's frustrating." (Participant 11)

[39] Puentedura, *SAMR and TPCK: Intro to Advanced Practice*.

The emotional dimension of this theme was particularly salient. Teachers described stress, burnout, and feelings of helplessness when institutional systems failed to support their efforts. NVivo nodes such as *"infrastructure frustration," "digital fatigue," "administrative ambiguity,"* and *"emotional labor"* illustrated how professional adaptation is not solely an individual endeavor, but also a system-mediated experience.

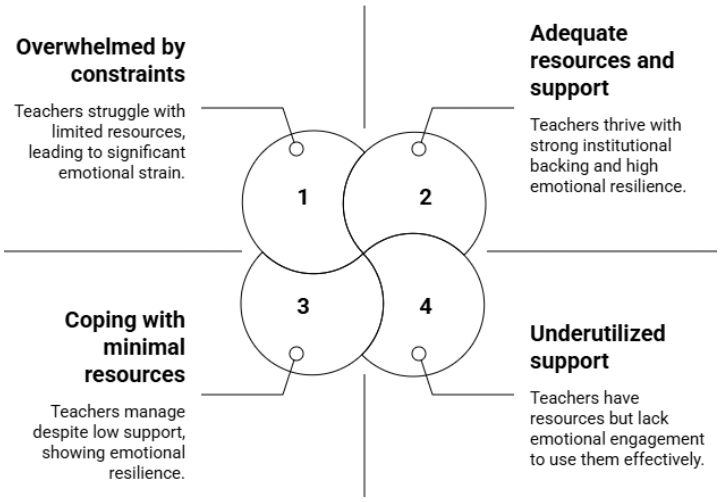

Figure 3. Institutional Constraints and Emotional Impacts on Teacher

These findings resonate with those of Ogodo et al., who found that the absence of structural support exacerbates teacher stress and limits pedagogical innovation.[40] Moreover, teachers who lacked peer collaboration opportunities or were isolated in their adaptation process expressed lower confidence and motivation levels. This underscores the importance of contextualized, continuous support systems to ensure sustainable digital integration.

The Centrality of Self-Efficacy in Digital Adaptation

A recurring theme in participants' narratives was the central role of self-efficacy in shaping their capacity to adapt professionally to digital teaching environments. Teachers who described themselves as confident in exploring new technologies, even in the absence of formal training, tended to report more positive experiences with digital facilitation. In contrast, those who lacked confidence frequently delayed technology use or restricted it to basic applications.

"I wasn't trained in any of these tools, but I just tried YouTube tutorials. I had to believe I could do it or I'd fall behind." (Participant 2)

NVivo codes clustered under this theme included *"teacher autonomy," "confidence-building," "trial and error,"* and *"self-initiated learning."* These patterns reinforce findings from Wang and Chu,

[40] Ogodo et al., "Examining K-12 Teachers' Digital Competency and Technology Self-Efficacy During COVID-19 Pandemic."

who argue that self-efficacy is more predictive of effective digital engagement than access to institutional infrastructure.[41] While external factors mattered, internal beliefs about competence emerged as a powerful enabler or inhibitor of change.

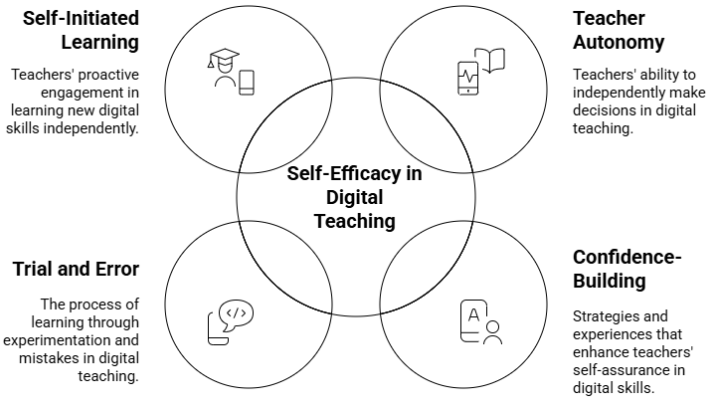

Figure 4. Self-Efficacy in Digital Teaching

Teachers who had support networks such as informal peer groups or mentoring were better able to sustain their motivation. This suggests that fostering a culture of collaborative self-efficacy, through both structured and informal support, is essential in promoting sustainable pedagogical transformation.

The Role of Peer Collaboration and Knowledge Sharing

Peer interaction emerged as a crucial mediator in teachers' adaptation to the digital curriculum. Participants consistently emphasized the importance of peer collaboration, not only for technical troubleshooting but also for emotional validation and pedagogical innovation. Many teachers described informal WhatsApp groups or shared folders where they exchanged lesson plans, discussed tools, and provided emotional support.

"I learned more from my colleagues than from any training. We shared templates, ideas, and even complaints it made a difference." (Participant 10)

This theme is supported by NVivo-generated codes such as *"peer learning," "informal mentoring," "collaborative planning,"* and *"community of practice."* The emergence of grassroots-level support systems often filled the void left by limited institutional training. This aligns with Midtlund et al., who stress that fostering a digitally collaborative environment enhances both pedagogical creativity and psychological resilience.

[41] Wang and Chu, "Examination of Higher Education Teachers' Self-Perception of Digital Competence, Self-Efficacy, and Facilitating Conditions: An Empirical Study in the Context of ChinA."

Figure 5. Cycle of Peer Collaboration in Digital Adaption

Interestingly, even teachers from low-resourced schools reported building strong collaborative networks, often across institutions or regions. This reinforces the notion that relational capacity, not just material capacity, is critical in shaping digital transformation outcomes.

Emotional Resilience and Reflective Practice

The final major theme centers on the emotional and reflective dimensions of professional transformation. Many participants described emotional struggles, particularly during the initial phases of digital adoption. Feelings of anxiety, fear of failure, and frustration were commonly cited, particularly during the COVID-19 pandemic's forced transition to online modalities.

However, over time, several teachers developed emotional resilience a capacity to adapt, learn from setbacks, and maintain motivation. Teachers attributed this growth to self-reflection, student feedback, and gradual success with digital tools.

"I cried after my first online class failed. But I kept a journal, rewatched my recordings, and talked to students. That helped me get better." (Participant 6)

This theme was represented by NVivo codes such as *"reflective journaling," "coping with change," "student feedback,"* and *"resilience development."* The findings align with transformative learning theory, which posits that emotionally charged disorienting dilemmas can catalyze deep learning and identity transformation.[42] Illeris further notes that affective engagement is integral to sustainable professional learning an insight clearly echoed in participants' narratives.[43]

[42] Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*
[43] Illeris, "What Do We Actually Mean by Experiential Learning?"

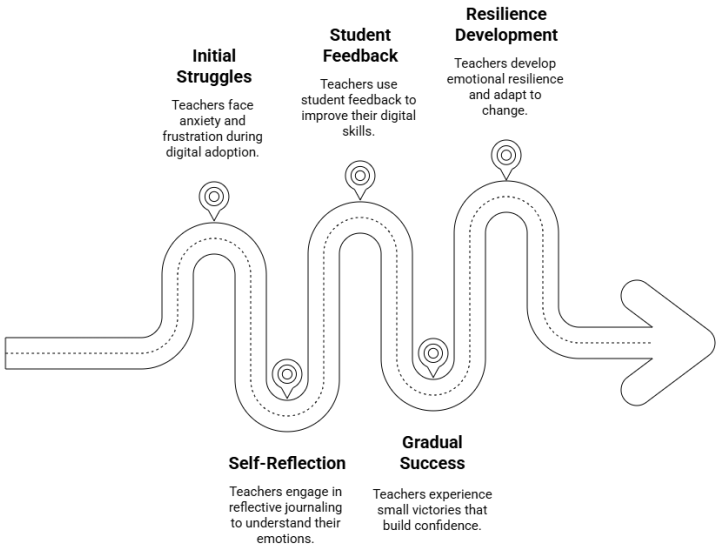

Figure 6. Journey of Emotional Resilience

The emergence of reflective routines, whether formal (e.g., journaling) or informal (e.g., discussion with peers), played a crucial role in helping teachers interpret and reconstruct their professional experiences in meaningful ways.

Reconstructing Pedagogical Identity

Across all six themes, a central narrative emerges: teachers' adaptation to digital roles is not merely a matter of skill acquisition, but a process of identity reconstruction. From redefining their roles as digital facilitators to developing emotional resilience and peer-based knowledge systems, teachers engaged in deep and often personal journeys of transformation. This journey was dynamic marked by tension, growth, and reflective negotiation.

The findings suggest that pedagogical identity is reconstructed through three intersecting pathways:

1. Internal agency (self-efficacy, emotional resilience),
2. Collaborative social structures (peer learning, informal mentoring),
3. Institutional scaffolding (technological infrastructure, leadership support).

Teachers who successfully aligned these three dimensions were more likely to describe their experiences positively and report pedagogical innovations. In contrast, misalignment such as low institutional support paired with low self-efficacy led to frustration, resistance, or superficial integration of digital tools. This synthesis reinforces the need to view digital transformation not as a technological challenge, but as a pedagogical and identity-based process, shaped by multilayered contexts.

Theoretical Alignment and Expansion

The findings of this study resonate strongly with key theoretical frameworks discussed. First, the TPACK model remains useful for conceptualizing the interdependence of content, pedagogy, and technology. However, the data also suggest that TPACK must be understood not just as a knowledge model, but as a practiced and lived experience, deeply mediated by contextual constraints.

The SAMR model is partially validated in this study; while some teachers progressed to the modification and redefinition levels, most remained at substitution or augmentation due to structural and psychological barriers.[44] The non-linear nature of their progression also challenges the implied hierarchy of the model, suggesting the need for more adaptive and circular models of integration.

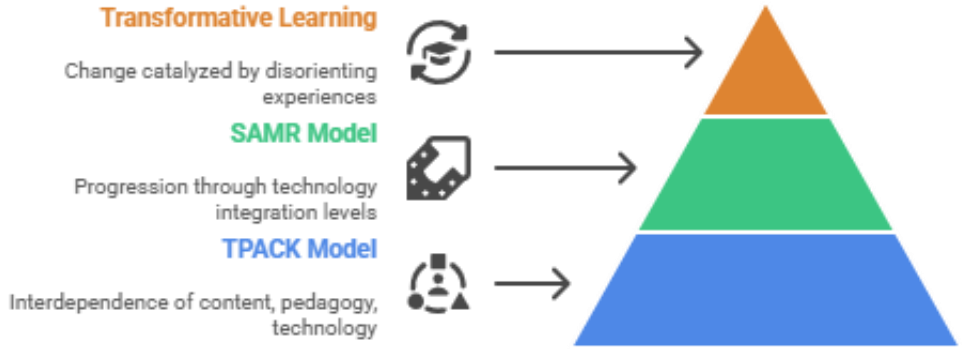

Figure 7. Frameworks in education

The most salient theoretical alignment is with Transformative Learning Theory, which finds strong support in this study. Teachers' narratives reveal that professional change is often catalyzed by disorienting experiences such as the pandemic or failed lessons which in turn provoke critical reflection and identity realignment.[45] Illeris's emphasis on the emotional and institutional dimensions of transformation is also validated, as teachers' adaptation was shown to be both cognitively and emotionally taxing.[46]

Thus, this study not only supports existing frameworks but also extends them by contextualizing their application within the realities of under-resourced and geographically diverse education systems.

Discussions

Research findings indicate that teachers are undergoing a significant shift in professional identity, moving from their traditional role as conveyors of knowledge to assuming the position of digital facilitators who guide learning processes. This transformation extends beyond technical adjustments, requiring both cognitive and emotional realignment. While some teachers initially demonstrated

[44] Puentedura, *SAMR and TPCK: Intro to Advanced Practice*.
[45] Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*
[46] Illeris, "What Do We Actually Mean by Experiential Learning?"

resistance or experienced pressure, critical reflection on instructional practices encouraged self-transformation. These findings align with Mezirow's Transformative Learning Theory, which underscores the importance of disorienting dilemmas in reshaping self-concept.[47] Institutional support and peer recognition have served as critical reinforcements in sustaining this process.

Within the pedagogical domain, flexibility has emerged as a key factor in managing technology-mediated instruction. Teachers adapted their approaches by incorporating blended learning models, utilizing virtual discussion spaces, and employing project-based assignments to foster interactive learning environments. These practices correspond with the SAMR Model, particularly at the modification and redefinition stages.[48] Nonetheless, the transition has not followed a linear trajectory, as infrastructural limitations and psychological barriers constrained some educators at the substitution or augmentation levels. Adaptability, willingness to experiment, and receptiveness to student feedback were identified as essential determinants of successful pedagogical advancement.

Institutional constraints further compounded these challenges. Teachers reported limited access to devices, inconsistent internet connectivity, and ambiguous administrative policies, all of which generated frustration. These obstacles not only hindered technical aspects of instruction but also negatively affected teachers' emotional well-being, contributing to stress, digital fatigue, and feelings of helplessness. The findings corroborate Ogodo et al., who demonstrated that insufficient structural support intensifies psychological strain and obstructs pedagogical innovation.[49] Teachers in rural contexts experienced the greatest impact, emphasizing the necessity for equitable policies in educational infrastructure provision.

Self-efficacy was consistently identified as a central determinant of digital adaptation. Teachers who demonstrated confidence in their abilities adapted more rapidly to digital facilitation, even in the absence of formal training. In contrast, those with low self-efficacy tended to limit their engagement with technology. These outcomes reinforce Wang and Chu's assertion that self-efficacy is a stronger predictor of digital participation than infrastructural availability.[50] Peer collaboration and a culture of autonomous learning further contributed to sustaining confidence and resilience in navigating digital transitions.

Collaboration among colleagues also emerged as a pivotal factor in the adaptation process. Informal interactions through digital platforms, such as WhatsApp groups, shared teaching resources, and non-formal mentoring, provided both technical assistance and emotional support. Midtlund et al. highlight that communities of practice not only strengthen psychological resilience but also foster

[47] Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*
[48] Puentedura, *SAMR and TPCK: Intro to Advanced Practice*.
[49] Ogodo et al., "Examining K-12 Teachers' Digital Competency and Technology Self-Efficacy During COVID-19 Pandemic."
[50] Wang and Chu, "Examination of Higher Education Teachers' Self-Perception of Digital Competence, Self-Efficacy, and Facilitating Conditions: An Empirical Study in the Context of ChinA."

pedagogical creativity.[51] Even within resource-constrained schools, collaborative networks stimulated innovation and compensated for the inadequacies of formal institutional training.

The initial phase of digitalization was widely perceived as overwhelming, marked by failure and emotional distress. However, through reflective practices including journaling, student evaluations, and collegial discussions teachers gradually developed emotional resilience. This progression supports the perspectives of Mezirow and Illeris, who emphasize that transformative learning requires the integration of cognitive, emotional, and social dimensions.[52] Reflective engagement enabled teachers to transform negative experiences into opportunities for professional growth.

Overall, digital adaptation cannot be reduced to the acquisition of technical competencies; rather, it constitutes a comprehensive reconstruction of pedagogical identity. This reconstruction occurs through three interconnected channels: internal agency in the form of self-efficacy and emotional resilience, collaborative structures grounded in peer support and mentoring, and institutional scaffolding through infrastructure and leadership. The balance among these three dimensions largely determines the success of identity transformation, while imbalance frequently leads to frustration or resistance.

Theoretical implications of these findings are evident. The TPACK model is not only conceptualized as a framework of knowledge domains but also experienced as a practice influenced by contextual social and emotional factors.[53] The SAMR Model remains relevant, although the progression between levels was shown to be non-linear and strongly conditioned by external and psychological constraints.[54] The Transformative Learning Theory receives strong validation, as teachers' narratives reveal identity reconstruction triggered by disorientation, critical reflection, and self-redefinition.[55]

In sum, this study affirms the applicability of established theoretical models while expanding their scope by situating them within resource-limited educational contexts. The findings highlight the necessity of adapting theoretical frameworks to the realities of diverse and often under-resourced teaching environments.

CONCLUSION

The findings of this study offer several actionable insights for stakeholders in education, particularly in developing contexts such as Indonesia. First, professional development should be

[51] Arne Midtlund et al., "Digital Communication and Collaboration in Lower Secondary School," *Nordic Journal of Digital Literacy* 16 (August 2021): 65–76, https://doi.org/10.18261/issn.1891-943x-2021-02-03.

[52] Illeris, "What Do We Actually Mean by Experiential Learning?"; Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*

[53] Punya Mishra and Matthew J Koehler, "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge.," in *Teachers College Record*, vol. 108, no. 6, Blackwell Publishing, 2006, https://doi.org/10.1111/j.1467-9620.2006.00684.x.

[54] Puentedura, *SAMR and TPCK: Intro to Advanced Practice*.

[55] Illeris, "What Do We Actually Mean by Experiential Learning?"; Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*; Mezirow, *Learning as Transformation: Critical Perspectives on a Theory in Progress.*

reimagined as an ongoing, reflective, and peer-supported process, rather than one-off workshops focused solely on technical training. Programs should emphasize teacher agency, build self-efficacy, and include mechanisms for emotional support and identity exploration.

Second, school leaders and policymakers must recognize that digital transformation cannot succeed without institutional coherence. Access to devices and connectivity must be accompanied by pedagogical autonomy, mentoring systems, and school cultures that encourage experimentation and failure as part of the learning process. Third, the use of collaborative digital platforms for peer exchange should be formally supported. Many of the most impactful practices in this study originated from grassroots, teacher-led initiatives. Supporting these organically formed professional learning communities can significantly enhance adaptive capacity, especially where formal systems are limited. Finally, teacher evaluation systems should evolve to include reflective teaching portfolios, peer feedback, and qualitative metrics that capture identity growth and pedagogical innovation not just digital compliance or platform usage.

While this study provides rich insights into the professional adaptation of Indonesian teachers as digital facilitators, several limitations must be acknowledged. First, the sample size and scope, although sufficient for qualitative inquiry, limit the generalizability of the findings. The study involved 15 teachers from private junior secondary schools in Java, which may not fully capture the experiences of educators in other educational levels or public institutions, especially in more remote or resource-constrained regions. Second, the data were collected during a transitional post-pandemic period, a time when many schools were still adjusting to hybrid or online modalities. As such, participants' reflections may have been influenced by temporary adaptations rather than long-term shifts in professional identity or pedagogical norms. Future studies should investigate whether these changes persist once more stable teaching environments are established. Third, while NVivo supported systematic coding and theme development, the analysis was inherently interpretive. Researcher bias, despite the use of memoing, peer debriefing, and member checking, remains a possibility in phenomenological work. The deeply contextual nature of qualitative data also means that subjectivity and positionality inevitably shape what is seen and interpreted in the narratives.

Building on the insights and constraints of this study, several recommendations for future research are proposed. First, longitudinal studies could track how teacher identities and practices evolve over time with sustained exposure to digital curricula. Such research would help distinguish between temporary adaptations and deeper pedagogical transformations.

Second, future research should explore comparative studies across different educational settings for instance, comparing public versus private institutions, urban versus rural schools, or secondary versus primary levels. This would enable a more nuanced understanding of how institutional type and socio-economic context shape professional adaptation. Third, the voices of other stakeholders, including

school leaders, students, and policymakers, should be incorporated to develop a multi-perspective view of digital transformation. Exploring how leadership styles, organizational culture, and national policy frameworks influence teacher adaptation could provide valuable insights for system-level reform. Finally, more work is needed on intersectional influences such as gender, age, and teaching discipline, which were not a central focus of this study. These factors likely mediate how teachers experience and respond to digital innovation and deserve focused investigation.

BIBLIOGRAPHY

Baran, E, S C Bilici, A A Sarı, and J Tondeur. "Investigating the Impact of Teacher Education Strategies on Preservice Teachers' TPACK." *British Journal of Educational Technology* 50, no. 1 (2017): 357–70. https://doi.org/10.1111/bjet.12565.

Bazeley, P, V Braun, J W Creswell, et al. "Qualitative Data Analysis with NVivo." *Qualitative Research in Psychology* 3, no. 2 (2013). https://doi.org/10.1191/1478088706qp063oa.

Binar, Kurnia, Nadi Suprapto, Fida Rachmadiarti, et al. "Online Scientific Creativity Learning (OSCL) in Science Education to Improve Students' Scientific Creativity in Covid-19 Pandemic." *Journal of Turkish Science Education* 18 (August 2021): 77–90. https://doi.org/10.36681/tused.2021.73.

Braun, Virginia, and Victoria Clarke. "Using Thematic Analysis in Psychology." *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101. https://doi.org/10.1191/1478088706qp063oa.

Brumadyadisty, Garry. "Implementation of Core Values 'BerAKHLAK' In Improving Professionalism and Performance of State Civil Apparatus." *Journal of Business Management and Economic Development* 3, no. 01 (2025): 216–35. https://doi.org/10.59653/jbmed.v3i01.1351.

Budianto, Suhartawan, Victor Maroli Tua L Tobing, Garry Brumadyadisty, Nuril Huda, and Sony Piously Budianto. "The Use Of Songs As A Tool For Language Education In Multilingual Populations." *Eralingua: Jurnal Pendidikan Bahasa Asing Dan Sastra* 8, no. 2 (2024): 332. https://doi.org/10.26858/eralingua.v8i2.59597.

Carrick, A, and C Hamilton. "Heated Behaviour in the Classroom for Children With FASD: The Relationship Between Characteristics Associated With ADHD, ODD and ASD, Hot Executive Function and Classroom Based Reward Systems." *Children* 10, no. 4 (2023): 685. https://doi.org/10.3390/children10040685.

Castellanos-Reyes, D, A A Koehler, and J Richardson. "The I-Sun Process to Use Social Learning Analytics: A Conceptual Framework to Research Online Learning Interaction Supported by Social Presence." *Frontiers in Communication* 8 (2023). https://doi.org/10.3389/fcomm.2023.1212324.

Creswell, J W, and J D Creswell. *Research Design: Qualitative, Quantitative and Mixed Methods Approach*. 5th ed. Edited by H Salmon. SAGE Publications Ltd, 2018.

Eri Mardiani, Loso Judijanto, Syamsuri Syamsuri, and Siska Armawati Sufa. "Online Marketing Strategy and Customer Loyalty in E-Commerce-Based Asian Business: The Case of Tokopedia and Shopee." *West Science Journal Economic and Entrepreneurship* 1, no. 04 (2023): 129–36. https://doi.org/10.58812/wsjee.v1i04.389.

Ertmer, Peggy A, and Anne T Ottenbreit-Leftwich. "Teacher Technology Change." *Journal of Research on Technology in Education* 42, no. 3 (2010): 255–84. https://doi.org/10.1080/15391523.2010.10782551.

Fraillon, J., J. Ainley, W. Schulz, T. Friedman, and D. Duckworth. "Preparing for Study, Life in a Digital World: The IEA International Computer and Infor-Mation Literacy 71, COMPUTERS IN THE SCHOOLS Educational." *International Association for the Evaluation of Educational Achievement (IEA)*, 2018, 1–299.

Hamilton, Erica, Joshua Rosenberg, and Mete Akcaoglu. "The Substitution Augmentation Modification Redefinition (SAMR) Model: A Critical Review and Suggestions for Its Use." *TechTrends* 60 (May 2016). https://doi.org/10.1007/s11528-016-0091-y.

Hennessy, C, E Kirkpatrick, C F Smith, and S Border. "Social Media and Anatomy Education: Using Twitter to Enhance the Student Learning Experience in Anatomy." *Anatomical Sciences Education* 9, no. 6 (2016): 505–15. https://doi.org/10.1002/ase.1610.

Hew, Khe, and Thomas Brush. "Integrating Technology into K-12 Teaching and Learning: Current Knowledge Gaps and Recommendations for Future Research." *Educational Technology Research and Development* 55 (May 2006): 223–52. https://doi.org/10.1007/s11423-006-9022-5.

Illeris, Knud. "What Do We Actually Mean by Experiential Learning?" *Human Resource Development Review* 6, no. 1 (2007): 84–95. https://doi.org/10.1177/1534484306296828.

Irdalisa, I, P Paidi, and D Djukri. "Implementation of Technology-Based Guided Inquiry to Improve TPACK Among Prospective Biology Teachers." *International Journal of Instruction* 13, no. 2 (2020): 33–44. https://doi.org/10.29333/iji.2020.1323a.

Lincoln, Y.S., and E.G Guba. *Naturalistic Inquiry*. Sage, 1985. http://dx.doi.org/10.1016/0147-1767(85)90062-8.

Manen, M van. *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. State University of New York Press, 1990.

Mas'an Al Wahid, Sucahyo, Dedi Kusnadi, and Frendy Fantiro. "Persepsi Mahasiswa Dalam Penggunaan Ragam Platform Pembelajaran Daring." *Jurnal Pemikiran Dan Pengembangan Sekolah Dasar (JP2SD)* 8 (September 2020): 170–78. https://doi.org/10.22219/jp2sd.v8i2.15030.

Mezirow, J. *Learning as Transformation: Critical Perspectives on a Theory in Progress.* In *Journal of Physical Therapy Education*, vol. 18. CA: Jossey-Bass, 2000. https://doi.org/10.1097/00001416-200407000-00021.

Midtlund, Arne, Elen Instefjord, and Alexandra Lazareva. "Digital Communication and Collaboration in Lower Secondary School." *Nordic Journal of Digital Literacy* 16 (August 2021): 65–76. https://doi.org/10.18261/issn.1891-943x-2021-02-03.

Mishra, Punya, and Matthew J Koehler. "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge." In *Teachers College Record*, vol. 108. no. 6. Blackwell Publishing, 2006. https://doi.org/10.1111/j.1467-9620.2006.00684.x.

OECD. *Kajian Kebijakan Investasi OECD Indonesia 2020*. In *2020 Orange Book of Results - Volume 3*. 2023. https://doi.org/10.18356/9789210057738c063.

Ogodo, Justina, Marsha Simon, Dana Morris, and Mark Akubo. "Examining K-12 Teachers' Digital Competency and Technology Self-Efficacy During COVID-19 Pandemic." *Journal of Higher Education Theory and Practice* 21 (November 2021): 13–27. https://doi.org/10.33423/jhetp.v21i11.4660.

Olofsson, Anders D, Göran Fransson, and J Lindberg. "A Study of the Use of Digital Technology and Its Conditions with a View to Understanding What 'adequate Digital Competence' May Mean in a National Policy Initiative." *Educational Studies* 46 (August 2019): 1–17. https://doi.org/10.1080/03055698.2019.1651694.

Puentedura, R. *SAMR and TPCK: Intro to Advanced Practice*. 2010. http://hippasus.com/resources/sweden2010/SAMR_TPCK_IntroToAdvancedPractice.pdf.

Ridhuan, S, A Wahid, and S R Juwita. "Flesibilitas Pembelajaran Online Era Revolusi Industri 4.0." *Eduscience: Jurnal Ilmu Pendidikan*, 2020.

Soekiman, Susanto, Garry Brumadyadisty, Muhammad Yus Firdaus, and Degdo Suprayitno. *Facing Digital Transformation : The Role of the Prakerja Program in Enhancing Indonesian Workforce Competencies*. no. July (2025). https://doi.org/10.31941/pj.v24i2.6380.

Suryani, T, A A Fauzi, and M Nurhadi. "Enhancing Brand Image in the Digital Era: Evidence From Small and Medium-Sized Enterprises (SMEs) in Indonesia." *Gadjah Mada International Journal of Business*, ahead of print, 2021. https://doi.org/10.22146/gamaijb.51886.

Tondeur, Jo, Johan van Braak, Peggy Ertmer, and Anne Ottenbreit-Leftwich. "Understanding the Relationship between Teachers' Pedagogical Beliefs and Technology Use in Education: A Systematic Review of Qualitative Evidence." *Educational Technology Research and Development* 65 (September 2016). https://doi.org/10.1007/s11423-016-9481-2.

UNESCO. "Global Education Monitoring Report, 2020: Inclusion and Education: All Means All." UNESCO, 2020. https://unesdoc.unesco.org/notice?id=p::usmarcdef_0000373718.

Wang, Z., and Z Chu. "Examination of Higher Education Teachers' Self-Perception of Digital Competence, Self-Efficacy, and Facilitating Conditions: An Empirical Study in the Context of ChinA." *Sustainability* 15, no. Article 10945 (2023). https://doi.org/10.3390/su151410945.