SCIENTIFIC CULTURE
www.sci-cult.com

*SCIENTIFIC CULTURE, Vol. 11, No. 2, (2025), pp. 212-225*
*Open Access. Online & Print*

**DOI: 10.5281/zenodo.17316960**

# NETWORKED LEARNING APPROACH FOR TEACHERS' AUTHENTIC GROWTH: A DECADE OF RESEARCH ON TECHNOLOGICAL MEDIATION IN TEACHER PROFESSIONAL DEVELOPMENT

**Rasdiana Rasdiana[1*], Marianus Yufrinalis[1], Rizki Tuhulele[3], Ahmad Ridwan[1], Vina Vania Suhartawan[1], Muhammad Muqorrobin[1], Fauzia Handayani Kartini Fanolong[2], Afifah Marshalina[1], Della Febrianti[1], Astri Mardilla Ramli[1], Umi Kalsum Iwan A Rianto[2], Imam Fikry Fanani[1], Dewi Bernike Tampubolon[4]**

*[1]State University of Malang, Indonesia. [2]State University of Yogyakarta, Indonesia. [3]State University of Jakarta, Indonesia. [4]State University of Medan, Indonesia.*

*Received: 10/06/2025*
*Accepted: 18/09/2025*

*Corresponding Author: Rasdiana Rasdiana (rasdiana.2201328@students.um.ac.id)*

## ABSTRACT

*Networked learning has arisen as a viable method for teacher professional development, highlighting collaboration and knowledge generation across institutional borders via technology facilitation. This paper analyses the evolution of networked learning research from 2014 to 2025, highlighting significant frameworks, prominent contributions, and essential gaps in the academic discourse. This study employed bibliometric analysis of 33 Scopus articles through VOSviewer network visualisation and systematic content analysis with predefined coding categories to investigate theoretical frameworks, methodological approaches, and contextual aspects. Results indicate that four essential trends have emerged: (1) Theoretical fragmentation publications decreased by 67% from a peak of six articles in 2018-2019 to one or two articles in 2022-2025; (2) Citation hierarchy technology-oriented studies (Kannan & Munday, 75 citations) garnered twice the recognition of critical analyses (Bali & Caines, 37 citations); (3) Global South exclusion four Western nations (US, UK, Australia, Spain) accounted for 73% of significant research, thereby marginalising viewpoints from Asia, Africa, and Latin America; (4) Conceptual blindness keyword networks focused on networked learning and connected learning, neglecting issues of power, inequality, resistance, and workload. These tendencies indicate that networked learning has been diminished to technical solutionism instead of genuine professional transformation, systematically marginalising frameworks that address institutional restrictions and cultural settings particularly pertinent to the educational realities of the Global South. The discipline necessitates a thorough reconceptualisation, shifting from Western-centric, technology optimistic paradigms to critical frameworks that recognise digital worlds as contested arenas. This approach offers essential guidance for formulating post-colonial theoretical frameworks, creating research collaborations between the Global South and North, and utilising participatory methodologies that regard teachers as co-researchers instead of subjects.*

**KEYWORDS:** Networked Learning, Connected Learning, Teacher Authentic Learning, Educational Technology, Teacher Professional Development.

## 1. INTRODUCTION

In various global contexts, effective teacher professional development is increasingly acknowledged as a crucial catalyst for educational enhancement, allowing educators to adjust to changing student requirements and social expectations (Kemmis et al., 2014). This perspective, grounded in social constructivism and/or connectivism theory, posits that learning is fundamentally social and influenced by cultural context, with knowledge being formed through interaction and shared experiences (Siemens, 2005; Vygotsky, 1978). Kemmis et al. (2014) assert that professional learning must transcend standardised methods and be integrated into instructors' authentic, daily activities. This entails recognising the cultural, material, and social contexts of their work and fostering development through joint investigation and reflective discourse.

However, as global education systems contend with swiftly changing societal requirements, heightened complexity in classroom settings, and the incorporation of digital technologies, the effectiveness and relevance of conventional methods of teacher professional development have come under scrutiny (Hammond et al., 2017; Kennedy, 2016). In response, networked learning characterized by methodologies that prioritise interactions and connections across institutional, geographical, and disciplinary boundaries has developed as a viable alternative (Networked Learning Editorial Collective (NLEC), 2021).

Conventional Professional Learning Communities (PLCs) emphasise collaboration within single schools (Dufour, 2006; DuFour & Eaker, 2009), however networked learning fosters involvement across various borders (Chapman & Montecinos, 2024; Hodgson & McConnell, 2019; Katz & Earl, 2010). In this broader context, connected learning denotes a distinct category that highlights participatory, interest-driven, and academically focused experiences, whereas technological mediation refers to the mechanisms by which digital tools enhance these learning interactions (Goodyear et al., 2004; McConnell, 1998). This methodology prioritises collaboration, connectedness, and the co-creation of knowledge, with technology acting as both a facilitator and a disruptor of traditional teacher learning methods for genuine development.

In this context, we define "authentic growth" as professional development arising from instructors' sincere involvement in practice, rather than from externally mandated standards or superficial technological implementation. According to Kemmis et al.'s (2014) framework, authentic growth consists of three dimensions: (1) epistemic authenticity teachers engaging in knowledge construction via collaborative inquiry; (2) relational authenticity establishing meaningful connections across institutional boundaries to promote genuine dialogue; and (3) transformational authenticity cultivating critical consciousness to challenge assumptions and modify teaching to meet student needs (Mockler, 2013; Sachs, 2016). This differentiates genuine progress from training driven by compliance or technology-centric methods that emphasise tool proficiency rather than pedagogical reform. In networked learning environments, genuine development occurs when educators utilise digital capabilities for critical reflection and collaborative problem-solving that tackle actual classroom issues.

However, as global education systems contend with swiftly changing societal requirements, heightened complexity in classroom settings, and the incorporation of digital technologies, the effectiveness and relevance of conventional methods of teacher professional development have come under scrutiny (Hammond et al., 2017; Kennedy, 2016). In response, networked learning characterized by methodologies that prioritise interactions and connections across institutional, geographical, and disciplinary boundaries has developed as a viable alternative (Networked Learning Editorial Collective (NLEC), 2021).

Conventional Professional Learning Communities (PLCs) emphasise collaboration within single schools (Dufour, 2006; DuFour & Eaker, 2009), but networked learning promotes involvement across various borders (Chapman & Montecinos, 2024; Hodgson & McConnell, 2019; Katz & Earl, 2010). In this broader context, connected learning denotes a particular subset that highlights participatory, interest-driven, and academically focused experiences, whereas technological mediation refers to the mechanisms by which digital tools enable these learning interactions (Goodyear et al., 2004; McConnell, 1998). This methodology underscores cooperation, connectedness, and the co-creation of information, with technology acting as both a facilitator and a disruptor of traditional teacher learning methods for genuine development.

Current evidence indicates that networked learning facilitates teacher professional development via various interconnected avenues. At the individual level, Pan and Chen (2023) demonstrated that networked learning induces transformative changes in teachers' beliefs and instructional practices, corroborating Denee's (2024) conclusions regarding enhanced teacher efficacy and the application of practical knowledge. Nonetheless, Denee (2024) more explicitly correlates these to pedagogical practice. Lund & Jaldemark (2024) and Woodward et al. (2022)

emphasise, from a systemic viewpoint, networked learning's ability to transcend geographic and infrastructural limitations, specifically addressing rural teacher isolation and offline collaboration frameworks in resource-limited settings. Anderson et al. (2022) contribute a creative aspect, illustrating how multimodal involvement notably advantages educators of intricate subjects, whereas Acuyo (2022) provides essential nuance by analysing how social media broadens professional networks while eliciting resistance and fear. The varying focuses behavioral change, educational improvement, accessibility, creative involvement, and digital incorporation highlight the necessity for a cohesive theoretical framework that connects personal, technological, and systemic aspects of networked learning for teacher professional development.

Notwithstanding the extensive research on technological interventions in teacher professional development (e.g., networked learning approach), there is a paucity of systematic analysis about the conceptual, methodological, and empirical evolution of the area. Comprehending the conceptual framework of this study subject is essential for spotting new trends, recognising significant theoretical models, appreciating foundational contributions, and highlighting gaps that require further exploration. This bibliometric analysis utilises a networked methodology to delineate and examine the academic terrain of technology mediation in teacher professional development. This study seeks to elucidate the interconnectedness of research in this topic by analysing co-citation networks, patterns of keyword co-occurrence, and collaboration structures, thereby offering insights into its conceptual foundations and evolutionary trajectories. This analysis employs a networked viewpoint that reflects the issue under investigation the capacity of networked methodologies to promote genuine teacher growth and development.

This study utilises an extensive dataset of professional development, specifically focussing on articles related to networked learning approaches, to examine the following research questions

- **RQ1:** How has the scholarly discourse regarding the publication and citation trend of networked learning evolved over the past decade?
- **RQ2:** Which theoretical/conceptual frameworks and methodological approaches have been most influential in shaping research on networked learning?
- **RQ3:** Who are the most influential authors and publications studying networked learning?
- **RQ4:** What are the emerging research themes and potential gaps in the current understanding of networked learning?

This study seeks to enhance the theoretical comprehension and practical implementation of networked methodologies in teacher professional development by thoroughly mapping this research domain. The findings are significant for educational policymakers, professional development designers, teacher educators, and academics aiming to utilise technological advantages to foster genuine teacher development and improve student learning outcomes.

## 2. LITERATURE REVIEW

### *2.1. Theoretical Foundations of Networked Learning*

Networked learning incorporates various theoretical traditions, whose integration, however cognitively attractive, reveals unresolved conceptual difficulties. Although social constructivism underpins networked techniques, opponents argue that it often simplifies collaborative models, neglecting power dynamics and cultural tensions (Matusov et al., 2005). Although there has been progress in comprehending professional communities, situated learning theory has faced criticism for idealising practice communities while downplaying disputes on the legitimacy of knowledge (Contu & Willmott, 2003; Fuller et al., 2005). The extension of connectivism potentially opportunistic elicits enquiries regarding whether technology-facilitated dispersed knowledge generation genuinely resolves the theoretical difficulties highlighted in previous frameworks.

Progressing, a theoretically sound understanding of networked learning addresses these significant contradictions by adopting what Jones (2015) refers to as relational thinking, which recognises the intricate interaction among individual agency, technological mediation, and institutional frameworks. This approach acknowledges that knowledge formation is both personal and societal (Hodgson & McConnell, 2019), situated within power dynamics that favour specific voices and modes of involvement (Ryberg et al., 2012). Critical networked learning theory should transcend neutral or deterministic perspectives to investigate how digital environments serve as disputed arenas for the negotiation of professional identity (Czerkawski, 2016; Selwyn, 2010). This viewpoint necessitates consideration of the material circumstances around teachers' labor recognizing how time limitations, increased workloads, and accountability frameworks facilitate or hinder genuine networked participation (Mockler, 2013; Sachs, 2016). It necessitates

acknowledging that significant teacher learning arises not from utopian notions of seamless knowledge exchange but through constructive interaction with variances, disputes, and disturbances across many contexts (Fransson et al., 2019; Williamson, 2019). This entails formulating networked learning methodologies that directly confront power imbalances, foster environments for critical discourse regarding educational objectives and values, and maintain a reflexive awareness of how technologies facilitate and limit specific modalities of professional learning (Goodyear et al., 2004; Hodgson & McConnell, 2019; Networked Learning Editorial Collective (NLEC), 2021). By acknowledging these complexities instead of reducing them to simplistic models of collaboration or connectivity, the networked learning approach can provide conceptually rich and practically relevant insights into how educators manoeuvre through the increasingly intricate, technology-driven professional development environment.

### *2.2. The Historical Development of Networked Learning in Education*

The conceptual transition from PLCs to networked learning coincided with technology advancements that facilitated novel types of cross-boundary collaboration (Hadfield, 2011; Katz & Earl, 2010). Technological advancements not only established new communication channels but also fundamentally transformed the potential for professional connections, generating unparalleled opportunities to transcend institutional, disciplinary, and geographic boundaries (Carpenter & Krutka, 2014; Trust, 2016). These technology advancements not only established new communication channels but also redefined the potential for professional connections, generating unparalleled prospects for transcending institutional, disciplinary, and geographic boundaries.

This formalisation delineated networked learning from individualistic online learning methods that arose during technological advancement, highlighting crucial conceptual frameworks that underscored the interaction among social, cognitive, and technological aspects of networked environments. Their efforts, in conjunction with significant contributions from McConnell et al. (1998; 2012), facilitated the establishment of networked learning as a domain with unique theoretical perspectives, transcending the confines of technology-enhanced learning. Recently, the Networked Learning Editorial Collective (NLEC, 2021) has endeavoured to refine definitions and theoretical frameworks, highlighting that networked learning includes both human-human and human-material connections across various contexts, explicitly distinguishing it from individualistic approaches to online learning that arose during technological advancement.

### *2.3. Key Characteristics of Networked Learning*

**Four essential aspects differentiate networked learning** (1) Systematic boundary-crossing that introduces educators to previously unattainable perspectives and practices (McConnell et al., 2012), thereby exposing them to diverse viewpoints and methodologies that are often inaccessible in more insular professional environments (Wenger-Trayner & Wenger-Trayner, 2015); knowledge mobilisation wherein participants engage in collaborative inquiry to transform information rather than merely consuming it passively (Levin & Schrum, 2013), functioning not solely as knowledge consumers but as active co-constructors who reshape knowledge through collaborative inquiry (Paavola & Hakkarainen, 2005; Phelps et al., 2012). The initial two features highlight the social and epistemological aspects of networked learning, framing it as a methodology that prioritises distributed expertise and collaborative meaning-making over hierarchical knowledge dissemination.

**The additional attributes further differentiate the holistic approach of networked learning** (3) The amalgamation of formal professional development frameworks with informal learning avenues, recognising that substantial professional advancement frequently arises from implicit, unstructured interactions (Eraut, 2004), thereby facilitating more adaptive, just-in-time learning that directly confronts arising classroom challenges (W. M. Jones & Dexter, 2014); and (4) the deliberate application of technology to fulfil social and epistemological objectives rather than as a mere objective (G Technology offers the infrastructure to support social and epistemological objectives, rather than existing as an end in itself this viewpoint differentiates networked learning from methodologies that prioritise technology adoption without adequately addressing the quality of professional relationships or knowledge processes.

## 3. METHOD

### *3.1. Design*

This study utilises bibliometric analysis to investigate the influence of networked learning on teacher professional development over the last decade. Bibliometric analysis offers a rigorous

methodological framework for elucidating scholarly discourse patterns, enabling researchers to objectively map citation networks and intellectual development while considering distinct publication cultures and citation dynamics (Ellegaard & Wallin, 2015), especially in social science disciplines (Van Leeuwen, 2006). Consequently, by a rigorous analysis of publication patterns, citation networks, and topic trends in prominent educational databases, the study seeks to delineate the intellectual progression of this discipline and ascertain its theoretical underpinnings. The investigation analysed publication paths, identify significant frameworks and approaches, acknowledge key scholars and seminal publications, and emphasise emerging research areas and existing knowledge gaps to provide guidance for future research.

This bibliometric review integrated quantitative citation metrics with qualitative content analysis to develop a thorough understanding of the impact of technological mediation on authentic teacher development in networked learning environments. It aims to offer valuable insights for educational researchers, teacher educators, and policymakers by elucidating the current state of knowledge and proposing promising directions for future research in networked learning strategies for teacher professional development. The quantitative aspect utilises VOSviewer for visualising co-authorship networks, keyword co-occurrences, and citation links, alongside Excel for analysing publication trends, citation impact, and journal distribution metrics. The qualitative assessment entails systematic content analysis employing predetermined coding categories (1) identification of theoretical frameworks, (2) classification of methodological approaches, (3) analysis of contextual factors, (4) evaluation of critical perspectives regarding power dynamics and equity issues, and (5) conceptualisation of technology integration.

### 3.2. Data Sources and Selection Criteria

In our bibliometric analysis, we gathered data from Scopus utilising meticulously adjusted search parameters to guarantee thorough but targeted coverage of networked learning literature. We chose Scopus as our principal data source because of its notable advantages as one of the largest curated abstract and citation databases, characterised by stringent quality control, extensive global coverage of social science journals, and advanced author profiling features that facilitate dependable bibliometric analysis (Baas et al., 2020; Schotten et al., 2017).

To clarify the inclusion criteria, we restricted our search to the past decade, from 2014 to 2025, concentrating solely on English-language, peer-reviewed journal papers in the Social Sciences field. We intentionally omitted review papers to focus on original empirical research and theoretical contributions instead of synthesised viewpoints, facilitating a more direct examination of primary knowledge production in the field of networked learning. Our keyword refinement technique focused on publications explicitly related to "Networked Learning" (120 articles), "Social Networking (online)" (106 articles), and "Connected Learning" (75 articles). This deliberate filtering procedure resulted in a final dataset of 294 journal articles, which constitute the basis of our bibliometric study, offering a comprehensive picture of scholarly discourse on networked learning as the primary subject within the social sciences over the previous decade.

### 3.3. Procedure of Data Collection

The data collecting process commenced with 294 articles sourced from Scopus, adhering to inclusion criteria, which utilised a systematic review to pinpoint literature especially related to networked learning for teachers' professional development (refer to Figure 1).

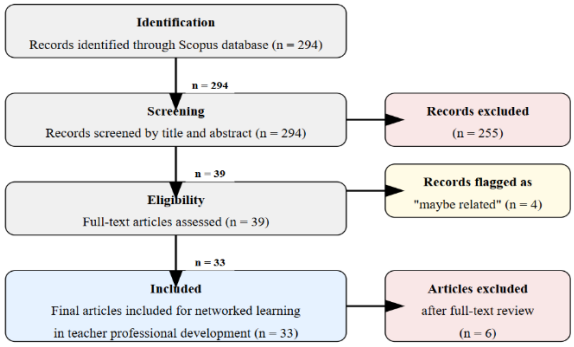


***Figure 1: Flow Diagram of Selection Process.***

Following a comprehensive full-text review, we established a corpus of 33 papers that specifically pertained to networked learning in the context of teacher professional development. This sample size is suitable for multiple reasons, (1) It signifies extensive coverage of the specialised literature at this intersection, as demonstrated by the substantial exclusion rate (255 of 294 articles) under stringent criteria; (2) bibliometric studies in nascent educational technology sectors generally examine 30-50 articles for significant pattern recognition; (3) our analysis achieved theoretical saturation, with recurring themes and citation patterns evident throughout the sample; and (4) the sample encompasses key geographical region.

### *3.4. Data Analysis*

For our data analysis, we employed a dual-approach methodology combining the specialized bibliometric visualization capabilities of VOSviewer with the statistical analysis features and Microsoft Excel. VOSviewer was utilized to generate comprehensive network visualizations of co-authorship patterns, keyword co-occurrences, and citation relationships among the 35 selected articles focused on networked learning in teacher professional development. This software enabled us to identify clusters of related research, visualize intellectual connections between scholars, and map the conceptual landscape of the field through network density visualizations and heat maps. Complementing this, we used Excel for quantitative bibliometric analysis, including publication trends over the 2014-2025 timeframe, citation impact calculations, and journal distribution metrics. Excel's analytical capabilities allowed us to create temporal visualizations of publication patterns, calculate productivity metrics for key authors, and generate descriptive statistics characterizing the evolving scholarly discourse on networked learning within teacher professional development contexts.

## 4. FINDINGS

### *4.1. Publication Trends over the Years*

The publication landscape for networked learning research demonstrates a dynamic trend from 2014 to 2025, marked by notable oscillations in academic production (See Figure 2).

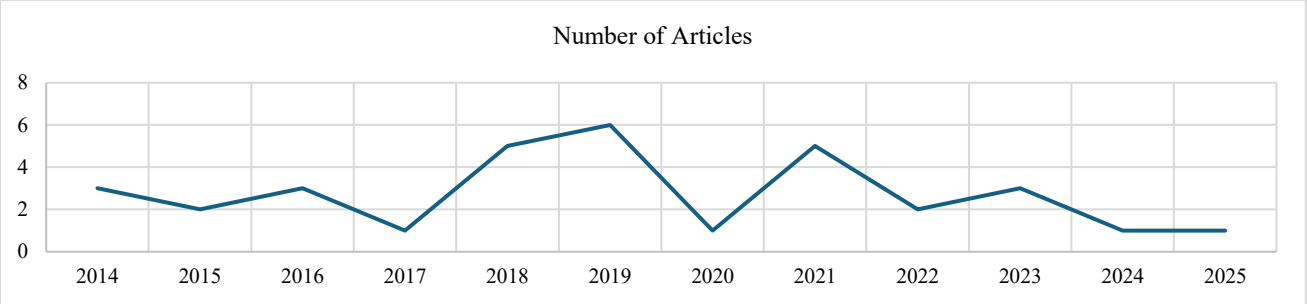


***Figure 2: Publication Trends over the Years.***

Initially including a modest 2-3 papers per year, the field witnessed a significant increase around 2018-2019, with roughly six publications annually. This peak underscored a significant phase of research interest, succeeded by ongoing fluctuations, culminating in another prominent peak in 2021, nearing five papers and reflecting the field's dynamic scholarly involvement. The years 2022 to 2025 exhibit a divergent trend of stabilisation, characterised by a decrease in publishing numbers, which have stabilised at a more modest rate of 1-2 articles per year. This tendency likely indicates the maturing of the study field, implying a transition from general exploratory studies to more focused, advanced enquiries. The decreased publishing output may reflect a shift towards more focused and sophisticated scholarly investigation into the intricacies of networked learning and technological mediation in teacher professional development, rather than a decline in interest.

### *4.2. Influential Author Based on Citation.*

This citation analysis reveals the most impactful academic contributors to creative research on networked learning, technology mediation, and educational change from 2014 to 2022 within the essential field of teacher professional development (refer to Table 1).

Table 1 displays the five most influential authors according to citation counts from 2015 to 2019. Kannan and Munday (2018) spearheaded innovative research on second language acquisition via ICT, networked learning, and artificial intelligence. They obtained 75 citations and emphasised technology's transformative impact on language instruction. Their work enhances the research of Haya et al. (2015), which thoroughly examined interaction patterns in networked learning environments, garnering 42 citations by investigating learner engagement with digital learning spaces.

Oddone and Hughes (2019) investigate teachers as interconnected professionals in the realm of professional development, garnering 41 citations for their analysis of how personal learning networks might improve educational practice. Hodgson and McConnell (2019) enhanced the theoretical framework by creating a comprehensive model for Networked Learning and Postdigital Education, which has garnered 39 citations and offers essential conceptual insights into interconnected learning settings. Bali and Caines (2018) completed this prominent group by advocating for equity and agency in learning, garnering 37 citations through their fervent

examination of ownership and inclusivity in teacher development via connected learning.

These authors collectively signify a crucial juncture in educational research, illustrating how technological mediation, networked methodologies, and innovative pedagogical strategies can fundamentally alter learning experiences across diverse educational contexts, especially in teacher professional development.

***Table 1: Top Five Influential Authors.***

| Authors | Work Title | Publication Year | Citation | Source |
|---|---|---|---|---|
| Kannan J.; Munday P. | New trends in second language learning and teaching through the lens of ICT, networked learning, and artificial intelligence | 2018 | 75 | Circulo de Linguistica Aplicada a la Comunicacion |
| Haya P.A.; Daems O.; Malzahn N.; Castellanos J.; Hoppe H.U. | Analysing content and patterns of interaction for improving the learning design of networked learning environments | 2015 | 42 | British Journal of Educational Technology |
| Oddone K.; Hughes H.; Lupton M. | Teachers as connected professionals: A model to support professional learning through personal learning networks | 2019 | 41 | International Review of Research in Open and Distributed Learning |
| Hodgson V.; McConnell D. | Networked Learning and Postdigital Education | 2019 | 39 | Postdigital Science and Education |
| Bali M.; Caines A. | A call for promoting ownership, equity, and agency in faculty development via connected learning | 2018 | 37 | International Journal of Educational Technology in Higher Education |

## *4.3. Influential Countries*

The heat map visualization reveals a distinct geographical distribution of scholarly influence in networked learning research (See Figure 3).

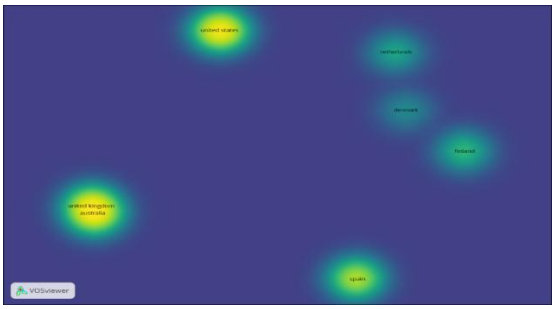


***Figure 3: Influential Countries in the Publication of Networked Learning.***

Figure 3 illustrates that the United States stands out as the preeminent centre of influence, indicated by a vivid yellow-green concentration in the upper left quadrant of the visualisation. A comparable intense cluster is evident in the lower left, indicating that the United Kingdom and Australia hold an analogous relevance, reflecting their combined involvement in this study topic. Spain is strongly represented by its vibrant yellow-green region in the lower right quadrant, signifying significant research contributions.

The visualisation depicts a secondary tier of influence indicated by a moderate blue-green hue, comprising Northern European nations, specifically the Netherlands in the upper right, Denmark in the middle right, and Finland on the right side of the map. These countries sustain a discernible albeit less predominant presence in the domain. The dark blue background accentuates the concentrated nature of impactful scholarship, with research leadership concentrating in particular geographic areas rather than being uniformly spread worldwide. This pattern indicates that research on networked learning has evolved inside specific academic communities, predominantly in English-speaking countries and select European nations.

## *4.4. Author Keywords and Co-Occurrences*

The authors' keywords on network visualization reveal two interconnected centers networked learning and connected learning that form the conceptual backbone of research on technology-mediated teacher professional development. Networked learning is emerging as the dominant framework linking pedagogical practices to technological innovations (See Figure 4).

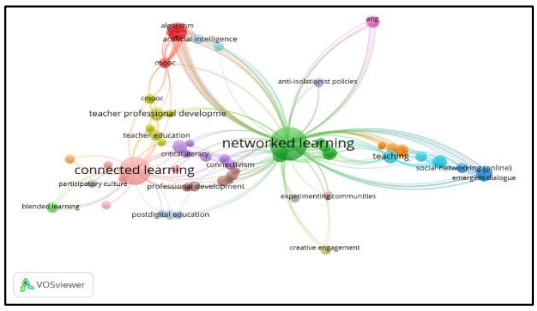


***Figure 4: Keywords Networked Analysis in the Publication of Networked Learning.***

Figure 4 illustrates that the networked learning centre serves as the primary hub, characterised by its

greater size and more extensive connections. It directly connects to essential educational principles, encompassing teacher professional development, teacher education, online social networking, and pedagogy. This centrality underlines its recognised status in the literature as a holistic framework for comprehending technology-mediated professional learning.

Furthermore, albeit smaller, the connected learning centre constitutes a significant secondary cluster that integrates concepts such as connectivism, professional development, participatory culture, and blended learning. The visualisation indicates a robust connection between this node and the primary networked learning centre, implying that linked learning is perceived as a closely related yet separate methodology within the wider domain. The connection between these two centres illustrates how the domain interprets various methodologies for technology-enhanced learning. Although networked learning serves as the primary framework, linked learning presents a supplementary viewpoint that highlights interactive and interest-driven educational experiences. The closeness and interrelation of these two centres indicate they possess shared theoretical foundations while upholding unique foci within the research domain.

## *5. DISCUSSION*

### *5.1. Evolution of Scholarly Discourse in Networked Learning*

Publication statistics indicate an initial spike, reaching a zenith of 6 articles per year during 2018-2019, followed by a subsequent peak in 2021, before diminishing to 1-2 articles annually by 2025. This pattern indicates that networked learning research is characterised by theoretical fragmentation rather than development. Analysed through Jones's (2015) relational thinking framework, the instability exposes a core inadequacy in harmonising individual agency, technological mediation, and institutional frameworks. The domain seems ensnared between Siemens' (2005) technical optimism and Selwyn's (2010) critical scepticism, unable to reconcile these conflicting viewpoints.

Skantz-Åberg et al. (2022) illustrate that, despite heightened focus on teachers' professional digital competence, the idea remains unclear and elusive, with academics utilising a multitude of words lacking conceptual coherence. This corresponds with the current bibliometric research conducted by Gökdaş et al. (2024), which indicates that although COVID-19 heightened attention to digital competences, it simultaneously exposed enduring deficiencies in theoretical coherence. Moreover, Arstorp et al. (2024) observe that research on professional digital competence is predominantly confined to North America and Europe, with insufficient input from other global locations that could enrich theoretical viewpoints.

This fragmentation is seen in rival theoretical factions that hardly interact substantively with one another. Hodgson and McConnell (2019) contend that the discipline has not established a cohesive philosophical framework that synthesises the collaborative focus of social constructivism with critical analyses of power and technology. Furthermore, the publishing pattern reveals the enduring difficulty noted by Goodyear et al. (2004), wherein academics utilise networked learning terminology without grappling with its theoretical intricacies. This superficial involvement elucidates the field's transient prominence followed by its demise, as it provided technological innovation devoid of significant theoretical advancement.

The ramifications extend beyond scholarly discussion to practical application. In the absence of rigorous theoretical frameworks, professional development programs exhibit incoherent design principles, resulting in fragmented interventions that, as Kennedy (2016) articulates, do not provide enduring change. Professional learning communities risk becoming, as DuFour and Eaker (2009) cautioned, frameworks devoid of substance.

Future research must provide integrative frameworks that recognise the complex realities of teaching practice. Kemmis et al. (2014) advocate for an authentic practice-based learning model that emphasises instructors' life experiences rather than abstract theoretical frameworks. Researchers ought to concentrate on longitudinal research that investigate the evolution of networked learning within particular cultural and institutional contexts (Mockler, 2013; Sachs, 2016). Educational systems should prioritise investment in sustainable research programs over pursuing technological trends, thereby creating what Chapman and Montecinos (2024) refer to as robust knowledge infrastructures that link theory to practice.

### *5.2. Theoretical Frameworks and Methodological Approaches*

Citation analysis indicates that seminal studies mostly emphasise technology applications (e.g., Haya et al., 2015; Kannan & Munday, 2018) rather than exploring power dynamics and institutional limitations. This technical determinism directly

contradicts the study by Matusov et al. (2005), which cautions against simplistic cooperation models and strengthens Contu and Willmott's (2003) critique of idealised practice communities. The recent study by Trevisan et al. (2024) contends that, despite the potential of AI-based technologies in education, they have garnered little attention from a pedagogical standpoint, even though teachers are vital stakeholders. This technological emphasis conceals what the same writers recognise as significant risks AI technologies rely on extensive data, potentially reflecting and perpetuating algorithmic biases, societal injustices, and prejudices dynamics that the research on networked learning frequently overlooks. The beneficial impact of technology on student achievement is contingent upon the pedagogical methods employed by educators, rather than only on the complexity of the technology itself. A recent systematic review by Hennessy et al. (2022) on technology-mediated teacher professional development indicates that, although the findings predominantly demonstrate advantages for teachers, evidence regarding sustainability, cost-effectiveness, or concrete effects on classroom practices and student outcomes is limited. These findings reveal the disparity between the optimistic discourse around networked learning and the empirical evidence.

This methodological bias is evident in what Ryberg et al. (2012) term depoliticised collaboration research that analyses interaction patterns without interrogating who gains from specific networked configurations. The methodological constraints pertain to data collection methods. Many studies depend on what Carpenter and Krutka (2014) refer to as convenience samples of technologically adept educators, systematically omitting those with restricted access or dissenting viewpoints. This sample bias distorts the perception of networked learning's potential, exaggerating advantages while downplaying obstacles. The methodological limitations of the field undermine its theoretical assertion of valuing multiple perspectives and inclusive involvement.

The solution necessitates a paradigm shift. Research should employ critical frameworks that openly analyse the functioning of digital environments as contested areas (Czerkawski, 2016; Ryberg et al., 2012). Consequently, subsequent research should utilise participatory approaches that regard instructors as co-researchers instead of mere subjects, referencing Eraut's (2004) insights on informal learning and Fransson et al.'s (2019) focus on constructive engagement with diversity. In this context, educational institutions ought to create what Trust (2016) refers to as critical networked inquiry communities, wherein educators and researchers collaboratively examine power relations inside technological settings. Consequently, researchers must establish standardised protocols that necessitate the inclusion of teacher resistance narratives and the documentation of researcher positionality within the power dynamics influencing the communities under study.

### *5.3. Influential Authors and Publications*

Citation patterns indicate that critical perspectives (e.g., Bali & Caines, 2018) garner considerably less attention, receiving 37 citations, in contrast to technologically-oriented research (e.g., Kannan & Munday, 2018), which has 75 citations. The inclination towards technical solutions instead of critical analysis sustains the knowledge legitimacy problems outlined by Fuller et al. (2005). This prejudice weakens the foundation of social constructivism (Vygotsky, 1978) and contradicts Lave and Wenger's (1998) emphasis on genuine community engagement. This pattern exposes a concerning dynamic in knowledge production what Lieberman and Mace (2010) refer to as the techno-celebratory language prevalent in educational technology research. Research that offers favourable evaluations of technology initiatives garners excessive attention, whilst studies that challenge foundational assumptions remain marginal. These scenarios result in what Hadfield (2011) describes as an echo chamber effect, wherein researchers reference similar viewpoints instead of considering crucial alternatives.

The predominance of Western authors in citation measures intensifies this issue. McConnell et al. (2012) contend that this spatial concentration systematically marginalises perspectives from the Global South, resulting in a skewed comprehension of networked learning in many contexts. The discipline purports to appreciate interdisciplinary engagement while yet upholding intellectual limits using exclusionary citation methods. Academic institutions and journals must vigorously advocate for critical scholarship. This entails the establishment of specialised areas for study focused on power imbalances and the formulation of assessment standards that prioritise contextual comprehension above technological advancement. Funding organisations ought to prioritise research examining the intersection of networked learning with workload intensification and accountability frameworks (Williamson, 2019). Furthermore, publishers ought to mandate interaction with varied theoretical frameworks and geographical situations. Journal editors must enforce affirmative action stipulating that 30% of networked learning papers originate from Global South universities, establish

special issues focused on critical perspectives, and require technologically optimistic studies to engage with a minimum of three critical frameworks. Professional groups ought to mandate that conference panels incorporate essential and Global South representatives, organise North-South mentorship initiatives, and finance joint research partnerships.

### *5.4. Emerging Research Themes and Knowledge Gaps*

Keyword network analysis identifies two interlinked centres networked learning and connected learning, although it notably lacks terminology pertaining to power dynamics, cultural settings, or institutional limits. This absence exposes the discipline's inability to incorporate Brown and Duguid's (1991) essential ideas regarding situated learning, hence undermining its assertion of boundary-crossing potential. This conceptual limitation is evident in what Phelps et al. (2012) term technical solutionism the conviction that digital tools can solely revolutionise professional learning without confronting fundamental structural impediments. The keyword patterns reveal the discipline's failure to incorporate what Levin and Schrum (2013) refer to as critical knowledge ecology approaches, which analyse how power dynamics influence information dissemination inside networks. When networked learning rhetoric neglects concepts such as inequity, resistance, or workload, it engenders what Downes (2010) characterises as a superficially harmonious perspective on professional connectedness.

The geographical concentration reveals a Western-centric bias, undermining the global objectives of networked learning. This constraint reinforces the concern raised by Paavola and Hakkarainen (2005) regarding knowledge mobilisation that overlooks varied epistemic traditions. The geographical insularity of the field engenders pseudo-networking superficial relationships that bolster existing power inequalities instead of promoting authentic information exchange (Katz & Earl, 2010). Recent studies on digital formative assessment indicate a paradoxical phenomenon wherein digital feedback fosters an increased sense of physical distance and isolation between teachers and students, hence contradicting the connectivity promises of networked learning (Okoye et al., 2023). Zou et al. (2025) elucidate that digital learning poses considerable pedagogical challenges, especially regarding curriculum integration and teacher training, necessitating a fundamental transformation in instructional design that existing networked learning frameworks fail to adequately address.

To address these deficiencies, the field must undergo a thorough transformation across several dimensions cultivating post-colonial perspectives that displace Western paradigms (Mcconnell et al., 2012; Networked Learning Editorial Collective (NLEC), 2021); integrating critical race theory and feminist frameworks to scrutinise systemic inequities (Bali & Caines, 2018; Oddone et al., 2019); forging substantial research collaborations with marginalised regions to contest prevailing narratives (Lev Furthermore, legislators should enforce equity assessments in all educational technology policies, necessitate that professional development programs perform access audits, and implement legislation obligating corporations to demonstrate the elimination of inequality. Teacher educators must restructure training programs to include compulsory critical technology analysis courses, varied field experiences, and assessment protocols that necessitate understanding of power dynamics. School leaders must build assessment methods that assess key participation, allocate protected time for all educators, and adopt accountability measures that illustrate the elimination of inequity.

In the absence of these essential changes, networked learning may devolve into yet another unsuccessful educational reform, pledging revolution while perpetuating existing disparities and neglecting the genuine needs of educators. The discipline must adopt critical networked praxis, integrating technology potential with rigorous examination of power dynamics and structural limits. Addressing these important gaps is essential for networked learning to realise its potential in facilitating teachers' genuine professional development in increasingly complicated educational contexts.

## *6. Implications*

This bibliometric analysis of networked learning research from 2014 to 2025 uncovers complex consequences across theoretical, methodological, practical, and research areas. Theoretically, the erratic publication patterns and the marginalisation of critical viewpoints require more cohesive frameworks that genuinely connect social constructivism with critical methodologies that tackle power dynamics and institutional limitations. The field must transcend its narrow focus by integrating participatory methodologies that regard instructors as co-researchers and formulating strategies that accurately reflect networked learning processes across many cultural contexts, moving beyond Western-centric paradigms. These findings necessitate that practitioners and policymakers transition from

technology-centric reforms to strategies that incorporate digital tools while prioritising teachers' working conditions and professional autonomy, alongside the application of equity-focused design principles in professional development initiatives. The research landscape necessitates post-colonial perspectives on networked learning, intersectional analyses of power dynamics in networked environments, investigations into teacher resistance to technological interventions, and longitudinal studies assessing the evolution of networked learning within particular institutional contexts transitioning from the prevailing cycle of enthusiasm followed by neglect to sustainable models of technology-mediated professional development that recognise the intricate realities of teachers' professional lives.

### *7. Limitations*

Although it offers significant insights into networked learning research, it possesses many notable limitations that must be recognised. Our sole emphasis on English-language publications may omit substantial contributions from non-English speaking regions, thereby perpetuating the Western-centric bias we challenge in the discipline. This linguistic constraint may have hindered our ability to encompass varied viewpoints on networked learning, especially from scholars in Asia, Africa, and Latin America who may write in regional languages. To address the constraints of language filtering in future research, scholars should forge collaborative alliances with regional institutions in non-English speaking nations, systematically explore regional databases (SciELO, CNKI, J-STAGE, African Journals Online) employing search terms validated by native speakers, assemble cross-linguistic research teams comprising bilingual academics, and establish funding mechanisms to support translation expenses and cross-cultural collaboration. These initiatives would convert methodological constraints into possibilities for decolonising networked learning research by prioritising multiple epistemic traditions.

Secondly, our dependence on Scopus as the singular database, albeit warranted by its extensive coverage, implies that we may have overlooked pertinent papers indexed solely in alternative databases such as ERIC or regional educational repositories. Third, while removing review papers from our approach is methodologically justifiable for assessing primary knowledge generation, it may overlook significant synthesising viewpoints that could clarify theoretical patterns. Fourth, although our bibliometric method elucidates citation patterns and keyword associations, it fails to adequately encapsulate the qualitative subtleties of how concepts are utilised or debated within the literature. The limited sample size of 33 core articles, while indicative of the field's scope, constrains statistical generalisability and may exacerbate the impact of outlier publications. Subsequent research must rectify these limitations by employing multi-database methodologies, incorporating non-English literature, utilising mixed-methods designs that merge bibliometric analysis with qualitative content evaluation, and conducting comparative analyses across related disciplines to contextualise the evolution of networked learning within the wider scope of educational research trajectories

## 8. CONCLUSION

This bibliometric analysis of networked learning in teacher professional development from 2014 to 2025 elucidates the intricate evolution of this domain across various aspects. Our research of publishing trends revealed a troubling pattern of initial enthusiasm followed by a drop, indicating theoretical fragmentation rather than maturation. Citation analysis demonstrated the marginalisation of critical viewpoints in favour of technical determinism, while geographical mapping uncovered a concerning Western-centric bias that defies the boundary-crossing objectives of networked learning. Keyword network analysis revealed a substantial deficiency in studies concerning power dynamics, cultural contexts, and institutional limitations. These findings necessitate a major reconceptualisation of networked learning that merges social constructivist approaches with critical frameworks, recognising digital environments as contested arenas where professional identities are negotiated within prevailing power structures. The discipline must cultivate post-colonial viewpoints, integrate critical racial and feminist theories, forge alliances with marginalised areas, and utilise approaches that emphasise educators' lived experiences and material circumstances. Notwithstanding the methodological constraints of our study, especially concerning the emphasis on English-language sources and database selection, this research offers significant guidance for future academic inquiry. The transformative potential of networked learning relies not on technological sophistication but on its ability to engage meaningfully with the social, cultural, and institutional complexities of teachers' professional lives, fostering authentic growth through critically informed, contextually sensitive, and genuinely empowering methods. Only by accepting these challenges can networked learning realise its potential as a framework for teacher

development in our swiftly changing educational environment.

**Acknowledgments:** The authors sincerely would like to thank indonesian education scholarship (bpi), center for higher education funding and assessment (ppapt), and indonesian endowment fund for education (lpdp) from the ministry of finance republic indonesia for granting the scholarship and supporting this research and all the participants involved in this study.

## REFERENCES

Acuyo, A. (2022). Reviewing the Literature on Professional Development for Higher Education Tutors in the Work-From-Home Era: Is it Time to Reconsider the Integration of Social Media? *Education and Information Technologies*, *27*(1), 89–113. https://doi.org/10.1007/s10639-021-10603-2

Anderson, R. C., Katz-Buonincontro, J., Bousselot, T., Land, J., Livie, M., & Beard, N. (2022). Space that was safe to explore and learn: Stretching the affordances for networked professional learning in creativity for educators. *Australasian Journal of Educational Technology*, *38*(4), 55–75. https://doi.org/10.14742/ajet.7879

Arstorp, A. T., Olofsson, A. D., & Lindberg, J. O. (2024). Professional digital competence in teacher education–where are we, where are we headed and how to get there? *Teachers and Teaching: Theory and Practice*, *30*(4), 395–399. https://doi.org/10.1080/13540602.2024.2379845

Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, *1*(1), 377–386. https://doi.org/10.1162/qss_a_00019

Bali, M., & Caines, A. (2018). A call for promoting ownership, equity, and agency in faculty development via connected learning. *International Journal of Educational Technology in Higher Education*, *15*(1). https://doi.org/10.1186/s41239-018-0128-8

Brown, J. S., & Duguid, P. (1991). Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science*, *2*(1), 40–57. https://doi.org/10.1287/orsc.2.1.40

Carpenter, J. P., & Krutka, D. G. (2014). How and why educators use Twitter: A survey of the field. *Journal of Research on Technology in Education*, *46*(4), 414–434. https://doi.org/10.1080/15391523.2014.925701

Chapman, C., & Montecinos, C. (2024). Professional learning in Latin America and the Caribbean: towards a Networked Learning System? *Professional Development in Education*, *00*(00), 1–6. https://doi.org/10.1080/19415257.2025.2446110

Contu, A., & Willmott, H. (2003). Re-embedding situatedness: The importance of power relations in learning theory. *Organization Science*, *14*(3), 283–296. https://doi.org/10.1287/orsc.14.3.283.15167

Czerkawski, B. C. (2016). Networked learning: design considerations for online instructors. *Interactive Learning Environments*, *24*(8), 1850–1863. https://doi.org/10.1080/10494820.2015.1057744

Denee, R. (2024). The network professional learning community approach: an effective model for individual and group learning. *Teacher Development*, *28*(3), 330–346. https://doi.org/10.1080/13664530.2024.2307588

Downes, S. (2010). New technology supporting informal learning. *Journal of Emerging Technologies in Web Intelligence*, *2*(1), 27–33. https://doi.org/10.4304/jetwi.2.1.27-33

Dufour, R. (2006). What Is a " Professional Learning Community "? *Educational Leadership*, *61*(8), 6–11.

DuFour, R., & Eaker, R. (2009). *Professional Learning Communities at Work TM: Best Practices for Enhancing Students Achievement*. Solution Tree Press.

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809–1831. https://doi.org/10.1007/s11192-015-1645-z

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, *26*(2), 247–273. https://doi.org/10.1080/158037042000225245

Fransson, G., Holmberg, J., Lindberg, O. J., & Olofsson, A. D. (2019). Digitalise and capitalise? Teachers' self-understanding in 21st-century teaching contexts. *Oxford Review of Education*, *45*(1), 102–118. https://doi.org/10.1080/03054985.2018.1500357

Fuller, A., Hodkinson, H., Hodkinson, P., & Unwin, L. (2005). Learning as peripheral participation in communities of practice: A reassessment of key concepts in workplace learning. *British Educational Research Journal*, *31*(1), 49–68. https://doi.org/10.1080/0141192052000310029

Gökdaş, İ., Karacaoğlu, Ö. C., & Özkaya, A. (2024). COVID-19 and teachers' digital competencies: a comprehensive bibliometric and topic modeling analysis. *Humanities and Social Sciences*

*Communications*, *11*(1), 1–17. https://doi.org/10.1057/s41599-024-04335-0

Goodyear, P., Banks, S., Hodgson, V., & McConnell, D. (2004). Advances in Research on Networked Learning. In *Advances in Research on Networked Learning* (Issue January). Kluwer Academic Publisher. https://doi.org/10.1007/1-4020-7909-5

Hadfield, M. (2011). School networks, networked learning and 'network theory'. In *The Routledge International Handbook of Teacher and School Development* (pp. 516–526). https://doi.org/10.4324/9780203815564-56

Hammond, L. D., Hyler, M. E., & Gardner, M. (2017). Effective Teacher Professional Development in the evolution of human and non-human animals. *Learning Policy Institute*, *June*.

Haya, P. A., Daems, O., Malzahn, N., Castellanos, J., & Hoppe, H. U. (2015). Analysing content and patterns of interaction for improving the learning design of networked learning environments. *British Journal of Educational Technology*, *46*(2), 300–316. https://doi.org/10.1111/bjet.12264

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., Brugha, M., & Zubairi, A. (2022). Technology Use for Teacher Professional Development in Low- and Middle-Income Countries: A systematic review. *Computers and Education Open*, *3*(December 2021), 100080. https://doi.org/10.1016/j.caeo.2022.100080

Hodgson, V., & McConnell, D. (2019). Networked Learning and Postdigital Education. *Postdigital Science and Education*, *1*(1), 43–64. https://doi.org/10.1007/s42438-018-0029-0

Jones, C. (2015). Networked Learning: An Educational Paradigm for the Age of Digital Networks. In V. Hodgson & D. McConnell (Eds.), *Research in Networked Learning*. Springer International Publishing Switzerland. https://doi.org/10.1007/978-3-319-01934-5

Jones, W. M., & Dexter, S. (2014). How teachers learn: The roles of formal, informal, and independent learning. *Educational Technology Research and Development*, *62*(3), 367–384. https://doi.org/10.1007/s11423-014-9337-6

Kannan, J., & Munday, P. (2018). New trends in second language learning and teaching through the lens of ICT, networked learning, and artificial intelligence. *Circulo de Linguistica Aplicada a La Comunicacion*, *76*, 13–30. https://doi.org/10.5209/CLAC.62495

Katz, S., & Earl, L. (2010). Learning about networked learning communities. *School Effectiveness and School Improvement*, *21*(1), 27–51. https://doi.org/10.1080/09243450903569718

Kemmis, S., Wilkinson, J., Edwards-Groves, C., Hardy, I., Grootenboer, P., Bristol, L., Kemmis, S., Wilkinson, J., Edwards-Groves, C., & Hardy, I. (2014). Professional Learning as Practice Development. *Changing Practices, Changing Education*, 127–155.

Kennedy, M. M. (2016). How Does Professional Development Improve Teaching? *Review of Educational Research*, *86*(4), 945–980. https://doi.org/10.3102/0034654315626800

Lave, J., & Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Pers Universitas Cambridge.

Levin, B. B., & Schrum, L. (2013). Using systems thinking to leverage technology for school improvement: Lessons learned from award-winning secondary schools/districts. *Journal of Research on Technology in …*. https://doi.org/10.1080/15391523.2013.10782612

Lieberman, A., & Mace, D. (2010). Making practice public: Teacher learning in the 21st century. *Journal of Teacher Education*, *61*(1–2), 77–88. https://doi.org/10.1177/0022487109347319

Lund, S., & Jaldemark, J. (2024). Supporting small remote school teachers' professional development through networked learning designs. *Networked Learning Conference*, *14*, 1–5. https://doi.org/10.54337/nlc.v14i1.8052

Matusov, E., Julien, J. S., & Hayes, R. (2005). Building a Creole Educational Community as the Goal of Multicultural Education for Preservice Teachers. In L. V. Barness (Ed.), *ContemporaryTeaching and Teacher lssues* (pp. 1–38). Nova Science Publisher Inc.

McConnell, D. (1998). Developing networked learning professionals: a critical perspective. In S. Banks, C. Graebner, & D. McConnell (Eds.), *Networked lifelong learning: Innovative approaches to education and training through the internet*. University of Sheffield.

Mcconnell, D., Hodgson, V., & Dirckinck-holmfeld, L. (2012). Exploring the Theory, Pedagogy and Practice of Networked Learning. *Exploring the Theory, Pedagogy and Practice of Networked Learning*, 3–24. https://doi.org/10.1007/978-1-4614-0496-5

Mockler, N. (2013). Teacher professional learning in a neoliberal age: Audit, professionalism and identity. *Australian Journal of Teacher Education*, *38*(10), 35–47. https://doi.org/10.14221/ajte.2013v38n10.8

Networked Learning Editorial Collective (NLEC). (2021). Networked Learning: Inviting Redefinition.

*Postdigital Science and Education*, *3*(2), 312–325. https://doi.org/10.1007/s42438-020-00167-8

Oddone, K., Hughes, H., & Lupton, M. (2019). Teachers as connected professionals: A model to support professional learning through personal learning networks. *International Review of Research in Open and Distributed Learning*, *20*(3), 102–120.

Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., Ortiz, E. A., Escamilla, J., & Hosseini, S. (2023). Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks. In *Education and Information Technologies* (Vol. 28, Issue 2). Springer US. https://doi.org/10.1007/s10639-022-11214-1

Paavola, S., & Hakkarainen, K. (2005). The knowledge creation metaphor - An emergent epistemological approach to learning. *Science and Education*, *14*(6), 535–557. https://doi.org/10.1007/s11191-004-5157-0

Pan, H. L. W., & Chen, W. Y. (2023). Networked Learning Communities in Promoting Teachers' Receptivity to Change: How Professional Learning Beliefs and Behaviors Mediate. *Sustainability (Switzerland)*, *15*(3). https://doi.org/10.3390/su15032396

Phelps, C., Heidl, R., & Wadhwa, A. (2012). Knowledge, Networks, and Knowledge Networks: A Review and Research Agenda. In *Journal of Management* (Vol. 38, Issue 4). https://doi.org/10.1177/0149206311432640

Ryberg, T., Buus, L., & Georgsen, M. (2012). Exploring the Theory, Pedagogy and Practice of Networked Learning. In L. Dirckinck-Holmfeld, V. Hodgson, & D. McConnell (Eds.), *Exploring the Theory, Pedagogy and Practice of Networked Learning* (pp. 43–58). https://doi.org/10.1007/978-1- 4614-0496-5_3

Sachs, J. (2016). Teacher professionalism: Why are we still talking about it? *Teachers and Teaching: Theory and Practice*, *22*(4), 413–425. https://doi.org/10.1080/13540602.2015.1082732

Schotten, M., el Aisati, M., Meester, W., Steiginga, S., & Ross, C. (2017). A Brief History of Scopus: The World's Largest Abstract and Citation Database of Scientific Literature. In F. J. Cantu-Ortiz (Ed.), *Research Analytics* (1st ed., p. 28). Auerbach Publications. https://doi.org/10.1201/9781315155890

Selwyn, N. (2010). Schools and schooling in the digital age: A Critical analysis. In *Schools and Schooling in the Digital Age: A Critical Analysis*. Routledge. https://doi.org/10.4324/9780203840795

Siemens, G. (2005). Connectivism : a new learning theory for the Digital Age. *International Journal of Instructional Technology & Distance Learning*, *2*, 3–10.

Skantz-Åberg, E., Lantz-Andersson, A., Lundin, M., & Williams, P. (2022). Teachers' professional digital competence: an overview of conceptualisations in the literature. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186X.2022.2063224

Trevisan, O., Christensen, R., Drossel, K., Friesen, S., Forkosh-Baruch, A., & Phillips, M. (2024). Drivers of Digital Realities for Ongoing Teacher Professional Learning. *Technology, Knowledge and Learning*, *29*, 1851–1868. https://doi.org/10.1007/s10758-024-09771-0

Trust, T. (2016). New Model of Teacher Learning in an Online Network. *Journal of Research on Technology in Education*, *48*(4), 290–305. https://doi.org/10.1080/15391523.2016.1215169

Van Leeuwen, T. (2006). The application of bibliometric analyses in the evaluation of social science research. Who benefits from it, and why it is still feasible. *Scientometrics*, *66*(1), 133–154. https://doi.org/10.1007/s11192-006-0010-7

Vygotsky, L. S. (1978). *Mind in Society: The Development ofHigher Psychological Processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (eds.)). Harvard University Press.

Wenger-Trayner, E., & Wenger-Trayner, B. (2015). *Learning in Landscapes of Practice: Boundaries, identity, and knowledgeability in practice-based learning* (E. Wenger-Trayner, M. Fenton-O'Creevy, S. Hutchinson, C. Kubiak, & B. Wenger-Trayner (eds.)). Routledge. https://doi.org/10.4324/9781315777122-3

Williamson, B. (2019). New power networks in educational technology. *Learning, Media and Technology*, *44*(4), 395–398. https://doi.org/10.1080/17439884.2019.1672724

Woodward, C., Gaved, M., Hanson, R., Gallastegi, L., & Stutchbury, K. (2022). *Internet not Available! Using Offline Networked Learning to Enhance Teachers' School-Based Continuing Professional Development in Zambia*. https://doi.org/10.56059/pcf10.6083

Zou, Y., Kuek, F., Feng, W., & Cheng, X. (2025). Digital learning in the 21st century: trends, challenges, and innovations in technology integration. *Frontiers in Education*, *10*(1562391). https://doi.org/10.3389/feduc.2025.1562391