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Mapping the Literature on Supervising Technical Competence in Technology and Livelihood Education: A Bibliometric Perspective

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Abstract

This bibliometric study examines the limited research on supervising technical competence among TLE/TVL teachers, aiming to inform leadership practices aligned with SDG 4. Analyzing 127 Scopus publications (2020–2024) using VOSviewer, the study identifies dominant clusters on technology integration, culturally responsive pedagogy, and qualitative methodology, but finds supervision—mentoring, feedback, and competency assessment—largely absent. Findings highlight the need for competency-based supervision, sustained professional development, and institutional accountability. Limitations include reliance on Scopus and a narrow timeframe, suggesting future research expand data sources, methods, and longitudinal studies to strengthen vocational education.

Keywords: *technical competence; technology and livelihood education (tle/tvl); instructional supervision; bibliometric analysis; sustainable development goal 4 (sdg 4)*

Introduction

In today's digitalized educational landscape, technical competence—the ability of teachers to effectively use technology—has become essential, yet supervision of these skills remains underexplored (Ertmer & Ottenbreit-Leftwich, 2010). Research has largely focused on individual factors such as teacher beliefs and digital self-efficacy (Ertmer, 2010; Tondeur et al., 2017), while institutional and supervisory strategies receive limited attention (Dexter, 2011; Anderson & Dexter, 2005). In the Philippine context, studies emphasize teacher readiness and curriculum integration (Cabero-Almenara et al., 2021), but formal oversight mechanisms are scarce. This study applies bibliometric analysis to map research trends, influential works, and knowledge gaps in Technology and Livelihood Education (TLE), highlighting the need for structured supervisory practices to sustain digital competence, inform leadership strategies, and guide evidence-based policy in vocational education.

Methodology

This study used bibliometric analysis to examine the limited attention to supervising technical competence among Technology and Livelihood Education (TLE) teachers, focusing on research trends, influential publications, and emerging themes from 2020–2024. Data from Scopus (127 articles) were analyzed using VOSviewer to generate co-citation and keyword networks. Inductive analysis identified five thematic clusters, highlighting gaps in supervisory practices and emphasizing the need to explore how school leaders support teachers' technical skill development in post-pandemic, technology-driven contexts.

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2.1 Search Strategy and Data Collection

Table 1

Search string used for database search

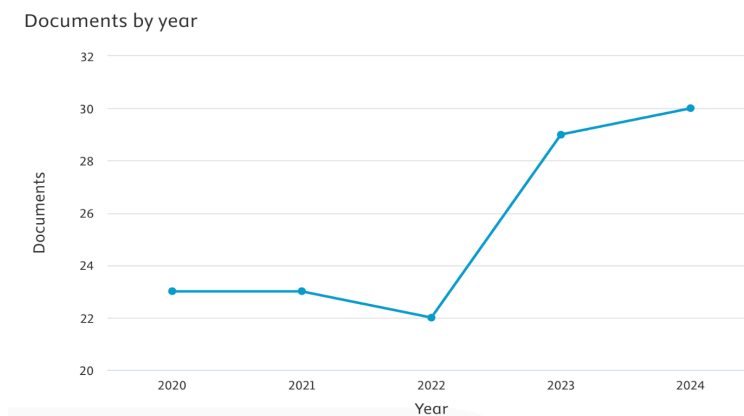
Keyword	Justification
"School" AND "Administrators" OR "Heads" AND "Teachers" AND "Competence"	Provides a focused yet inclusive retrieval of scholarly works examining the supervision of technical competence.

Results and Discussion

This section presents the findings of the bibliometric analysis on the limited scholarly attention to supervising technical competence. The analysis examined document distribution, co-citation networks, keyword co-occurrence patterns, and thematic clusters derived from the dataset. Visual maps and citation data are interpreted to highlight research trends, influential works, and emerging themes that shape the current landscape of this underexplored area.

Figure 1

Number of publications



(Source: Scopus)

Publication trends from 2020 to 2024 show shifts in scholarly attention to the link between school leadership and teacher competence. Stable output in 2020–2021 (23 articles) dipped slightly in 2022, likely due to pandemic disruptions, then rose to 29 in 2023 and 30 in 2024, reflecting renewed focus on leadership–competence frameworks amid post-pandemic recovery. The trends highlight competence as multidimensional—encompassing pedagogy, crisis management, technology, and socioemotional leadership—and align with global policy initiatives (UNESCO, 2023; OECD, 2024) advocating dynamic, context-responsive approaches.



3.2 Citation analysis

Table 2 presents the most frequently cited publications in the dataset. Citation counts highlight the academic influence and significance of these works in shaping scholarly discourse on leadership, teacher competence, and related supervisory practices.

Table 2
Top 10 highest-cited documents

No	Authors	Title	Citation
1	Fransson et al. (2020)	The challenges of using head mounted virtual reality in K-12 schools from a teacher perspective	86
2	Alakrash et al. (2021)	Education and the fourth industrial revolution: Lessons from COVID-19	37
3	Nguyen et al. (2022)	How teachers manage their classroom in the digital learning environment – experiences from the University Smart Learning Project	29
4	Feng et al. (2023)	The Association between Perceived Teacher Support, Students' ICT Self-Efficacy, and Online English Academic Engagement in the Blended Learning Context	27
5	Turgut et al. (2021)	Factors affecting ICT integration in TURKISH education: a systematic review	25
6	Bierman et al. (2021)	Reducing adolescent psychopathology in socioeconomically disadvantaged children with a preschool intervention: A randomized controlled trial	25
7	Chand et al. (2021)	Perceived Causes of Students' Poor Performance in Mathematics: A Case Study at Ba and Tavua Secondary Schools	22
8	A mar et al. (2022)	Effect of principal s technology leadership on teacher s technology integration	21



9	Chen et al. (2022)	Evaluating a cross-lagged panel model between problematic internet use and psychological distress and cross-level mediation of school administrator	19
10	Polly et al. (2023)	Examining Pre-Service and In-Service Teachers' Perceptions of Their Readiness to Use Digital Technologies for Teaching and Learning	19

3.2.1 Trends and Emerging Themes in the minimal focus on supervising technical competence

Analysis of top-cited educational technology studies highlights strong interest in digital integration, teacher and student engagement, ICT self-efficacy, and the effects of COVID-19 on learning (Fransson et al., 2020; Nguyen et al., 2022; Feng et al., 2023; Polly et al., 2023). Psychosocial impacts are also recognized (Chen et al., 2022; Bierman et al., 2021). However, supervisory and institutional oversight remains largely absent, with only Amar et al. (2022) addressing school leadership. Sustainable technology integration requires structured supervision and leadership to guide, evaluate, and support teachers' technical competence, highlighting a critical gap for future research.

3.2.2 Citation Distribution and Implications for the minimal focus on supervising technical competence.

Citation patterns among top works in educational technology show a strong focus on classroom practices, teacher preparedness, and student outcomes, while supervisory and institutional roles remain underrepresented. Studies like Fransson et al. (2020), Alakrash et al. (2021), Nguyen et al. (2022), and Feng et al. (2023) highlight technology adoption and ICT self-efficacy, yet only Amar et al. (2022) addresses school leadership, signaling the peripheral attention given to supervision. This imbalance underscores the need for coordinated leadership, competency-based supervision, and institutional accountability to sustain digital practices. While psychosocial dimensions are emphasized, systemic oversight is largely neglected, highlighting a critical gap in supporting effective and equitable technology integration.

3.3 Co-citation analysis

The co-citation analysis reveals a theoretically robust yet practically limited literature on supervising technical competence. Key works, including Karavas-Doukas (1995), Ozsevik (2010), Richards & Rogers (2006), and methodological guides by Patton (1990), Braun & Clarke (2006), and Charmaz (2006), emphasize teacher beliefs, instructional practices, and innovation adoption but offer little on structured supervision. Moderately cited studies like Rogers (2003) and Tondeur et al. (2016) address technology integration, while ISTE Standards (2016) and reports on inclusive education highlight digital literacy and equity, yet none provide frameworks for assessing or guiding teacher competence. Overall, literature prioritizes conceptual and methodological rigor over operational, competency-based supervisory models, underscoring the need for research and policies that support practical oversight in digital and AI-enhanced teaching.



Table 3
Top 10 documents with the highest co-citation and total link strength

Documents	Citation	Total link strength
“Karavas-Doukas, E., Teacher-Identified Factors Affecting the Implementation of an EFL Innovation in Greek Public Secondary Schools, Language, Culture and Curriculum, 8(1), 53–68 (1995)”	4	16
“Ozsevik, Z., The Use of Communicative Language Teaching (CLT): Turkish EFL Teachers’ Perceived Difficulties in Implementing CLT in Turkey, Master’s Thesis in Teaching English as a Second Language (2010)”	2	12
“Richards, J. C., & Rodgers, T., Approaches and Methods in Language Teaching (2006)”	2	12
“Patton, M. Q., Qualitative Evaluation and Research Methods (1990)”	2	7
“Rogers, E. M., Diffusion of Innovations (2003)”	2	7
“Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., & Edirisinghe, S., Responding to Challenges in Teacher Professional Development for ICT Integration in Education, Educational Technology & Society, 19(3), 110–120 (2016)”	2	7
“Braun, V., & Clarke, V., Using Thematic Analysis in Psychology, Qualitative Research in Psychology, 3(2), 77–101 (2006)”	3	6
“Charmaz, K., Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis (2006)”	2	6
“Inclusive Education and Classroom Practice in Secondary Education (2005)”	2	6

Source: Author interpretation based on VOSviewer analysis

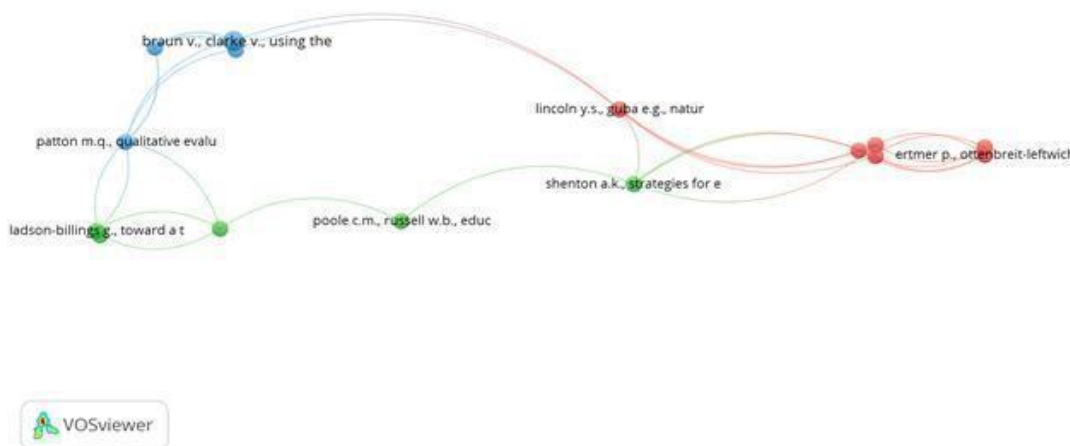
The network visualization from the co-citation analysis revealed three distinct clusters, as shown in Figure 2. Each cluster was identified and described based on its representative publications. Labels were assigned through the author’s inductive interpretation, reflecting the thematic focus and intellectual orientation of the works grouped within each cluster.

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Figure 2

Co-citation analysis on the minimal focus on supervising technical competence



The co-citation analysis highlights three main clusters in research on supervising technical competence, revealing a consistent gap in explicit supervisory frameworks. Cluster 1 emphasizes qualitative methods and interpretive approaches (Braun & Clarke, 2006; Patton, 2002), valuable for understanding perceptions but less suited for assessing technical skills. Cluster 2 focuses on culturally responsive pedagogy and inclusivity (Ladson-Billings, 1995; Shenton, 2004; Poole & Russell, 2015), framing competence in broad pedagogical terms rather than operational supervision. Cluster 3 bridges technology integration and naturalistic inquiry (Ertmer & Ottenbreit-Leftwich, 2010; Lincoln & Guba, 1985), addressing adoption barriers and teacher beliefs but offering little on structured oversight. Overall, the field is methodologically robust yet underdeveloped in hands-on supervision, signaling a need for competency-based frameworks, empirical evaluation, and mixed-methods approaches to guide technical skill development in educational contexts.

Table 4

Co-citation clusters on the minimal focus on supervising technical competence

Cluster	Cluster label	Number of articles	Representative publications
1 (Red)	Technology Integration and Innovation in Teacher Practice	6	Ertmer, P., Ottenbreit-Leftwich, A., Sadik, O., Sendurur, E., & Sendurur, P. (2010). Teacher beliefs and technology integration practices: A critical relationship. <i>Computers & Education</i> , 59(2), 423–435; ISTE Standards for Students (2016); Lincoln, Y. S., & Guba, E. G. (1985). <i>Naturalistic Inquiry</i> ; Martin, F., Polly, D., Coles, S., & Wang, C. (2020). Examining higher



Cluster	Cluster label	Number of articles	Representative publications
			education faculty use of current digital technologies: Importance, competence, and motivation. <i>International Journal of Teaching and Learning in Higher Education</i> , 32(1), 73–86; Rogers, E. M. (2003). Diffusion of Innovations; Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., & Edirisinghe, S. (2016). Responding to challenges in teacher professional development for ICT integration in education. <i>Educational Technology & Society</i> , 19(3), 110–120.
2 (Green)	Culturally Responsive Pedagogy and Teacher Preparation	5	Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. <i>American Educational Research Journal</i> , 32(3), 465–491; Lucas, T., & Villegas, A. M. (2013). Preparing linguistically responsive teachers: Laying the foundation in preservice teacher education. <i>Theory Into Practice</i> , 52(2), 98–109; Nieto, S. (2010). The light in their eyes: Creating multicultural learning communities; Poole, C. M., & Russell, W. B. (2015). Educating for global perspectives: A study of teacher preparation programs. <i>Journal of Education</i> , 195(3), 41–52; Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. <i>Education for Information</i> , 22(2), 63–75.
3 (Blue)	Qualitative Inquiry and Methodological Foundations	4	Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. <i>Qualitative Research in Psychology</i> , 3(2), 77–101; Charmaz, K. (2006). <i>Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis</i> ; Inclusive Education and Classroom Practice in Secondary Education (2005); Patton, M. Q. (1990). <i>Qualitative Evaluation and Research Methods</i> .

The co-citation analysis reveals a well-developed yet fragmented literature on teacher technical competence. Cluster 1 (Technology Integration and Innovation) highlights how teacher beliefs, institutional factors, and professional development shape digital adoption but lacks structured supervision frameworks. Cluster 2 (Culturally Responsive Pedagogy) emphasizes equity, inclusion, and context-sensitive teaching, yet engages minimally with digital skill assessment. Cluster 3 (Qualitative Inquiry and Methodological Foundations) provides methodological rigor for exploring educational practices but offers little guidance on evaluating technical competence. Collectively, these clusters underscore a critical gap: despite strong theoretical, ethical, and methodological contributions, the literature provides few systematic approaches for supervising and assessing educators' digital and AI-enhanced competencies.



Table 5

Top 15 keywords in the co-occurrence of keywords analysis

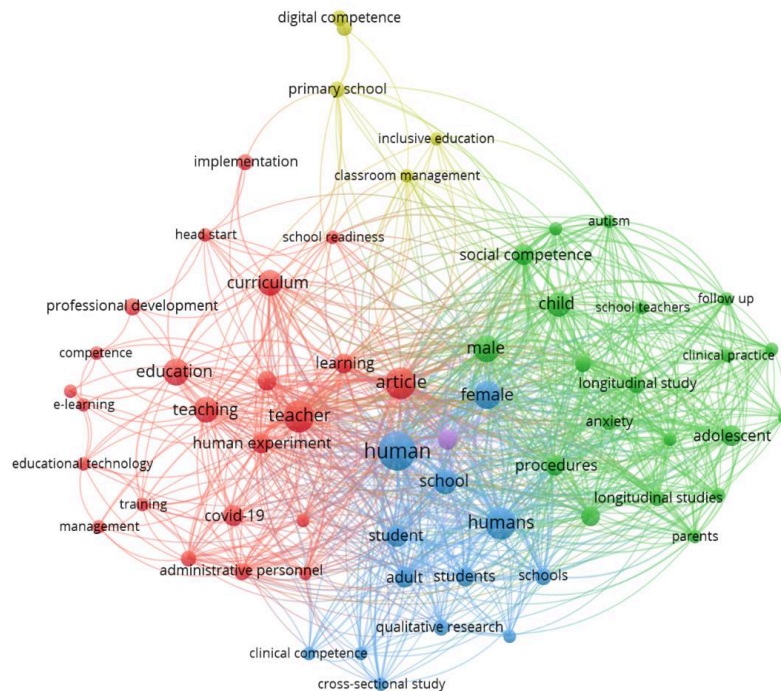
Ranking	Keyword	Occurrences	Total link strength
1	Human	24	254
2	Article	16	190
3	Human24	16	184
4	Female	12	157
5	male	11	152
6	Teacher	16	135
7	Child	9	116
8	School	9	108
9	Social competence	7	94
10	Adolescent	7	87
11	Longitudinal study	5	82
12	Controlled study	6	81
13	Questionnaire	6	81
14	Adult	7	80
15	Student	8	78

The co-occurrence analysis of keywords highlights a strong focus on demographics and broad educational constructs, with little attention to supervisory practices or frameworks linked to technical competence. Frequent terms like “Human,” “Teacher,” “School,” and “Student” reflect traditional educational contexts, but teachers are often treated as static entities rather than professionals engaged in continuous technical growth. Supervision-related terms such as “mentoring,” “feedback,” and “competency assessment” are largely absent, indicating a conceptual gap between classroom practice and systems that sustain teacher competence. While methodological terms like “Longitudinal study” and “Controlled study” demonstrate rigor, they focus on



research design rather than evaluative oversight. Overall, the literature emphasizes descriptive, demographic, and developmental concerns but neglects the structured guidance and accountability mechanisms essential for maintaining and enhancing technical competence, underscoring the need to integrate supervision into educational research and practice.

Figure 3
Co-Word Network on Supervising Technical Competence: A Minimal Focus Analysis (Scopus)



The co-word analysis of Scopus publications reveals five interconnected clusters in research on technical competence in education, consistently highlighting a gap in the supervision of teacher skills. Cluster 1 emphasizes teacher education and professional development, focusing on digital and pedagogical knowledge but lacking mentoring, coaching, or formal evaluation. Cluster 2 centers on learner outcomes, with teacher supervision largely peripheral, while Cluster 3 highlights qualitative and contextual research, yet borrows clinical competence concepts without fully applying structured supervision in education. Cluster 4 recognizes digital competence in early childhood education, but processes for supporting teachers' skill acquisition remain underdeveloped, and Cluster 5 provides demographic context with limited relevance to supervision. Overall, the field is fragmented: technical competence is acknowledged but rarely addressed through structured supervision, mentorship, or institutional accountability, underscoring the urgent need for frameworks and best practices to guide teacher technical skill development in dynamic, digitally driven educational contexts.



Table 6:

Co-word analysis on the minimal focus on supervising technical competence

Cluster No and color	Cluster label	Number of keywords	Representative Keywords
1 (Red)	Educational Policy and Professional Development in Technology Integration	23	Administrative personnel, article, competence, COVID-19, curriculum, e-learning, education, educational technology, head start, human experiment, implementation, learning, management, medical education, professional competence, professional development, school readiness, Spain, teacher, teaching, technology integration, training, work environment.
2 (Green)	Psychosocial and Clinical Aspects of Child and Adolescent Education	20	Adolescent, anxiety, autism, bullying, child, child parent relation, clinical practice, controlled study, depression, emotion, follow up, longitudinal studies, longitudinal study, major clinical study, male, parents, procedures, schoolteachers, social competence
3 (Blue)	Research Methodologies and School-Based Learning Environments	13	Adult, clinical competence, cross-sectional studies, cross-sectional study, female, human, humans, qualitative research, school, school climate, schools, student, students
4 (Yellow)	Digital Competence and Inclusive Early Education	5	Classroom management, digital competence, inclusive education, primary school, teachers
5 (Violet)	Measurement and Assessment Tools in Education	1	Questionnaire

1. Implications of the Study

1.1 Theoretical Implications

This study highlights that teacher technical competence in vocational education is often framed at the individual level, focusing on digital self-efficacy, pedagogical integration, and classroom innovation, while supervisory and leadership roles are largely overlooked. The findings call for reconceptualizing technical Mapping the Literature on Supervising Technical Competence in Technology and Livelihood Education: A Bibliometric Perspective. DIO: 10.65223/OVAN3443



competence as an evolving capability, supported by structured, competency-based supervision and leadership. Embedding instructional leadership and systemic accountability within digital competence frameworks can ensure sustainable, equitable skill development aligned with vocational standards and broader digital transformation goals.

1.2 Practical Implications

The findings reveal a critical gap in supervising TLE/TVL teachers' technical competence, limiting consistent and effective technology use. Schools and educational leaders should implement competency-based supervision models, while graduate programs integrate these frameworks to prepare future leaders. Professional development should move beyond one-off ICT training to sustained, supervised practice. Treating technical competence as a continuous, structured process ensures digital reforms are effectively adopted, sustained, and equitably implemented.

Conclusion

This bibliometric study maps research on teacher technical competence in TLE/TVL education, highlighting themes like digital self-efficacy, pedagogical integration, and classroom innovation. However, it reveals a notable gap in institutional and supervisory frameworks, with technical competence largely framed at the individual level. The findings emphasize the need to treat technical competence as an institutional priority, supported by structured supervision, leadership involvement, and competency-based evaluation, to strengthen vocational education and advance SDG 4: Quality Education.

Limitation

This study relies on Scopus, potentially missing regional or gray literature. Bibliometric analysis identifies research patterns but not policy impact or case studies, and the 2020–2024 timeframe may not capture long-term trends.

Recommendations

Future research should expand beyond Scopus-indexed sources to include regional databases and gray literature, capturing underrepresented perspectives on supervising technical competence in vocational education. Qualitative studies, such as interviews and case studies, can provide deeper insights into how school leaders support or neglect TLE/TVL teachers' digital skill development. The development of localized, competency-based supervision models and longitudinal studies beyond 2024 will further strengthen the literature by evaluating the long-term impact of leadership training and systemic reforms on sustainable, equitable digital capacity-building in teacher education.



References

- Alakrash, H. M., & Razak, N. A. (2021). Education and the fourth industrial revolution: Lessons from COVID-19. *Computers, Materials & Continua*. <https://www.techscience.com/cmc/v70n1/44329>
- Alcaide, A. E., & Blancia, M. M. (2024). Technology and Livelihood Education (TLE) teachers' technology proficiency and instructional module writing ability in the new normal. *Asian Journal of Education and Social Studies*, 50(6), 62–71. <https://doi.org/10.9734/ajess/2024/v50i61394>
- A'mar, F., & Eleyan, D. (2022). Effect of principal's technology leadership on teachers' technology integration. *International Journal of Instruction*, 15(1), 781–798. https://www.e-iji.net/dosyalar/iji_2022_1_45.pdf
- Andreson, R. E., & Dexter, S. L. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, 41(1), 49–82. <https://doi.org/10.1177/0013161X04269517>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Bierman, K. L., Heinrichs, B. S., Welsh, J. A., & Nix, R. L. (2021). Reducing adolescent psychopathology in socioeconomically disadvantaged children with a preschool intervention: A randomized controlled trial. *American Journal of Psychiatry*, 178(4), 305–312. Retrieved from: <https://psychiatryonline.org/doi/10.1176/appi.ajp.2020.20030343>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. Retrieved from <https://www.tandfonline.com/doi/abs/10.1191/1478088706qp063oa>
- Cabero-Almenara, J., Barroso-Osuna, J., Gutiérrez-Castillo, J. J., & Palacios-Rodríguez, A. (2021). The teaching digital competence of health sciences teachers: A study at Andalusian universities. *International Journal of Environmental Research and Public Health*, 18(5), 2552. <https://doi.org/10.3390/ijerph18052552>
- Chand, S., Chaudhary, K., Prasad, A., & Chand, V. (2021). Perceived causes of students' poor performance in mathematics: A case study at Ba and Tavua Secondary Schools. *Frontiers in Applied Mathematics and Statistics*, 7, Article 614408. <https://www.frontiersin.org/articles/10.3389/fams.2021.614408/full>
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. SAGE Publications.
- Chen, I.-H., Chen, H.-P., Gamble, J. H., Liao, X., Chen, X. M., Yang, Y. T. C., Pakpour, A. H., Griffiths, M. D., & Lin, C. Y. (2022). Evaluating a cross-lagged panel model between problematic Internet use and psychological distress and cross-level mediation of school administrator support on problematic Internet use: The serial mediating role of
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psychological needs thwarting of online teaching and psychological distress. *Frontiers in Public Health*, 10, Article 987366. <https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2022.987366/full>

Dexter, S. (2011). School technology leadership: Artifacts in systems of practice. *Journal of School Leadership*, 21(2), 166–189. <https://doi.org/10.1177/105268461102100202>

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2010). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423–435. <https://www.sciencedirect.com/science/article/abs/pii/S0360131512000437?via%3Dihub>

Feng, L., He, L., & Ding, J. (2023). The association between perceived teacher support, students' ICT self-efficacy, and online English academic engagement in the blended learning context. *Sustainability*, 15(8), 6839. <https://www.mdpi.com/2071-1050/15/8/6839>

Fransson, G., Holmberg, J., & Westelius, C. (2020). The challenges of using head-mounted virtual reality in K–12 schools from a teacher perspective. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-020-10119-1>

International Society for Technology in Education. (2016). ISTE standards for students. <https://iste.org/standards/students>

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465–491. <https://doi.org/10.3102/00028312032003465>

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.

Lucas, T., & Villegas, A. M. (2013). Preparing linguistically responsive teachers: Laying the foundation in preservice teacher education. *Theory Into Practice*, 52(2), 98–109. Retrieved from <https://www.tandfonline.com/doi/abs/10.1080/00405841.2013.770327>

Nguyen, L. T., Kanjug, I., Lowatcharin, G., Manakul, T., Poonpon, K., Sarakorn, W., Somabut, A., Srisawasdi, N., Traiyarach, S., & Tuamsuk, K. (2022). How teachers manage their classroom in the digital learning environment: Experiences from the University Smart Learning Project. *Heliyon*, 8(10), e10817. <https://doi.org/10.1016/j.heliyon.2022.e10817>

Nieto, S. (2010). *The light in their eyes: Creating multicultural learning communities* (10th anniversary ed.). Teachers College Press.

OECD. (2024). *Education Policy Outlook 2024: Reshaping teaching into a thriving profession from ABCs to AI*. OECD Publishing. <https://doi.org/10.1787/dd5140e4-en>

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- Ozsevik, Z. (2010). The use of communicative language teaching (CLT): Turkish EFL teachers' perceived difficulties in implementing CLT in Turkey (Master's thesis). University of Illinois at Urbana-Champaign. <https://hdl.handle.net/2142/16211>
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). SAGE Publications.
- Polly, D., Martin, F., & Byker, E. (2023). Examining pre-service and in-service teachers' perceptions of their readiness to use digital technologies for teaching and learning. *Computers in the Schools*, 40(1), 22–55. <https://doi.org/10.1080/07380569.2022.2121107>
- Poole, C. M., & Russell, W. B. (2015). Educating for global perspectives: A study of teacher preparation programs. *Journal of Education*, 195(3), 41–52.
- Ramos, F. G. (2024). An evaluation of the Technical Vocational Livelihood Track in public senior high schools in the Division of Batangas: Basis for an enhancement program. *International Journal of Academic Research in Progressive Education and Development*, 10(2). <https://doi.org/10.6007/IJARPED/v10-i2/10269>
- Richards, J. C., & Rodgers, T. S. (2001). *Approaches and methods in language teaching* (2nd ed.). Cambridge University Press.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.).
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63–75.
- Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2017). A comprehensive investigation of TPACK within pre-service teachers' ICT profiles: Mind the gap! *Australasian Journal of Educational Technology*, 33(3), 46–60. <https://doi.org/10.14742/ajet.3504>
- Turgut, Y. E., & Aslan, A. (2021). Factors affecting ICT integration in Turkish education: A systematic review. *Education and Information Technologies*, 26(4), 4069–4092. <https://doi.org/10.1007/s10639-021-10441-2>
- UNESCO. (2024). *Leadership in education: Lead for learning* (Global Education Monitoring Report 2024/5). Paris: UNESCO.