

CONTEMPORARY TEACHERS' DEVELOPMENT EDUCATION: A FOCUS ON PREREQUISITE SKILLS SET FOR FUTURE GENERATION STUDENTS.

HELEN NGOZI ELEMS-IKWEGBU, Ph.D

*Department of Educational Foundations
Faculty of Education,
Rivers State University, Port Harcourt*

Abstract

Teacher Development Education (TDE) faces challenges due to rapid technological advancements, globalization, and evolving educational demands. Traditional training models emphasizing rigid pedagogies and content mastery are increasingly inadequate for 21st-century classrooms, creating a gap between educator competencies and modern learning needs. This paper examines how teacher education can be restructured to integrate technological proficiency, adaptive teaching, socio-emotional intelligence, and continuous professional development (CPD). Grounded in Adult Learning Theory and Technological Pedagogical Content Knowledge (TPACK), the paper highlights the necessity for self-directed learning, digital literacy, and interdisciplinary teaching. Hence, a new framework for teacher development education reform was established which revealed that Technological Proficiency & Digital Pedagogy, Adaptive & Student-Centered Teaching, Socio-Emotional Intelligence & Inclusive Education, and Lifelong Learning & Professional Development must be included in TDE curriculum to enable teachers acquire the necessary skills for effective and functional teaching of future generations. These elements collectively contribute to a comprehensive teacher education model that aligns with 21st-century learning demands. Without these reforms, educators will struggle to meet modern students' needs, leading to a decline in educational quality. Policy interventions, institutional reforms, and cross-sector collaborations are critical to modernizing teacher education. It also recommends among others that investing in EdTech infrastructure, professional development programs, and public-private partnerships is crucial to sustaining teacher effectiveness and ensuring that education systems remain aligned with 21st-century learning demands.

Keywords: Adaptive Teaching, Competency-Based Education, Continuous Professional Development (CPD), Digital Pedagogy, Teacher Development.

International Journal of Research Development

Introduction

The role of teachers in shaping future generations has never been more critical, as societies grapple with rapid technological evolution, globalization, and shifting socio-economic landscapes. Traditional teacher education models, largely focused on content mastery and rigid pedagogical structures, are becoming increasingly inadequate in preparing educators for 21st-century learning environments (Agarwal & Naaz, 2020; Raduan & Na, 2020). With Education 4.0 emphasizing adaptive, technology-integrated, and student-centered learning, contemporary teacher training must evolve to equip educators with the necessary competencies to meet these emerging demands

(Hussin, 2018). Today's students, often referred to as "Digital Natives", possess learning preferences that differ significantly from previous generations, necessitating a pedagogical shift that aligns with interactive digital tools, personalized learning experiences, and interdisciplinary teaching (Benade, 2017). As Prensky (2001) argues, "Digital Natives are used to receiving information really fast. They like to parallel process and multitask. They function best when networked." Given these realities, the current landscape of teacher education requires a comprehensive transformation to ensure educators are prepared for the future of learning.

The growing influence of technology in education, coupled with changing learner expectations, underscore the need for technological proficiency in teacher training. Research highlights that many teachers, particularly Digital Immigrants, struggle to integrate digital tools effectively into their instruction, leading to a disconnect between teaching methods and student learning behaviors (Haug&Mork, 2021). Despite the increasing availability of digital platforms, and AI-driven learning systems, many teacher training institutions continue to prioritize traditional lecture-based methods (Flores, 2020). This lack of technological integration has created gaps in digital competency, further reinforcing the urgent need for a restructured approach to teacher education that prioritizes digital literacy, data-driven instruction, and blended learning models (Imants& Van der Wal, 2020). Teachers must not only understand these technologies but also be trained in their effective application, ensuring that future generations receive a dynamic, innovative, and relevant education.

Beyond technological proficiency, contemporary teacher development must embrace student-centered and adaptive pedagogies, which focus on fostering critical thinking, creativity, and problem-solving (Flores, 2020). As classrooms become more diverse, culturally, socially, and cognitively rigid, one-size-fits-all teaching models are no longer effective in meeting the varied needs of students (Benade, 2017). It is obvious that modern educators must develop flexibility in their teaching approaches, incorporating constructivist methodologies, project-based learning, and inquiry-driven instruction to promote active engagement and deeper learning experiences (Svendsen, 2020). The ability to tailor instruction to individual learning styles, while leveraging collaborative, interdisciplinary, and competency-based approaches, is essential for the future of education. Without adaptive teaching methodologies, the gap between curriculum objectives and real-world skill demands will continue to widen, leaving students ill-prepared for complex, rapidly evolving professional environments.

A fundamental challenge in contemporary education is the need for socio-emotional intelligence and inclusive teaching practices. As schools increasingly cater to diverse populations with varying learning abilities, emotional needs, and cultural backgrounds, teachers must possess the skills to navigate these complexities effectively (Agarwal &Naaz, 2020). Research indicates that teachers with strong socio-emotional competencies foster more inclusive and supportive learning environments, leading to higher student engagement, reduced behavioral issues, and improved academic outcomes (Flores, 2020; Raduan& Na, 2020). However, many teacher training programs fail to integrate these crucial aspects, leaving educators ill-equipped, emotional regulation and differentiated instruction (Morris et al 2021). Another crucial aspect of teacher development is the need for a lifelong learning mindset among educators. Given the rapid transformations in education, static, one-time certification models for teacher training are no longer sufficient (Haug&Mork, 2021).

This paper takes the position that teacher education must undergo a fundamental shift in focus to effectively equip future educators with the skills necessary for 21st-century classrooms. Traditional models that emphasize rote learning, content-based instruction, and outdated

assessment techniques are no longer sufficient. Instead, teacher development must integrate four core competency areas:

- A. Technological Proficiency and Digital Pedagogy, ensuring that teachers can leverage digital tools effectively.
- B. Adaptive and Student-Centered Teaching Approaches, fostering critical thinking, personalized learning, and interdisciplinary methodologies
- C. Socio-Emotional Intelligence and Inclusive Education, preparing teachers to navigate diverse classrooms, mental health challenges, and equity issues; and
- D. Lifelong Learning and Professional Development, reinforcing continuous improvement, innovation, and reflective teaching practices.

What is Teacher Development Education and Skills?

Development education is a learning process that enhances individuals' understanding of global issues, social justice, and sustainable development. It promotes critical thinking, active citizenship, and ethical responsibility, equipping learners with the knowledge, values, and skills to address global challenges and contribute positively to societal transformation (UNESCO, 2023; Merriam, 2018). Hence, teacher development education refers to the structured process through which educators acquire the knowledge, methodologies, and competencies needed to enhance their teaching effectiveness. It involves initial teacher training (pre-service education) and ongoing professional development (in-service training) to keep educators updated with emerging pedagogies, technological advancements, and student-centered approaches (Agarwal & Naaz, 2020). Effective teacher development ensures that educators are equipped to adapt to changing educational landscapes, manage diverse classrooms, and integrate digital tools into learning (Hussin, 2018; Flores, 2020). Theories like Adult Learning Theory (Knowles, 1980) and Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006) highlight the need for lifelong learning and practical skill development in teacher education (Merriam, 2018).

Skill refers to the ability to perform tasks effectively, acquired through training, practice, and experience. It includes cognitive, technical, and interpersonal competencies essential for problem-solving, adaptability, and professional success (Kim, et al, 2019). Consequently, teachers' skills refer to the essential abilities and competencies teachers must possess to facilitate effective teaching and learning. These skills include pedagogical expertise, which involves instructional planning, classroom management, and student assessment (Bernard et al., 2019).

Additionally, technological proficiency enables teachers to leverage digital tools, AI-driven platforms, and blended learning environments (Omar & Mohmad, 2023). Socio-emotional skills, such as empathy, communication, and conflict resolution, are also critical for fostering inclusive and psychologically safe learning spaces (Rajendran et al, 2020; Lozano-Pena et al., 2021). Without these skills, teachers may struggle to engage students, implement innovative teaching methods, and address diverse learning needs effectively (Tuomi, 2022; UNESCO, 2023).

Theoretical Foundations of Teacher Education for Skill Development

In education, theories guide teaching practices and professional development. The Adult Learning Theory (Knowles, 1980) and TPACK (Mishra & Koehler, 2006) reinforce the need for competency-based teacher education, digital literacy, and lifelong learning, ensuring that educators continuously adapt to evolving pedagogical and technological advancements (Bouchrika, 2024).

The Adult Learning Theory (Andragogy) proposed by Knowles (1980) provides a strong foundation for the argument that continuous professional development (CPD) must be institutionalized for teachers. Andragogy asserts that adults, including educators, learn best when they are self-directed, problem-oriented, and engaged in practical learning experiences (Merriam, 2018). Teachers, as adult learners, require personalized, competency-based training models that allow them to integrate emerging pedagogies into their instructional practices (Bouchrika, 2024). However, many pre-service teacher education programs focus on initial certification, neglecting the need for continuous learning in response to technological and pedagogical advancements (Malik & Khaliq, 2017). This paper argues that governments and educational institutions must mandate ongoing teacher training, including micro-credentialing and structured CPD programs, aligning with Knowles' principle that adult learning should be experiential, goal-driven, and adaptable to evolving needs (Knowles, 1980). By integrating andragogical principles into teacher development programs, educators can continually enhance their skills, making professional growth a career-long endeavor rather than a one-time achievement.

The Technological Pedagogical Content Knowledge (TPACK) framework introduced by Mishra and Koehler (2006) further strengthens the case for competency-based teacher education and CPD programs that incorporate digital literacy. TPACK emphasizes that effective teaching requires an intersection of technological, pedagogical, and content knowledge, highlighting the necessity for teachers to integrate digital tools within pedagogically sound frameworks (Dewi et al., 2021). However, research suggests that many educators lack adequate training in EdTech integration, resulting in ineffective implementation of technology-enhanced learning (Andyani, et al, 2020). This gap according to Greene & Jones (2020) can be addressed by revising teacher licensing and accreditation to include regular competency evaluations focusing on digital literacy and adaptive pedagogy. This can be achieved when Schools and institutions prioritize investment in education technology infrastructure, ensuring teachers have access to modern learning management systems (LMS), artificial intelligence-driven teaching tools, and interactive digital content.

Going forward, the principles of andragogy and TPACK converge in the argument for interdisciplinary learning and public-private partnerships in teacher education. Knowles' theory asserts that adults learn best when they see the direct applicability of knowledge to their profession (Merriam, 2018). Similarly, the TPACK framework highlights that teachers must continuously update their skills in response to technological and curricular changes (Andyani et al., 2020).

In conclusion, Adult Learning Theory and the TPACK framework both underscore the necessity of ongoing professional development, competency-based teacher training, and institutionalized digital literacy programs. Knowles' andragogical principles validate the need for flexible, self-directed learning pathways, such as micro-credentialing and interdisciplinary training (Knowles, 1980; Malik & Khaliq, 2017). Meanwhile, the TPACK framework highlights the importance of digital pedagogy, emphasizing that technology and content expertise must be seamlessly integrated into teacher development programs (Mishra & Koehler, 2006; Schmidt et al., 2009). Without these essential reforms, teacher education will remain static, failing to equip educators with the skills necessary to navigate modern, technology-enhanced classrooms.

The Need for a Paradigm Shift in Teacher Development: The New Framework Technological Proficiency and Digital Pedagogy

The increasing integration of artificial intelligence (AI), virtual learning environments (VLEs), and data-driven instruction has redefined the educational landscape, making digital

literacy a fundamental requirement for modern teachers. However, many teacher training programs continue to operate under traditional pedagogical models, failing to equip educators with the necessary technological skills to effectively navigate digital classrooms (Orakova et al., 2024). According to UNESCO (2023), 65% of teachers globally feel inadequately trained in digital tools, underscoring the urgent need for structured training in technology-enhanced teaching strategies. Despite the prevalence of Learning Management Systems (LMS), AI-powered educational platforms, and gamified learning, many educators struggle with their adoption due to limited exposure during their training (Meylina, et al 2021). The digital divide between teachers and students, often framed as the gap between digital natives and digital immigrants, has created challenges in engagement, accessibility, and instructional effectiveness (Omar & Mohmad, 2023). As Noronha-Sousa et al. (2021) highlight, students today are naturally immersed in digital environments, whereas many teachers must adapt, learn, and integrate digital tools as second nature.

Teachers who rely solely on traditional, lecture-based methodologies risk alienating students who are accustomed to interactive, self-directed, and technology-driven learning experiences (David, 2022). Research by Oriji and Torunarigha (2020) suggests that many digital immigrant educators experience cognitive overload when attempting to integrate technology into their teaching, further widening the generational gap between teachers and students. To address these challenges, teacher training institutions must integrate comprehensive digital pedagogy modules into both pre-service and in-service training programs. Effective strategies include:

- A. Mandatory digital literacy training, Ensuring teachers develop baseline competencies in digital tools, Cyber security awareness, and Online classroom management (Omar & Mohmad, 2023).
- B. Hands-on training in emerging EdTech tools, such as AI-assisted learning platforms, VR-enhanced simulations, and interactive whiteboards, to improve engagement and student learning outcomes (Orakova et al., 2024).
- C. Development of adaptive teaching models, blending face-to-face instruction with digital methodologies, allowing educators to transition seamlessly between physical and virtual classrooms (Guillén-Gámez et al., 2021).
- D. Encouraging micro-credentialing and online professional development, ensuring teachers continuously update their technological proficiency rather than relying on outdated skills (UNESCO, 2023).

Ultimately, technological proficiency and digital pedagogy should not be viewed as optional skills but as foundational competencies for educators in the 21st century. Without systematic reforms in teacher training, the digital gap between teachers and students will continue to expand, reducing the effectiveness of modern education systems. Moving forward, policymakers, educational institutions, and professional development bodies must collaborate to ensure that all educators are equipped with the necessary digital skills to thrive in technology-driven learning environments.

Adaptive and Student-Centered Teaching Approaches

Adaptive and student-centered teaching approaches have become essential in modern education, given the increasing diversity of learners and the evolving demands of the workforce. Traditional, rigid, and content-driven instructional methods often fail to engage students meaningfully, limiting their ability to develop essential skills such as critical thinking, creativity, and problem solving

(Tang, 2023). Furthermore, the need for student-centered learning is emphasized by the shift towards technology-driven instruction, where digital tools enhance personalized and flexible learning experiences (Ginting et al, 2024). However, many educators continue to rely on standardized, lecture-based teaching which does not fully leverage the potential of adaptive learning models (Bernard, et al, 2019). To Zhang et al (2021), effective learning occurs when students participate actively in their education than passive recipients of information. Hence, a fundamental shift is necessary for the enhancement of student-centered pedagogy. Going forward, student-centered learning places a strong emphasis on self-regulation and autonomy, allowing learners to be in control of their educational journey (Zhang, et al 2021).

Socio-Emotional Intelligence and Inclusive Education

Socio-emotional intelligence has become an essential competency in education, particularly as classrooms become more diverse and complex. Traditional teacher training often focuses primarily on subject knowledge and instructional techniques while neglecting the emotional and psychological dimensions of teaching (Rajendran, et al, 2020). Research suggests that when teachers possess strong socio-emotional competencies, students experience reduced stress, improved engagement, and higher academic achievement (Lechner, et al, 2019). Despite the importance of socio-emotional intelligence, many teacher training programs fail to incorporate socio-emotional learning (SEL) as fundamental component, leaving educators ill-prepared to manage classroom dynamics effectively (Tuomi, 2022).

Inclusive education requires teachers to be sensitive to the diverse needs of learners, particularly those with disabilities, learning difficulties and socio-economic challenges. However, studies indicate that many educators lack the training necessary to implement inclusive practices effectively (Cristovao et al, 2020). Teachers with well-developed socio-emotional intelligence can better support learners with special needs by fostering an empathetic and responsive classroom environment (Chetverikova, et al 2020). They also recognize learners' emotional distress, provide appropriate interventions, and create a supportive learning environment.

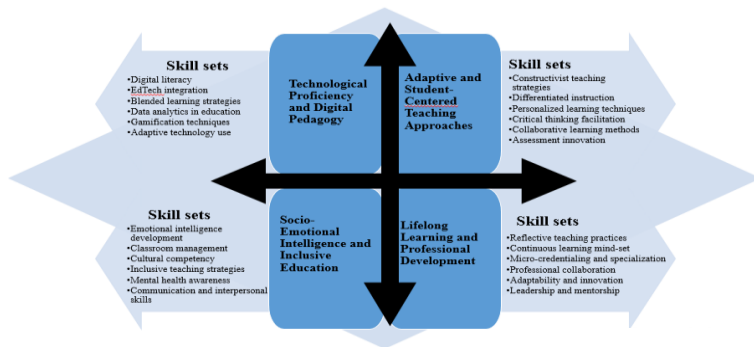
Lifelong Learning and Professional Development

Continuous professional development (CPD) is essential for educators in an era where technological advancements, pedagogical innovations, and student needs are evolving rapidly. A single teacher certification is no longer sufficient to equip educators for the complexities of modern classrooms, which require ongoing adaptation and skill enhancement (Murray, 2021). The growing demand for student-centered learning, digital literacy, inclusive education, and socio-emotional intelligence underscores the necessity of CPD as an institutionalized requirement rather than a mere recommendation (Flores, 2020). Research indicates that teachers who engage in continuous learning demonstrate higher levels of instructional effectiveness, classroom adaptability, and student engagement (Guillén-Gómez, et al, 2021). However, many educational institutions still lack structured frameworks that ensure educators remain up-to-date with emerging pedagogies and technological advancements (Orakova et al., 2024). One of the most effective strategies for ensuring continuous teacher development is the mandating of structured training programs at national and institutional levels (UNESCO, 2023). Studies emphasize that teachers in systems with compulsory CPD programs are more adept at integrating adaptive teaching methodologies, technology-enhanced learning, and inclusive classroom practices (Enemuoh, 2022).

Another critical aspect of CPD is access to micro-credentialing and certification programs that focus on emerging pedagogies and digital competencies (Lozano-Pena et al, 2021). Unlike

traditional one-time teacher training, micro-credentials offer flexible, targeted skill development in areas such as AI-assisted teaching, inclusive education, and socio-emotional learning (Tuomi, 2022; Devis-Rozental et al, 2018). According to Meylina et al (2021), research shows that teachers who complete micro-credential programs demonstrate higher confidence in applying modern instructional techniques and digital tools in the classroom.

Figure 1: Proposed Content Focus Framework for Teacher Development Education



Implications for Teacher Education, Policy, and Institutional Reforms

The integration of these four competencies requires systemic changes in teacher training policies and institutional structures. The following reforms are necessary:

Policy-Level Interventions

Governments play a critical role in shaping teacher development programs, and policy-level interventions are necessary to ensure that educators receive the training required to meet modern educational demands. One of the most important steps is to mandate competency-based teacher education programs, ensuring that all educators are trained in digital literacy, adaptive pedagogy, and socio-emotional learning (Flores, 2020; Tuomi, 2022). Traditional teacher education often focuses on rote content delivery and outdated instructional methods, leaving the teachers ill-equipped to handle digital learning environments, learner-centered pedagogies, and the socio-emotional needs of diverse classrooms (Agarwal & Naaz, 2020). Competency-based teacher education ensures that teachers develop practical skills and adaptive strategies rather than simply completing standardized coursework.

Many countries still rely on one-time certification systems, which do not account for the rapid technological and pedagogical changes in education. It is imperative as observed by Ginting et al (2024) that teachers be required to demonstrate continued proficiency in key areas, such as technology integration, differentiated instruction, and inclusive teaching. Also, micro-credentialing systems can be integrated into teacher licensing, allowing teachers to continuously update their skills in response to emerging trends in education.

Another critical policy reform as earlier mentioned is the prioritization of investment in education technology to equip schools with the necessary infrastructure for digital learning. This is owing to the fact that many schools particularly in low-income and rural areas, lack access to high-speed internet, digital devices, and interactive learning platforms (UNESCO, 2023; Chetverikova et al, 2020). This is crucial for teachers to effectively implement digital pedagogy, regardless of their training.

Institutional Reforms

One of the most urgent reforms is the overhaul of teacher education curricula to focus on interdisciplinary learning (Enemuoh, 2022). Traditionally, teacher education has been discipline-specific, with little emphasis on cross-disciplinary integration (Eimuhi&Eimuhi, 2018). However, Tuomi (2022) emphasizes that modern educational challenges, such as climate change, artificial intelligence, and global citizenship require interdisciplinary approaches that connect multiple fields of knowledge. Also, Murray (2021) suggests that teacher training programs must incorporate courses that promote interdisciplinary teaching, problem-based learning, and real-world application of knowledge.

Another critical institutional reform is the promotion of public-private partnerships to provide teachers with real-world exposure to industry practices (Ginting et al, 2024). In the observation of Zhang et al (2021), many teacher education programs remain disconnected from the realities of the job market, leading to producing graduates who struggle to integrate real-world skills into their teaching. Partnerships with private sector organizations, technology firms, and research institutions can help bridge this gap by providing practical experiences, internships, and collaborative projects for teachers (Rajendran et al, 2020). For example, partnerships with EdTech companies can expose teachers to AI-driven education tools, virtual classrooms, and personalized learning platforms (Guillén-Gámez et al., 2021).

Additionally, on-the-job training and mentorship programs should be institutionalized to ensure that teachers receive continuous professional guidance throughout their careers (Lechner et al, 2019). Similarly, Serrano et al (2023) assert that many newly trained teachers face difficulties in transitioning from theory to practice, particularly in handling classroom management, student behavior, and differentiated instruction. Invariably, Schools need to implement structured mentorship programs, pairing new teachers with experienced educators who can offer guidance, support, and constructive feedback (Cristóvão et al., 2020).

Cross-Sector Collaboration

Collaboration across sectors is essential to developing a modernized and globally competitive teacher training framework. One of the key recommendations is fostering collaboration between education ministries, technology firms, research institutions, and non-governmental organizations (NGOs) (Bernard et al., 2019; UNESCO, 2023). This cross-sector approach can drive innovation in teacher development, facilitate the integration of new technologies into classrooms, and ensure that teacher training aligns with the evolving needs of students (Lozano-Pena et al., 2021). Many countries have successfully implemented EdTech partnerships to provide teachers with access to interactive learning tools, data analytics for student assessment, and AI-powered education platforms (Tuomi, 2022; Meylina et al., 2021). NGOs can also play a critical role in developing training programs, providing funding, and advocating for inclusive education policies (Hoidn&Reusser, 2020).

Additionally, in the words of Orakova et al (2024), the development of a global teacher competency framework is necessary to standardize and align teacher training with contemporary education demands. According to Murray (2021), currently, teacher qualifications vary widely across different countries, leading to inconsistencies in teacher preparedness and instructional quality. However, Omar & Mohmad (2023) suggest that a standardized competency-based framework can help ensure that all teachers, regardless of location, possess fundamental skills in digital literacy, socio-emotional intelligence, and adaptive teaching. In furtherance, Tuomi (2022) contributes that such a framework should be developed through international collaboration among educational institutions, policymakers, and industry leaders, ensuring that it remains flexible

enough to accommodate regional variations while maintaining universal teaching standards. In all, policy reforms, institutional changes, and cross-sector collaboration are essential for developing a future-ready teaching workforce.

Conclusion

This paper posits that contemporary teacher development education must undergo a radical transformation to align with future learning demands. The traditional models of teacher training, which emphasize rote knowledge transmission, static curricula, and rigid pedagogical methods, are insufficient to equip educators with the skills necessary to prepare future generations for an increasingly complex and evolving world. With the rise of Education 4.0, digital transformation, and interdisciplinary learning, it is evident that teacher education must prioritize competency-based training, adaptability, and lifelong professional development. The integration of technological proficiency, adaptive and student-centered pedagogies, socio-emotional intelligence, and a continuous learning mindset will enable educators to meet the diverse and evolving needs of learners. Moreover, the frameworks of Adult Learning Theory and TPACK reinforce the need for innovative approaches to teacher training that align with digital and pedagogical advancements. Without urgent policy reforms, institutional changes, and cross-sector collaboration, the gap between teacher competencies and 21st-century learning demands will continue to widen, jeopardizing global educational progress.

Recommendations

Following the argument presented in this paper, the following recommendations are fundamental:

- 1) Policymakers must implement competency-based teacher education policies, mandating continuous professional development (CPD) and integrating micro-credentialing systems to ensure educators stay updated with technological and pedagogical advancements.
- 2) Teacher training institutions must reform curricula to emphasize digital pedagogy, interdisciplinary learning, and student-centered teaching models, replacing rigid, content-driven methodologies.
- 3) Governments and the private sector must invest in teacher capacity-building initiatives, funding EdTech infrastructure, professional development programs, and industry partnerships to enhance instructional effectiveness.
- 4) Lastly, teachers must embrace lifelong learning and adaptability, actively engaging in peer collaborations, emerging technologies, and self-directed professional growth to remain effective in evolving educational environments.

References

- Agarwal, P., & Naaz, I. (2020). Teacher development and teacher education. *Journal of Indian Research*, 8, 44-51.
- Andyani, H., Setyosari, P., Wiyono, B., & Djatmika, E. (2020). Does technological pedagogical content knowledge impact on the use of ICT in pedagogy?. *International Journal of Emerging Technologies in Learning (iJET)*, 15(3), 126-139.

- Benade, L. (2017). Being a teacher in the 21st century. *A Critical New Zealand Research. International Journal of Education and development*, 3(1), 1-12.
- Bernard, R. M., Borokhovski, E., Schmid, R. F., Waddington, D. I., & Pickup, D. I. (2019). Twenty-first century adaptive teaching and individualized learning operationalized as specific blends of student-centered instructional events: A systematic review and meta-analysis. *Campbell Systematic Reviews*, 15(1-2), 1-10.
- Bouchrika, I. (2024). The andragogy approach: Knowles' adult learning theory principles in 2024. *Education*.
- Chetverikova, T. Y., Kuzmina, O. S., & Sinevich, O. Y. (2020). Technology of social and emotional learning as a tool for preparing students for inclusive education. In *SHS Web of Conferences* (Vol. 87, p. 00069). EDP Sciences.
- Cristóvão, A. M., Candeias, A. A., & Verdasca, J. L. (2020, January). Development of socio-emotional and creative skills in primary education: Teachers' perceptions about the Gulbenkian XXI school learning communities' project. In *Frontiers in Education* (Vol. 4, p. 160). Frontiers Media SA.
- David, H. (2022). Digital immigrants, digital natives and digital learners: Where are we now? *Journal for the Education of Gifted Young Scientists*, 10(2), 159-172.
- Devis-Rozental, C., Farrow, & Devis-Rozental, C. (2018). *Developing socio-emotional intelligence in higher education scholars*. Springer International Publishing.
- Dewi, N. R., Rusilowati, A., Saptono, S., Haryani, S., Wiyanto, W., Ridlo, S., ... & Atunnisa, R. (2021). Technological, Pedagogical, Content Knowledge (TPACK) Research Trends: A Systematic Literature Review of Publications between 2010 & 2020. *Journal of Turkish Science Education*, 18(4), 589-604.
- Eimuhi, J. O., & Eimuhi, K. E. (2018). Equipping teachers with learner-centered pedagogical skills. *Journal of Emerging Trends in Educational Research and Policy Studies*, 9(4), 138-147.
- Enemuoh, C. (2022). *Context-Responsive Learner-Centered Education in a Secondary School* (Doctoral dissertation, Walden University).
- Flores, M. A. (2020). Preparing teachers to teach in complex settings: Opportunities for professional learning and development. *European Journal of Teacher Education*, 43(3), 297-300.
- Ginting, D., Sabudu, D., Barella, A. M., Woods, R., & Kemala, M. (2024). Student-centered learning in the digital age: in-class adaptive instruction and best practices. *Int J Eval & Res Educ*, 13(3), 2006-2019.

- Greene, M. D., & Jones, W. M. (2020). Analyzing contextual levels and applications of technological pedagogical content knowledge (TPACK) in English as a second language subject area. *Educational Technology & Society*, 23(4), 75-88.
- Guillén-Gámez, F. D., Mayorga-Fernández, M. J., Bravo-Agapito, J., & Escribano-Ortiz, D. (2021). Analysis of teachers' pedagogical digital competence: Identification of factors predicting their acquisition. *Technology, Knowledge and Learning*, 26(3), 481-498.
- Haug, B. S., & Mork, S. M. (2021). Taking 21st century skills from vision to classroom: What teachers highlight as supportive professional development in the light of new demands from educational reforms. *Teaching and Teacher Education*, 100, 103286.
- Hoidn, S., & Reusser, K. (2020). Foundations of student-centered learning and teaching. In *The Routledge international handbook of student-centered learning and teaching in higher education*, 17-46. Routledge.
- Hussin, A. A. (2018). Education 4.0 made simple: Ideas for teaching. *International Journal of Education and Literacy Studies*, 6(3), 92-98.
- Imants, J., & Van der Wal, M. M. (2020). A model of teacher agency in professional development and school reform. *Journal of Curriculum Studies*, 52(1), 1-14.
- Kim, S., Raza, M., & Seidman, E. (2019). Improving 21st-century teaching skills: The key to effective 21st-century learners. *Research in Comparative and International Education*, 14(1), 99-117.
- Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy/Malcolm S. Knowles. New York: Cambridge, The Adult Education Company.
- Lechner, C. M., Anger, S., & Rammstedt, B. (2019). Socio-emotional skills in education and beyond: recent evidence and future research avenues. In *Research handbook on the sociology of education*, 427-453. Edward Elgar Publishing.
- Lozano-Pena, G., Saez-Delgado, F., Lopez-Angulo, Y., & Mella-Norambuena, J. (2021). Teachers' social-emotional competence: History, concept, models, instruments, and recommendations for educational quality. *Sustainability*, 13(21), 12142.
- Malik, K., & Khaliq, T. (2017). Andragogy (adult learning). *Annals of PIMS-Shaheed Zulfiqar Ali Bhutto Medical University*, 13(4), 272-274.
- Merriam, S. B. (2018). Adult learning theory: Evolution and future directions. In *Contemporary Theories of Learning*, 83-96, Routledge.
- Meylina, M., Ardiasih, L. S., & Rahmiaty, R.** (2021). Teachers' digital competences: An overview on technological perspectives. *Linguists: Journal of Linguistics and Language Teaching*, 7(2), 29-43.

- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Morris, J., Song, Y., Soloway, E., & Norris, C. (2021). Teacher professional development in STEM education. *Journal of Educational Technology & Society*, 24(4), 1-14.
- Murray, J. (2021). Good teachers are always learning. *International Journal of Early Years Education*, 29(3), 229-235.
- Noronha-Sousa, D., Costa, E., Mateus, C., Noronha, A. R., & Vasquez-Justo, E. (2021). Contemporary education, technologies, and human connectivity: from native generations to digital immigrants. In *Perspectives and Trends in Education and Technology: Selected Papers from ICITED 2021* (pp. 973-986). Singapore: Springer Singapore.
- Omar, M. K., & Mohmad, I. R. (2023). Pedagogy, ICT skills, and online teaching readiness as factors on digital competency practices among secondary school teachers in Malaysia. *Asian Journal Of Vocational Education And Humanities*, 4(1), 1-9.
- Orakova, A., Nametkulova, F., Issayeva, G., Mukhambetzhanova, S., Galimzhanova, M., & Rezuanova, G. (2024). The relationships between pedagogical and technological competence and digital literacy level of teachers. *Journal of Curriculum Studies Research*, 6(1), 1-21.
- Oriji, A., & Torunarigha, Y. D. (2020). Digitized education: Examining the challenges of digital immigrant educators in the face of net generation learners. *NIU Journal of Social Sciences*, 5(4), 337-347.
- Prensky, M. (2001). Digital natives, digital immigrants part 2: Do they really think differently? *On the horizon*, 9(6), 1-6.
- Raduan, N. A., & Na, S. I. (2020). An integrative review of the models for teacher expertise and career development. *European Journal of Teacher Education*, 43(3), 428-451.
- Rajendran, P., Athira, B. K., & Elavarasi, D. (2020). Teacher Competencies for Inclusive Education: Will Emotional Intelligence Do Justice? *Shanlax International Journal of Education*, 9(1), 169-182.
- Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for pre-service teachers. *Journal of Research on Technology in Education*, 42(2), 123-149.

- Serrano, A., Sanz, R., Cabanillas, J. L. & Lopez-Lujan, E. (2023.). Socio-emotional competencies required by school counsellors to manage disruptive behaviours in secondary schools. *Children*, 10(2), 231-240.
- Svendsen, B. (2020). Inquiries into teacher professional development—what matters? *Education*, 140(3), 111-130.
- Tang, K. H. D. (2023). Student-centered Approach in Teaching and Learning: What does it really mean? *ActaPedagogicaAsiana*, 2(2), 72-83.
- Tuomi, I. (2022). Artificial intelligence, 21st century competences, and socio-emotional learning in education: More than high-risk? *European Journal of Education*, 57(4), 601-619.
- UNESCO.** (2023). *Technology in education: A tool on whose terms?* Global Education Monitoring Report. https://www.unesco.org/gem-report/sites/default/files/medias/fichiers/2023/07/Summary_v5.pdf
- Zhang, L., Basham, J. D., Carter Jr, R. A., & Zhang, J. (2021). Exploring Factors associated with the implementation of student-centered instructional practices in US classrooms. *Teaching and Teacher Education*, 99, 103273.