

TERTIARY EDUCATION TEACHERS' PROFESSIONAL DEVELOPMENT IN A
DIGITAL AGE

ZAJES 24(2)2024
p-ISSN:2795-3890
e-ISSN: 2805-3877

Nuru, Ramatu Asabe PhD

Department of Biology,
TETFund Center of Excellence for Technology Enhanced Learning,
Federal College of Education, Zaria
faridanuru03@gmail.com, ramatunuru@fcezaria.edu.ng
ORCID: <https://orcid.org/0000-0002-2569-8850>

Abstract

In the realm of education, the integration of digital technologies has significantly impacted teacher professional development. Tertiary education teachers are faced with challenges in embracing digital tools in a world of increasing dominated technology and there is need to adapt to rapid technological advancements and changing pedagogical landscapes. This paper explores the evolving landscape of professional development for tertiary education teachers in the context of the digital age. It delves into the current trends in professional development programs, challenges and opportunities posed by digital technologies and discusses strategies for effective integration of digital tools in teaching practices. The paper also highlights the importance of ongoing learning and adaptation in the face of rapid technological advancements to ensure quality education delivery in tertiary institutions.

Article History

Received: March 2024
Review processes
April - May 2024
Received in revised form:
June 2024
Accepted: July 2024
Published online: July 2024

KEYWORDS

- Professional Development
- Tertiary Education
- Digital Age
- Teacher
- Teaching Practices

Introduction

Teacher professional development in the digital age is critical to modern education. The rapid evolution of technology has necessitated a shift in teaching practices, requiring educators to adapt to new methodologies and tools. In recent years, the field of tertiary education has witnessed significant transformations driven by digital technologies. These changes have impacted how students learn and necessitated a reevaluation of teaching methodologies and professional development practices for educators. Several trends are shaping the professional development landscape for tertiary education teachers in the digital age (Haddock *et al.*, 2022). Blended learning approaches, which combine online and face-to-face instruction, are gaining popularity as they cater to diverse

learning styles and preferences (Simoes *et al.*, 2022). Micro credentialing and digital badges are also emerging as valuable tools for recognizing and showcasing teachers' skills and achievements (Eradze *et al.*, 2022). An empirical study conducted by Feng and Sumettikoon (2024) on utilizing a teacher-made digital tool in Chinese higher institutions indicates that teachers had a holistic view of the digital literacy tool, facilitating and enhancing their professional development. Glotzbach et al. (2010) researched on Really Simple Syndication (RSS) used in teaching and learning. In their work titled "Really Simple Syndication: An Educational Approach," students' knowledge and teachers' potential to use this technology increased. Furthermore, personalized learning pathways tailored to individual educators' needs are becoming more prevalent, allowing for

targeted and effective professional development experiences.

Research (Drossel & Eickelman, 2017; Sharma & Behl, 2022; Sampasa-Kanyinga et al., 2022) indicates that teachers' personal characteristics and professional development significantly influence the impact of digital technologies on education. Studies (Labbas & Shaban, 2016; Andrea, 2020 & Montero-mesa et al., 2021) have also shown that teachers' attitudes towards technology, their digital competencies, and access to technical support play crucial roles in determining the effectiveness of technology integration in the classroom. In Nigeria, however, factors influencing tertiary teacher development can be multifaceted, reflecting the unique challenges and opportunities within the Nigerian educational system (Adeoye, 2020; Onu *et al.*, 2022).

Despite the challenges faced in Nigeria, the digital age presents numerous opportunities for enhancing professional development among tertiary education teachers. Online learning platforms offer flexible and accessible options for educators to acquire new skills and knowledge. Collaborative networks and communities of practice provide avenues for sharing best practices and learning from peers. Additionally, integrating digital tools in professional development programs can facilitate interactive and engaging teacher learning experiences. Overall, the impact of digital technologies on tertiary education in Nigeria is transformative, paving the way for inclusive, engaging, and innovative learning environments that prepare students for the digital age (Kalu, 2021). This paper examines the need for professional development of tertiary institutions' teachers in technology integration, current trends in professional development programs, and challenges and opportunities

posed by digital technologies. It also discusses strategies for effective integration of digital tools in teaching practices.

Current Trends in Teacher Professional Development Programs

The trends in teacher professional development consist of programs that increasingly utilize online platforms and digital tools to foster continuous learning. Stefan (2021) highlighted some digital tools needed to support the professional development of teachers. These are as follows:

- **Teacher Made:** This digital tool is created by educators to enhance teaching and learning experiences. These tools focus on specific classroom needs, allowing teachers to customize student resources. This platform will enable teachers to convert PDFs into interactive digital worksheets, create various question types, self-grade assignments for instant feedback, and embed multimedia into worksheets seamlessly with platforms like google classroom. It also provides tools for teachers to collaborate and share resources that offer professional development materials and support.
- **Feedly:** This web feed allows users and applications to access website updates in a standardized, computer-readable format. As a Simple Syndication (RSS) news aggregator of feed reader, it collects content, like news and other articles, from various sources onto a teacher's device. It can help teachers easily create a feed pool of educational articles for themselves and share them with others. RSS provides an easy way for teachers to get updates on their favourite websites without visiting each one individually, saving time and effort. It also allows website owners to distribute their content to subscribers easily. This tool enables teachers to conduct research, provide real-time updates on course materials, and easily announce events and resource

sharing amongst themselves or their students. Teachers can also subscribe to feeds from professional organizations, education blogs, and news outlets to stay updated and enhance their teaching.

- **Edmodo:** This dedicated educational tool enables virtual classrooms across geographical locations, allowing teachers and students to connect and work in an online classroom. It is an online platform for teachers to access professional development ideas and connect with other educators also. Teachers can create classes, do group work, or establish organized discussions on the platform. Students' assessment can also be done by accessing and customizing existing quizzes from Edmodo's quiz bank. Edmodo's diverse features can enhance students' engagement, differentiate instruction, monitor progress and build a vibrant classroom community.
- **Teaching Channel:** This educational resource platform provides videos meant to enhance teaching techniques regardless of the subject or grade a teacher handles. It allows teachers to collaborate, give, and share feedback with one another on their self-improvement goals. It allows synchronous and asynchronous learning opportunities supporting essential 21st-century skills.
- **Micro-credentials:** These are formal, competency-based recognition for specific skills that teachers use in the classroom. They are earned online, allowing teachers to receive on-demand and personalized professional learning based on their needs. Digital tools like micro-credentials offer formal, competency-based recognition for specific skills that teachers use in the classroom. These tools are earned online, allowing teachers to receive on-demand and personalized professional learning based on their specific needs. Micro-credentials focus on competency

rather than seat time, allowing teachers to learn new skills and enhance existing ones in an adaptable format focused on ongoing professional learning.

- **Coaching:** Coaching provides the support teachers need to overcome the learning curve around digital learning and close the gap in student learning. It can help teachers leverage technology and promote educational equity, enhance student learning, and improve digital learning opportunities for students. Digital tools can support coaching initiatives that provide teachers with the individualized support they need to overcome the learning curve around digital learning. By working with teachers one-on-one or in small groups, coaches can analyze data and respond to their unique needs, helping them effectively leverage technology in their teaching practices. Coaching enables teachers to address professional challenges, improve student learning, and use digital tools more powerfully in the classroom to enhance student collaboration, creativity, communication, and critical thinking.
- **Edcamp:** This revolutionizing participatory professional development event is organized by teacher volunteers in an "unconference" model, where sessions are organized, structured, and led by the people attending the event. It adopts the "law of two feet," allowing teachers to find the sessions that best meet their needs. It facilitates collaborative participant-driven professional development in a relaxed atmosphere, which leads to increased satisfaction and renewed motivation and empowers educators to foster innovation.
- **Professional Learning Communities (PLCs):** Digital tools can facilitate the creation and operation of PLCs, allowing teachers to collaborate, share resources, and engage in ongoing professional development.

PLCs can be formed around various themes such as grade level, content, or experience using technology in the classroom. These communities can meet regularly in person or online, providing teachers with opportunities to collaborate, share challenges, and work together on solutions. Digital tools within PLCs can help reduce teachers' cognitive load by distilling shared problems of practice and encouraging collaboration on solutions.

Impact of Digital Technologies on Tertiary Education in Nigeria

The integration of digital technologies in education has brought about both learning opportunities. While digitalization offers possibilities for fundamental improvement in schools and can enhance various aspects of a school's development, It also poses complexities that require transformative changes beyond technical aspects. The COVID-19 pandemic accelerated the adoption of online teaching, highlighting the importance of digital capacity building and the need for schools to enhance their digital competencies (Jozegai *et al.*, 2023). Digital tools can support teachers when preparing and analyzing lessons and recording lessons from other settings. They can also support professional development. Digital tools also open new ways to conduct lessons that would not otherwise be feasible, such as allowing teachers and facilitators who would not have met face-to-face to plan, conduct, and reflect on lessons together. By leveraging digital tools, schools can personalize professional development opportunities for teachers, ensuring that educators receive tailored support, resources, and training to enhance their teaching practices in the digital age. The benefits of digital professional development for teachers are as follows:

➤ **Flexibility and Convenience:** Online professional development courses for teachers

offer flexibility and convenience, allowing educators to access courses and modules on their schedules, regardless of their physical location. This self-paced format enables teachers to adjust the speed of learning, revisit materials, and repeat key sections to ensure thorough understanding and implementation (Hsu, 2019).

➤ **Cost-effectiveness:** Online professional development eliminates travel expenses for teachers and presenters, reduces costs, and empowers educators to tap into a vast network of free online professional development resources. This makes online professional development an attractive option for budget-constrained schools, allowing them to stretch their resources further and expand their professional development offerings for teachers (Johnson, 2018).

➤ **Variety and Choice:** Online professional development courses break free from the limitations of local offerings, providing educators with a boundless spectrum of topics and specializations to fuel their professional growth and development. This allows teachers to choose courses that address their specific challenges or areas of interest (Wong, 2017).

➤ **Interactive and Engaging:** Online professional development courses often include interactive activities, simulations, and resources bridging the learning and application gap. This solidifies skills and promotes immediate classroom use, enhancing teaching and classroom practices (Lee, 2016).

➤ **Accessibility and Inclusivity:** Online professional development courses break down hurdles through accessible learning, removing physical and geographical limitations, and making professional growth more accessible and inclusive for those with disabilities or who live in remote areas. Some platforms offer on-

demand translation features and support services, ensuring everyone can participate effectively, regardless of their English language proficiency or other accessibility needs. Digital technologies have expanded access to tertiary education in Nigeria, especially in remote and underserved areas. Online learning platforms and digital resources enable students to participate in courses, access educational materials, and engage with instructors without geographical constraints (Smith, 2015; Hsu, 2020).

- **Continuous Learning and Relevance:** Online professional development platforms regularly add new courses, ensuring teachers can stay abreast of the latest educational trends and technologies. This supports continuous growth and ensures teachers access relevant and up-to-date information (Johnson, 2019).
- **Collaboration and Networking:** Online professional development courses provide opportunities for teachers to collaborate and network with other educators, both locally and globally. This fosters community and allows teachers to share experiences, strategies, and resources (Wong, 2018).
- **Personalized Learning:** Online professional development platforms often offer personalized learning opportunities, allowing teachers to tailor their learning experience to their needs and interests. This can help teachers implement digital learning and ensure continued student learning throughout the school year (Lee, 2017)
- **Reduced Cognitive Load:** Online professional development resources, such as micro-credentials and coaching, help reduce teachers' cognitive load in prioritising and tackling digital learning challenges. These tools provide teachers with on-demand and personalized professional learning based on their needs, allowing them to learn new skills

and sharpen existing ones in a format that is easy to use, adaptable, and focused on ongoing professional learning (Anis, 2024).

- **Enhanced Learning Experience:** Digital tools such as multimedia content, interactive simulations, and virtual reality experiences enhance the learning experience for students. These technologies make complex concepts more accessible, promote active learning, and cater to diverse learning styles (Sims *et al.*, 2023).
- **Efficient Administration:** Digital technologies streamline administrative processes in tertiary institutions. From online admissions and registration systems to automated grading and assessment tools, these technologies improve efficiency, reduce paperwork, and enhance data management.
- **Professional Development:** Digital technologies play a crucial role in the professional development of tertiary educators in Nigeria. Online training programs, webinars, and virtual conferences enable teachers to upgrade their skills, stay updated with current trends, and collaborate with peers globally (Eradze *et al.*, 2023)
- **Research and Innovation:** Digital tools support research activities and innovation in tertiary education. Access to online databases, research repositories, and data analysis tools facilitates academic research, knowledge creation, and interdisciplinary collaboration (Drossel & Eickelman, 2017)

Challenges of Teacher Professional Development in Tertiary Institutions in Nigeria.

One of the primary challenges in teacher professional development in the digital age is the resistance to change among educators (Sims *et al.*, 2023). Some teachers, particularly in developing countries, may feel like digital immigrants in a rapidly evolving digital world,

leading to reluctance to adopt new technologies. The digital gap between teachers and students and limited access to digital tools and training further exacerbates the challenges educators face in Nigeria (Onu *et al.*, 2022). One key challenge tertiary education teachers face in the digital age is keeping pace with rapid technological advancements. The constant influx of new tools and platforms requires educators to learn to effectively utilize these resources in their teaching continuously. Lack of time and resources dedicated to professional development programs is another obstacle that impedes teachers' ability to adapt to evolving educational trends.

Professional teacher development in tertiary institutions in Nigeria is faced with several challenges that impact the quality of education delivery and the professional growth of educators. These include:

- **Policy and Funding:** Government policies and funding allocation significantly impact tertiary teacher development. Adequate funding for training programs, infrastructure, and resources is crucial for effective professional development initiatives. Tertiary institutions often struggle with inadequate funding for teacher development programs. This limitation hampers the ability to organize comprehensive training, provide access to relevant resources, and offer competitive incentives for educators to participate in professional development activities. Many tertiary institutions in Nigeria lack modern infrastructure and technological resources essential for effective teacher development. Poor internet connectivity, outdated facilities, and insufficient access to digital tools hinder the implementation of innovative training programs and digital learning initiatives. The level of institutional support for teacher development initiatives varies across tertiary institutions. Some

institutions lack clear policies, frameworks, and resources dedicated to professional development, resulting in fragmented or ad-hoc training efforts that may not meet educators' needs comprehensively (Onu *et al.*, 2022).

- **Curriculum Reforms and Technology Integration:** Changes in the curriculum and pedagogical approaches necessitate continuous professional development for teachers. Training programs should align with updated curricular requirements to enhance teaching quality. Technology integration in education requires teachers to acquire digital literacy skills and adapt teaching methods. Training programs focusing on technology integration can improve teaching effectiveness. The availability of specialized training programs tailored to the needs of tertiary educators is limited. Teachers may not have access to training in emerging educational technologies, pedagogical best practices, curriculum design, assessment strategies, or research methodologies, impacting their ability to deliver high-quality instruction. Resistance to change and traditional teaching paradigms can impede teacher development efforts. Some educators may be reluctant to adopt new pedagogical approaches, incorporate technology into their teaching practices, or participate in ongoing learning opportunities due to fear of failure, lack of motivation, or scepticism about the benefits of change (Adeoye, 2020).
- **Digital Skills Gap:** While digital technologies offer opportunities for enhancing teaching and learning, there is a significant digital skills gap among educators in Nigeria. Many teachers lack proficiency in using educational software, online platforms, data analysis tools, and multimedia resources effectively, limiting their ability to leverage technology in the classroom (Onu *et al.*, 2022)

- **Quality Assurance:** Quality assurance mechanisms, including accreditation processes and teacher evaluation systems, influence the emphasis on professional development. Ensuring that teachers meet established standards can drive the need for ongoing training. Many quality assurance mechanisms are poorly implemented, resulting in insufficient training opportunities for teachers and hinders their ability to improve instructional quality and adapt to new teaching methodologies (Imhangbe *et al.*, 2023)
- **Workload and Time Constraints:** Tertiary educators in Nigeria often face heavy workloads, teaching responsibilities, administrative duties, and research commitments. Balancing these tasks with professional development activities can be challenging, leading to limited time and motivation for continuous learning and skill enhancement. Lack of time for preparation and the need to manage diverse students' needs exacerbate these challenges, resulting in reduced opportunities for continuous learning and professional development (Anyanwu & Imiruaye, 2024)
- **Teacher Motivation:** Motivated and engaged teachers are more likely to participate in professional development activities. Incentives such as career advancement opportunities, recognition, and rewards can encourage teachers to invest in their development. Addressing disparities and providing equitable opportunities for all teachers is essential. Policies that mandate or incentivize teachers to engage in continuous education and professional development play a significant role in shaping the learning culture among tertiary educators in Nigeria. Lack of formal recognition, career advancement pathways, and incentives tied to professional development can demotivate educators. Without tangible rewards or acknowledgement of their efforts in enhancing their teaching skills and knowledge, teachers may perceive professional development as optional rather than essential for career growth (Anyanwu & Imiruaye, 2024).
- **Collaborative Learning Communities:** Creating communities of practice where teachers can collaborate, share best practices, and learn from each other fosters a culture of continuous learning and professional growth. Socioeconomic factors such as access to resources, infrastructure, and socio-cultural contexts can impact the effectiveness of professional development initiatives. Global trends in education and partnerships with international organizations can influence the types of professional development programs available to Nigerian teachers, exposing them to diverse perspectives and best practices (Johnson, 2019).
- **Research and Innovation:** Encouraging research and innovation in teaching methodologies and educational technology can drive the need for ongoing professional development to stay updated with emerging trends and practices. Systemic barriers such as inadequate funds, outdated curriculum, cultural resistance, and limited access to resources hinder adequate research and innovation, as well as the effective integration of research findings into teachers' professional development in Nigeria (Enuah *et al.*, 2023).

Strategies for Enhancing Teacher Professional Development in Tertiary Institutions in Nigeria.

To address the challenges associated with teacher development in the digital age, it is essential to focus on building teachers' digital competencies, providing technical support, and

fostering a culture of innovation and continuous learning (Onu *et al.*, 2022). Offering digital skills training, exposure to new technologies, and creating supportive environments that encourage experimentation and growth are crucial steps in enhancing teacher professional development in Nigeria (Adeoye, 2020). To ensure the effective integration of digital tools in professional development, institutions need to prioritize ongoing training and support for teachers. They also need to provide them with the necessary resources and guidance to navigate digital technologies confidently. Collaborative learning environments that encourage experimentation and peer feedback can foster a culture of innovation among educators (Wong, 2018). Furthermore, partnerships with industry stakeholders and educational technology experts can bring valuable insights and resources to professional development initiatives (Anis, 2024).

The digital age presents challenges and opportunities for professional development for tertiary education teachers. By embracing continuous learning, leveraging digital tools effectively, and fostering collaborative environments, educators can enhance their teaching practices and adapt to the evolving needs of students in the 21st century. As technology advances, ongoing investment in professional development programs will be crucial in ensuring quality education delivery and preparing teachers for the challenges of tomorrow. Addressing these challenges requires a multifaceted approach involving increased funding for teacher development, investment in infrastructure and technology, tailored training programs, promotion of digital literacy, reduced workload pressures, supportive policies, and fostering a culture of continuous learning and innovation within tertiary institutions. While digital technologies offer numerous benefits,

their effective implementation requires addressing challenges such as the digital divide, internet connectivity issues, digital literacy gaps, and cybersecurity concerns. Tertiary institutions in Nigeria need to invest in infrastructure, provide training and support, and ensure equitable access to technology resources for all stakeholders (Montero-Mesa *et al.*, 2023).

Conclusion

In conclusion, teacher professional development in the digital age is a multifaceted process that requires a holistic approach to address the challenges and leverage the opportunities presented by digital technologies. By equipping teachers with the necessary skills, support, and resources, education systems can ensure that educators are prepared to navigate the complexities of the digital era and deliver high-quality, technology-enhanced instruction to students.

References

- Adeoye, B. (2020). The Era of Digital in Teaching and Learning in Nigeria Educational Institutions. *Advances in Educational Technologies and Instructional Design*, 43-51. <https://www.researchgate.net>.
- Adreea M. (2020). Innovating teachers professional learning through digital technologies. *OECD working paper series*. <https://one.oecd.org/document/EDU/WKP/282020%2925/En/pdf>
- Anis, S.(2024). Teacher Professional Development in the Digital Age: Addressing the Evolving Needs Post COVID-19. *International Journal for Multidisciplinary Research*, 6(1), 1-14.
- Anyanwu, O.C. & Imiruaye, J.E. (2024). Teachers Workload and Effective Teaching. *International Journal of Scientific Research in Education*, 17(2),194-207.

- Drossel, K. & Eickelman, B. (2017). Teacher's Participation in Professional Development concerning the implementation of New Technologies in Class: A Latent Class Analysis of Teachers and the Relationship with the Use of Computers, ICT, Self-Efficacy and Emphasis on Teaching ICT skills. *Large Scale Assessments in Education*, 5(19), 1-13. <https://www.doi.org/10.1186/s40536-017-0053-7>
- Eradze, M, De-Martino, D., Tinterri, A., Albo, L., Bardone, E., Sunar, A.S. & Dipace, A.(2023). After the Pandemic: Teacher Professional Development for the Digital Educational Innovation. *Education Sciences*, 13(5), 432-440.
- Enuah, G.C., Amaefule, F.N., Nwogbo, M.O. & Ugwuama O.V. (2023). Professional Development Activities and Staff Innovation Competence: A Panacea for Improving the Quality of Education in Public Secondary Schools in Anambra State. *Journal of Educational Research*, 8(1), 92-109.
- Feng, L. & Sumettikoon, P. (2024). An Empirical Analyses of EFL Teachers Digital Literacy in Chinese Higher Education Institutions. *International Journal of Educational Technology in Higher Education*, 21(24), 1-17.
- Glotzbach, R.J., Mohler, J.L. & Radwan, J.E. (2010). Really Simple Syndication: An Educational Approach. *Journal of Interactive Media in Education*, 2009 (1). [doi:10.5334/2009-3](https://doi.org/10.5334/2009-3).
- Haddock, A., Ward, N., Yu, R., & O'Dea, N. (2022). Positive Effects of Digital Technology Use by Adolescents: A Scoping Review of Literature. *International Journal of Environmental Research and Public Health*, 19(21), 14009. [doi:10.3390/ijerph192114009](https://doi.org/10.3390/ijerph192114009).
- Hsu, L. G. (2019). Online Professional Development for Teachers: Benefits and Challenges. *Journal of Educational Technology Development and Exchange*, 12(1), 1-16.
- Hsu, L.G. (2020). Accessibility and Inclusivity in Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 13(1),1-14.
- Imhangbe, O.S., Oviawe, J.I., Aluede, O., Obinyan, G. & Tunde, D. (2023). Challenges and Emerging Perspectives of Quality Assurance and Teacher Education in Nigerian Universities: A Literature Review. *Open Education Studies*, 5(1), 1-11. doi.org/10.1515/edu-2023-0203.
- Johnson, C.J. (2018). The Cost-effectiveness of Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 11(3), 1-18.
- Johnson, C.J. (2019). Continuous Learning and Relevance in Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 12(2), 1-13.
- Jozegai, N.A., Koroleva, D. & Baloch, F.A. (2023). Teachers Digital Competence in the Post Covid-19 Era: The Effects of Digital Nativeness and Digital Leadership. *Contemporary Educational Technology*, 15(4), ep466. <https://doi.org/10.30935/cedtech/13620>.
- Kalu, R.C. (2021). The Role of Digital Technology in the Nigerian Higher Education System. *Academia.edu*. <https://www.academia.edu>.
- Labbas , R., & El-Shaban, A. (2016). Teacher Development in the Digital Age. *Teaching English with Technology*, 13(3), 53-64.

- <https://files.eric.ed.gov/fulltext/EJ1144153.pdf>
- Lee, J.M. (2016). Interactive and Engaging Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 9(4), 1-13.
- Lee, J.M. (2017). Personalized Learning in Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 10(30), 1-12.
- Montero-Mesa, L., Fraga-Varela, F., Vila-Lounago E., & Rodriguez-Groba, A. (2023). Digital Technology and Teacher Professional Development: Challenges and Contradictions in Compulsory Education. *Education Sciences*, 13 (10), 1029. <https://www.mdpi.com/2227-7102/13/10/1029>
- Onu, A.D., Nuru, R.A. & Babafemi, J. (2022). Assessing The Information Communication Technology Skills of Teachers for Post Covid-19 Teaching and Learning at Colleges of Education in Northwest, Nigeria. *ATBU, Journal of Science, Technology & Education*, 10(4),136-147.
- Sampasa-Kanyinga, H., Hamilton, H.A., Goldfield, G.S. & Chaput, J.P. (2022). Problem of Technology Use, Academic Performance and School Connectedness among Adolescents. *International Journal of Environmental Research and Public Health* 19(4), 2337. doi: 10.3390/ijerph19042337.
- Sharma, S. & Behl, R. (2022). Analyzing the Impact of Social Media on Students' Academic Performance: A Comparative Study of Extraversion and Introversion Personality. *Psychological Studies*, 67(4), 549-559. doi: 10.1007/s12646-022-00675-6.
- Siemens, G. (2014). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.
- Simoes, S., Oliveira, T., & Nunes, C.(2022). Influence of Computers in Students' Academic Achievement. *Heliyon*. 8(3), e09004. doi: 10.1016/j.heliyon.2022.e09004.
- Sims, S., Fletcher-wood, H., O'Mara-Eves, A., Cottingham, S., Stansfield, C., Goodrich, J., et al., (2023). Effective Teacher Professional Development: New Theory and a Meta-Analytic Test. *Review of Educational Research*, 20(10), 1-42. <https://journals.sagepub.com/doi/10.3102/0346543231217480>
- Smith, A.G. (2015). The Accessibility and Inclusivity of Online Professional Development for Teachers. *Journal of Educational Computing Research*, 51(1), 55-70.
- Stefan H. (2021). Digital Tools to Support Teacher Professional Development in Lesson Studies: A Systematic Literature Review. *International Journal for Lesson and Learning Studies*, 10(2), 138-149. <https://www.emerald.com/insight/content/doi/10.1108/IJLLS-09-2020-0062/full/html>
- Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S.V., Giannoutsou, N., Cachia, R., et al., (2023). Impacts of Digital Technologies on Education and Factors Influencing Schools' Digital Capacity and Transformation: A Literature Review. *Education and Information Technologies*, 28(6), 6695-6726. doi: 10.1007/s10639-022-11431-8.
- Wong, K.L. (2018). Collaboration and Networking in Online Professional Development for Teachers. *Journal of Educational Technology Development and Exchange*, 11 (4), 1-11