A Systematic Review of the Impact of Web-based Professionals in Enhancing Student's Learning Outcomes

Li Xiaochao[1,*], Adenan Ayob[2] & Hisbulloh Als Mustofa[3]

[1]Department of Education, Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, Malaysia

[2]Faculty of Education and Liberal Arts, UCSI University, Kuala Lumpur, Malaysia

[3]Department of Physics, Faculty of Science and Mathematics, Sultan Idris Education University, Kuala Lumpur, Malaysia

*Correspondence: Department of Education, Faculty of Social Sciences and Liberal Arts, UCSI University, Kuala Lumpur, Malaysia. E-mail: 1002161449@ucsiuniversity.edu.my

Received: May 19, 2024 Accepted: June 24, 2024 Online Published: August 3, 2024

doi:10.5430/jct.v13n4p124 URL: https://doi.org/10.5430/jct.v13n4p124

Abstract

This conceptual paper investigates the evolutions, and effect of web-based professional development (WPD) on English teachers' instructional practices and the subsequent effects on students' learning outcomes. It examines the evolution from traditional in-person workshops to dynamic online learning environments and discusses how WPD can address the pedagogical needs of the 21st-century classroom. Key components of effective WPD, such as interactive content, personalized learning paths, and continuous support mechanisms, are explored to determine how they contribute to teacher proficiency and pedagogical innovation. This research is characterised as a systematic review of the the paper presents empirical insights from recent studies, highlighting the direct correlation between WPD and improvements in students' English language proficiency, engagement, and self-regulated learning skills. It also addresses the challenges and limitations of WPD, including accessibility, the digital divide, and the need for face-to-face interactions. Concluding remarks emphasize the necessity for ongoing research, equitable access, quality assurance, and blended learning models in the continuous development of WPD programs. This paper argues that, despite its challenges, WPD remains a critical tool for enhancing educational practices and outcomes in the rapidly evolving landscape of English language education. This comprehensive exploration of WPD underscores its potential to significantly impact educational practices and outcomes. As we move forward, it is crucial to build on the insights and lessons learned, continuously seeking ways to innovate and improve professional development for the benefit of teachers and students alike.

Keywords: web-based professional development (WPD), English language teaching (ELT), teacher professional growth, student learning outcomes

1. Introduction

The landscape of professional development for teachers has undergone significant transformations over the past decades, especially with the integration of technology in education (Lai & Jin, 2021). Traditional professional development models, often characterized by one-time workshops or seminars, have been criticized for their limited impact on teacher practices and student learning outcomes (Smith & Gillespie, 2023). This critique has paved the way for the adoption of web-based professional development (WPD) programs, which offer a flexible, accessible, and potentially more engaging approach to teacher learning. The shift towards WPD is particularly relevant in the field of English language teaching, where the rapid evolution of digital tools and resources can significantly enhance instructional practices and, subsequently, student outcomes.

As technology keeps changing rapidly, English teachers are finding it increasingly challenging to keep up with the latest tools and methods for teaching online (Gao & Zhang, 2020). This scenario is akin to trying to catch a fast-moving train while carrying a heavy load of books; no matter how hard they try, staying up-to-date and using these new technologies effectively in their teaching can feel overwhelming. The relentless pace of technological advancement poses a significant challenge for English educators in integrating contemporary digital tools into their pedagogical

repertoire (Lim et al., 2022). This necessitates not only a perpetual cycle of learning and adaptation but also a strategic overhaul of traditional teaching methodologies to embrace and effectively leverage these innovations for enhanced educational outcomes. Adapting to new educational technologies is not just about staying current; it's about enhancing the quality of English education in a digital age. Proficient use of these technologies can lead to more engaging and effective teaching methods, contributing to improved literacy rates and better preparation of students for a digitalized workforce. Economically, this adaptation supports the development of a more tech-savvy generation, potentially reducing the digital divide and promoting equal opportunities in education. Societally, it empowers educators to address diverse learning needs through personalized and accessible teaching methods, fostering inclusivity and democratizing education (Aas et al., 2024; Galaterou, 2017; Pasha, 2012).

The central thesis of this paper posits that WPD can indeed enhance students' learning outcomes, particularly in English language proficiency, by providing teachers with ongoing access to innovative pedagogies, a supportive community of practice, and resources that align with the latest educational standards and technologies. This assertion rests on the premise that effective teacher development is crucial for educational success, and that WPD, when designed and implemented thoughtfully, can offer a more effective and sustainable model for professional growth compared to traditional methods.

In the following sections, we will explore the evolution of professional development models for English teachers, identify key components that make WPD effective, examine the impact of WPD on teachers and their teaching practices, and analyze how these changes translate into improved student learning outcomes. Additionally, we will discuss the challenges and limitations associated with WPD, offering insights and recommendations for educators, policymakers, and stakeholders involved in teacher professional development.

By scrutinizing the relationship between WPD and student learning outcomes, this paper aims to contribute to the ongoing dialogue on how to best support teachers in an increasingly digital educational landscape, ensuring that they are equipped to meet the diverse needs of their students and enhance their learning experiences in meaningful ways.

2. Materials and Methods

The research is characterised as a systematic review of the the paper presents empirical insights from recent studies, highlighting the direct correlation between WPD and improvements in students' English language proficiency, engagement, and self-regulated learning skills. It also addresses the challenges and limitations of WPD, including accessibility, the digital divide, and the need for face-to-face interactions.

An online article search (computer-assisted literature search) was conducted in important online databases like Scopus. The selection of Scopus as databases was due to three main reasons. Firstly, the prestige and international reputation of these tools, as they are currently the main sources for finding publications with the greatest impact. Secondly, with respect to the sample, its representativeness is guaranteed by its international prestige and its requirements in the indexing protocol. Thirdly, there is the possibility of complementarity, despite some overlap in coverage, and the persistent bias pointed out (Mongeon and Paul-Hus, 2016) in certain disciplines. The aim was to provide a fairly comprehensive overview of research in this area. The search was conducted against reference lists of articles found electronically. However, it is also guaranteed by the specific limitations of a defined set of search criteria and procedures. Thirdly, there is the possibility of complementarity, despite some overlap in coverage, and the persistent bias pointed out (Mongeon and Paul-Hus, 2016) in certain disciplines. The aim was to provide a fairly comprehensive overview of research in this area. The search was conducted against reference lists of articles found electronically. The search was based on articles published as recently as March 2024.

The cited descriptors were associated with the Boolean operators 'and' and 'or', directing the search to the terms sought. In addition, manual searches were conducted based on the reference lists of electronically found articles. Therefore, the search was conducted until March 2024.

2.1 Criteria for Inclusion

The articles selected for this study were chosen according to the following criteria: (1) Published between January 2014 and March 2024; (2) Published in academic or peer-reviewed journals; (3) Specified search descriptors in the title, keywords and/or abstract; (4) English The selected articles were required to be written in English, to be related to the fields of education, English language education, and social science, and to discuss digital competencies in the professional development of English language teachers at each stage of the education system, either in the title, abstract, or keywords.

With regard to the exclusion criteria, the following documents were excluded: (a) publications where the full text

was not available; (b) doctoral theses, books, term papers, conference papers and technical reports; (c) studies outside the educational context; and (d) studies that did not involve teachers.

2.2 Study Selection and Data Extraction

Firstly, the literature search systematically retrieved and reviewed a total of 175 documents from Scopus, taking into account the inclusion criteria for research published in the period 2014-2024, both inclusive, in the field of Social Sciences, with a filter that only includes English language journal articles. Table 1 shows the number of papers published in the period 2014-2024 in the analysed databases.

Table 1. The Number of Papers Published in the Period 2014-2024 in the Analysed Databases

Year of published	Number of article		
	Searches	Refine	
2014	16	8	(Bridges et al., 2014; Ching & Hursh, 2014; Gould et al., 2014; Petrides et al., 2014; Raper et al., 2014; Stephens, 2014; Whyte, 2014; Zueger et al., 2014)
2015	11	5	(Hollingsworth & Lim, 2015; Kitching et al., 2015; Rakap et al., 2015; Shannon et al., 2015; Ul-Abdin & Svensson, 2015)
2016	24	7	(Alsobayel, 2016; Bansal & Dalrymple, 2016; Henderson et al., 2016; Huang, 2016; Jiménez & O'Shanahan, 2016; Matuk et al., 2016; Sharma et al., 2016)
2017	25	8	(Berndt et al., 2017; D'Souza et al., 2017; Jiménez & Gutierrez, 2017; Lawdis et al., 2017; Platz et al., 2017; Rhode et al., 2017; Sato & Haegele, 2017; Tuan et al., 2017)
2018	12	4	(Amendum et al., 2018; Duvall et al., 2018; Mitchell et al., 2018; Yang, 2018)
2019	20	7	(Barabasch & Cattaneo, 2019; Clark-Wilson & Hoyles, 2019; Curran et al., 2019; Goffard et al., 2019; Kawas et al., 2019; Márquez-Hernández et al., 2019; Wuryaningsih et al., 2019)
2020	26	1	(Kao et al., 2020)
2021	15	2	(Bartholomew et al., 2021; DeMers et al., 2021)
2022	12	3	(Kunicki et al., 2022; Ramsden et al., 2022; Wu et al., 2022)
2023	16	6	(Hegestedt et al., 2023; Raumer-Monteith et al., 2023; Shawaqfeh & Khasawneh, 2023; Spurava & Kotilainen, 2023; Williams et al., 2023; Xing & Wang, 2022)
2024	6	4	(Aas et al., 2024; Corral-Granados, 2024; Pålsson et al., 2024; Vega et al., 2024)
	184	49	

A total of 127 documents were excluded. The remaining 48 were analysed taking into account the mentioned variables. Exceptions are made for research that does not discuss the context of education, teachers and professional development.

2.3 Data Analysis Procedure

In the analysis and interpretation of the developed study on the correlation between WPD and improvements in students' English language proficiency, engagement, and self-regulated learning skills, combined with the application of semantic keyword studies, it was deemed appropriate to adopt a narrative analysis or descriptive synthesis, given the different and diverse evidence bases of the research designs referenced in this paper.

3. Finding and Discussions

3.1 The Evolution of Professional Development for English Teachers

The professional development of English teachers has undergone significant transformations over the years, evolving from traditional workshop-based models to more dynamic, collaborative, and technology-integrated approaches

(Huang, 2016). This evolution reflects the changing needs of educators in the digital age, where continuous learning and adaptation are crucial for effective teaching (Barabasch & Cattaneo, 2019; Ramsden et al., 2022). Initially, professional development for teachers often involved one-time workshops or seminars focusing on specific skills or knowledge areas(Platz et al., 2017). However, this approach has gradually shifted towards more sustainable and collaborative models, emphasizing ongoing learning and community engagement.

The pandemic has acted as a catalyst for a swift transition to online learning environments, necessitating a rapid evolution in the professional development of English teachers (Amini et al., 2024; Shin et al., 2023). As explored by Aslan and Solmaz (ASLAN İngilizce Öğretmeni et al., 2023), the sudden shift to webinars and other digital PD formats during and after COVID-19 has had lasting effects on EFL teacher candidates. This exploratory study could provide valuable empirical data on the challenges and opportunities faced by teacher candidates as they navigated the new landscape of web-based learning and professional growth, illustrating a critical juncture in the evolution of PD.

The evolution of professional development for English teachers has been profoundly influenced by technological advancements, changing educational paradigms, and a deeper understanding of effective teaching methodologies (Kao et al., 2020). This journey from traditional models to innovative, web-based approaches mirrors the broader trends in education and society towards digitalization, collaboration, and personalized learning.

3.1.1 Traditional Workshops and In-Service Training

In the context of changing professional development from traditional to technology-based, starting from its initial form, namely in-service training which was most often used when technology was not widely used. According to Huang, (2016) professional development with Traditional Workshops and In-Service Training was marked by the first time a country's national education was regulated and the time when the state began to intervene in teacher development. This professional development was dominated by workshops, seminars, and in-service training sessions. These events, often lecture-based, provided foundational knowledge on language teaching, classroom management, and curriculum development (Platz et al., 2017). While informative, they offered limited opportunities for interactive learning or collaborations or application to diverse classroom settings.

3.1.2 Collaborative Learning and Peer Observation

Previously because In-Service Training was initiated as an direct official and regulated activity its lack of collaboration. In Recognizing the importance of collaboration, the focus shifted towards more interactive models of professional development (Curran et al., 2019; Rhode et al., 2017; Sato & Haegele, 2017; Stephens, 2014; Yeo, 2023). According to Huang, (2016) this phase is marked by the emergence of various social actors (best practices) and the state and government no longer hold the main position in developing teacher professionalism. Practices such as peer observation, team teaching, and participation in study groups fostered a community of learning among English teachers, allowing for the sharing of experiences, challenges, and innovative solutions.

3.1.3 Advent of CLIL and CLT

The rise of Content and Language Integrated Learning (CLIL) and Communicative Language Teaching (CLT) marked a significant shift. These approaches emphasized language use in authentic communicative contexts and required PD programs to include strategies for integrating language and content effectively (Gallagher & Colohan, 2017; Li & Zhang, 2022; Ull & Agost, 2020). This period highlighted the need for teaching methodologies that promoted interaction and communicative competence.

3.1.4 Technology Integration

The integration of technology into education has been a pivotal evolution in PD. Smartphones and the internet have opened new avenues for learning and professional development, making it possible for teachers to access resources, networks, and support anytime and anywhere. The application of geographic information systems in educational settings demonstrates the broadening scope of technology use in schools, highlighting a shift towards more interactive and engaging learning environments (Kholoshyn et al., 2021). Training on digital tools, multimedia resources, and the management of online and blended learning environments became crucial. This stage expanded professional development to include aspects of digital literacy, creating engaging online content, and navigating virtual classrooms effectively.

3.1.5 Web-based Professional Development

The internet's advent revolutionized access to professional development through web-based platforms. Online courses, webinars, and professional learning communities provided flexible, personalized learning opportunities. This model encouraged continuous, self-directed learning and connected teachers with a global community,

facilitating the exchange of innovative teaching strategies(Karlsson & Nilsson, 2019; Rhode et al., 2017; Stephens, 2014).

3.1.6 Data-driven Instruction

The focus on data-driven instruction introduced a new dimension to PD, urging English teachers to leverage student performance data to refine teaching strategies(Hegestedt et al., 2023; Spurava & Kotilainen, 2023; Xing & Wang, 2022). This involves training in assessing language proficiency, interpreting data, and tailoring instruction to meet diverse learner needs effectively.

3.1.7 Cultural Competency and Inclusivity

Responding to increasingly diverse student populations, PD began to incorporate training on cultural competency, bias awareness, and creating inclusive environments (Aas et al., 2024). This focus ensures that English teaching supports multilingualism, respects cultural diversity, and promotes equity in the classroom.

Throughout its evolution, professional development for English teachers has transitioned from generalized, one-size-fits-all approaches to more customized, collaborative, and technologically savvy models (Mohammadi et al., 2023). This progression reflects the dynamic nature of the educational landscape, emphasizing the ongoing need to adapt teaching practices to enhance effectiveness and support diverse student outcomes in English language learning.

Web-based professional development for English teachers encompasses a range of online educational experiences designed to enhance teaching skills, including webinars, courses, and collaborative online spaces. These platforms offer opportunities for teachers to improve their understanding and application of teaching strategies, especially in fostering students' self-regulated learning skills and adapting to post-pandemic educational needs.

3.2 Key Components of Effective Web-based Professional Development

Web-based professional development (WPD) has emerged as a crucial medium for enhancing the capabilities of English teachers in the digital age. Its effectiveness, however, hinges on several core components that ensure these programs are impactful, engaging, and capable of driving meaningful changes in teaching practices. Here, we explore these key components, drawing insights from the evolution of professional development and the current needs of English educators. The role of language teacher associations, as discussed by Georgios Kormpas and Coombe (2023), represents a vital collaborative dimension to WPD. These associations offer robust platforms for English language teachers to engage in continued education and professional networking. Highlighting this aspect underscores the importance of professional learning communities and associations in fostering a supportive environment for teacher development. Khitrova and Treshina (2022) delve into how distance learning has influenced English language teachers' professional development. Their examination reveals that distance learning has not only provided teachers with new insights into pedagogical strategies but also equipped them with firsthand experience of learning in an online environment, which is invaluable for understanding the student experience in such settings.

3.2.1 Interactive Content and Collaborative Tools

The provision of interactive content is foundational to effective WPD. This includes multimedia resources, simulations, and interactive learning modules that not only present information but also engage teachers in active learning (Chaves & Guapacha, 2016; Khitrova & Treshina, 2022). Such content makes the learning experience more immersive, aiding in the retention of knowledge and the development of practical skills. Additionally, collaborative tools like forums, social media groups, and collaborative projects facilitate peer learning and the sharing of ideas, strategies, and resources among educators (Alsobayel, 2016). These tools support the creation of professional learning communities (PLCs), where teachers can engage in ongoing dialogue, share challenges, and collaboratively develop solutions (Salleh & Sulaiman, 2019).

3.2.2 Personalized Learning Paths

One of the significant advantages of WPD is its ability to offer personalized learning paths (Jacobs et al., 2022). Unlike traditional PD, which often adopts a one-size-fits-all approach, WPD can be tailored to match the individual needs, interests, and experience levels of each teacher. Through adaptive learning technologies and flexible course designs, teachers can focus on areas most relevant to their professional growth, set their learning pace, and choose content that aligns with their specific teaching contexts. This personalization enhances the relevance and effectiveness of PD, making it more likely that teachers will apply what they learn in their classrooms.

3.2.3 Continuous Support and Feedback Mechanisms

Continuous support and feedback are essential for the successful implementation of new teaching strategies learned

through WPD. This can take the form of online mentoring, coaching sessions, and peer review systems. Such mechanisms ensure that teachers receive constructive feedback on their practice, allowing them to refine their techniques and overcome challenges(Bartholomew et al., 2021; Sato & Haegele, 2017). Continuous support also refers to the availability of resources and guidance post-training, helping teachers to sustain changes in their teaching practices over time.

3.2.4 Familiarity with Digital Tools and Resources

Given the emphasis on technology integration in today's classrooms, effective WPD programs must also focus on developing teachers' familiarity with digital tools and resources (Mueller et al., 2023; Sato & Haegele, 2017). This includes training on using educational software, digital content creation tools, and online platforms for classroom management and student engagement. Proficiency in these areas enables teachers to design more interactive and engaging learning experiences for their students, thereby enhancing the learning outcomes.

3.2.5 Reflective Practices and Professional Growth

A crucial component of WPD is its encouragement of reflective practices (Karlsson & Nilsson, 2019). Teachers are prompted to reflect on their teaching methodologies, student interactions, and the impact of their instructional choices. This reflection, facilitated through journals (Hammond et al., 2019), discussion boards (Jacobs et al., 2022), and reflective assignments(Karlsson & Nilsson, 2019), fosters a culture of continuous improvement and professional growth(Khitrova & Treshina, 2022). It helps teachers to critically assess their practices, identify areas for enhancement, and stay committed to their professional development journey.

The key components of effective web-based professional development—interactive content, personalized learning paths, continuous support, familiarity with digital tools, and reflective practices—collectively contribute to a more dynamic, engaging, and impactful learning experience for English teachers. By focusing on these elements, WPD programs can address the diverse needs of educators, equipping them with the skills and knowledge necessary to thrive in the digital age and positively impact their students' learning outcomes (Chang et al., 2016).

3.3 Direct and Indirect Effects of Web-based Professional Development on Students' Learning Outcomes

Web-based professional development (WPD) for English teachers not only equips educators with advanced pedagogical skills and technology integration capabilities but also significantly impacts students' learning outcomes. The effects of WPD can be observed both directly and indirectly through improvements in English language proficiency, engagement, motivation, and overall academic performance. This section explores how the enhanced competencies of teachers, fostered by WPD, translate into tangible benefits for students. Linde et al. (Linde et al., 2023) emphasize the role of online professional development in enhancing teachers' abilities to develop students' self-regulated learning skills. Integrating this insight into our discussion on the effects of WPD underscores the direct impact on students' ability to take ownership of their learning, a crucial skill for academic success. This enhancement of self-regulation through WPD echoes the broader goal of empowering students to become active, lifelong learners.

3.3.1 Improvement in English Language Proficiency

One of the most direct outcomes of effective WPD is the improvement in students' English language proficiency (Powell et al., 2020). Teachers who undergo comprehensive WPD programs are better equipped with innovative teaching strategies, such as differentiated instruction, interactive learning, and content and language integrated learning (CLIL) approaches. These methodologies not only make learning more engaging but also more effective, catering to the diverse needs and learning styles of students. As teachers become more adept at integrating technology in language teaching, they can provide students with access to a wider range of resources and interactive tools, further enhancing language acquisition and proficiency.

3.3.2 Enhanced Engagement and Motivation

The integration of digital tools and resources into English language teaching, a key focus of many WPD programs, significantly enhances student engagement and motivation (Yuan et al., 2017). Teachers trained in WPD are more likely to use multimedia resources, gamification, and online collaborative projects, making lessons more interactive and enjoyable for students. This increase in engagement is crucial for language learning, as it encourages students to participate more actively in lessons, practice their language skills more frequently, and ultimately, achieve better learning outcomes.

3.3.3 Case Studies Showcasing Tangible Improvements

Several case studies and empirical research highlight the positive impact of WPD on student outcomes (Bartholomew et al., 2021; Sider et al., 2023; Ull & Agost, 2020). For instance, schools that have implemented

WPD programs often report not only an improvement in English test scores but also an increase in students' confidence in using the language in different contexts. These case studies demonstrate how targeted professional development initiatives can lead to significant educational improvements, showcasing the potential of WPD to transform English language teaching and learning.

3.3.4 Fostering a Culture of Continuous Learning

Indirectly, WPD fosters a culture of continuous learning and improvement among teachers, which, in turn, benefits students. When teachers engage in lifelong learning and regularly update their teaching practices, they model the importance of learning and adaptability for their students. This culture promotes resilience, curiosity, and a love for learning among students, qualities that are essential for academic success and personal growth (Chang et al., 2016).

3.3.5 Bridging the Digital Divide

WPD also plays a critical role in bridging the digital divide, ensuring that students from various backgrounds have equal opportunities to learn and succeed. By training teachers to effectively integrate technology into their teaching, WPD ensures that all students gain the digital literacy skills necessary for the modern world (Amendum et al., 2018; Clark-Wilson & Hoyles, 2019; Hammond et al., 2019). This is particularly important in underserved communities, where schools may struggle to provide students with access to technology and digital learning resources.

The direct and indirect effects of web-based professional development on students' learning outcomes underscore the importance of investing in teacher education and training. By enhancing English teachers' pedagogical skills, technology integration capabilities, and commitment to continuous learning, WPD contributes significantly to improving English language proficiency, engagement, motivation, and the overall educational experience of students. As the educational landscape continues to evolve, the role of WPD in shaping effective, responsive, and technologically adept educators will remain paramount.

3.4 Challenges and Limitations of Web-based Professional Development

While web-based professional development (WPD) offers numerous advantages for English teachers and has shown potential in enhancing students' learning outcomes, it is not without its challenges and limitations. Recognizing these obstacles is crucial for developing more effective WPD programs and ensuring that the benefits of such training are accessible to all educators. This section delves into some of the primary challenges associated with WPD, offering insights into accessibility issues, the variability in quality and effectiveness, and the necessity of blending online learning with face-to-face interactions. (Moser & Wei, 2023) focus on the critical importance of collaborative online spaces, especially for supporting the professional development of rural language teachers post-pandemic. This insight sheds light on the unique challenges faced by teachers in rural areas, emphasizing the need for PD programs that are not only accessible but also foster a sense of community and support, regardless of geographical constraints.

3.4.1 Accessibility and Digital Divide Issues

One of the most pressing challenges of WPD is ensuring equitable access to all teachers, regardless of their geographical location, socioeconomic status, or the resources available in their schools. The digital divide—a gap between those with easy access to digital technology and those without—can significantly hinder the effectiveness of WPD programs (Bartholomew et al., 2021). Teachers in rural or low-income areas may lack the necessary internet connectivity or technological devices to participate fully in WPD, thereby exacerbating educational inequities rather than mitigating them.

3.4.2 Quality Control and Effectiveness of Online Programs

The vast array of WPD programs available online presents another challenge: the variability in quality and effectiveness. Not all WPD offerings are created equal, and the lack of standardized benchmarks for content, delivery, and outcomes can make it difficult for educators to identify programs that will truly benefit their practice (Chang et al., 2016). This variability can lead to wasted resources and missed opportunities for genuine professional growth. Ensuring quality control and providing clear evidence of program effectiveness are essential steps in addressing this challenge.

3.4.3 The Need for Face-to-face Interaction

Despite the convenience and flexibility of WPD, the absence of face-to-face interaction can be a significant limitation for some educators (Wuryaningsih et al., 2019). Personal interaction with trainers and peers plays a critical role in learning, offering opportunities for immediate feedback, clarification of misunderstandings, and the building of professional networks(Wuryaningsih et al., 2019). While online forums and video conferencing can mitigate this issue to some extent, they cannot fully replicate the dynamics of in-person communication. Integrating hybrid

models of professional development that combine the best of online and in-person learning may be a solution to this challenge.

3.4.4 Addressing Diverse Learning Needs and Contexts

WPD programs must be carefully designed to address the diverse needs and contexts of English teachers(Sider et al., 2023). One-size-fits-all approaches are less effective in online environments, where participants bring a wide range of experiences, skills, and teaching conditions. Tailoring content to be relevant and applicable across different educational settings requires thoughtful program design and a deep understanding of the challenges faced by teachers in various contexts (Aas et al., 2024).

The challenges and limitations of web-based professional development highlight the need for ongoing evaluation, innovation, and support to maximize its benefits for English teachers and their students (Khitrova & Treshina, 2022). Addressing issues of accessibility, quality control, the need for personal interaction, and the diversity of teacher needs are crucial steps in creating more effective and equitable WPD programs. By acknowledging and tackling these challenges, stakeholders can ensure that WPD remains a powerful tool for enhancing teaching practices and improving student learning outcomes.

4. Conclusion

In reflecting on the evolution, key components, impacts, and challenges of web-based professional development (WPD) for English teachers, it's clear that while WPD offers significant potential to enhance teaching effectiveness and student learning outcomes, its success is contingent upon overcoming several notable hurdles. The shift towards WPD has been driven by technological advancements, a deeper understanding of effective teaching methodologies, and the need for flexible, personalized professional learning experiences. Interactive content, personalized learning paths, continuous support, digital tool proficiency, and reflective practices stand out as critical components for effective WPD, directly contributing to improved English language proficiency, engagement, and motivation among students.

However, the efficacy of WPD is tempered by challenges such as accessibility issues, the digital divide, variability in program quality, and the need for face-to-face interaction. These obstacles underscore the importance of deliberate, equitable WPD program design and implementation strategies that ensure all educators, regardless of their location or resources, can benefit from high-quality professional development opportunities.

Looking ahead, the future of WPD should focus on addressing these challenges through innovative solutions such as hybrid learning models, quality assurance standards, and initiatives aimed at bridging the digital divide. Additionally, the role of data-driven decision-making and the integration of emerging technologies in professional development programs warrant further exploration. By prioritizing accessibility, quality, and the personalization of learning experiences, WPD can continue to evolve as a powerful catalyst for educational improvement.

As education continues to navigate the complexities of the digital age, the role of WPD in supporting teachers' professional growth and enhancing student outcomes remains paramount. Stakeholders including educators, policymakers, and professional development providers must collaborate to refine and expand WPD offerings, ensuring they are effective, equitable, and aligned with the ever-changing landscape of education. In doing so, we can better support English teachers in their vital role of preparing students to thrive in a globalized, digitalized world, thereby contributing to the development of a more informed, capable, and adaptable society.

References

Aas, H. K., Uthus, M., & Løhre, A. (2024). Inclusive education for students with challenging behaviour: development of teachers' beliefs and ideas for adaptations through Lesson Study. *European Journal of Special Needs Education, 39*(1), 64-78. https://doi.org/10.1080/08856257.2023.2191107

Alsobayel, H. (2016). Use of social media for professional development by health care professionals: A cross-sectional web-based survey. *JMIR Medical Education, 2*(2). https://doi.org/10.2196/mededu.6232

Amendum, S. J., Bratsch-Hines, M., & Vernon-Feagans, L. (2018). Investigating the Efficacy of a Web-Based Early Reading and Professional Development Intervention for Young English Learners. *Reading Research Quarterly, 53*(2), 155-174. https://doi.org/10.1002/rrq.188

Amini, M., Ravindran, L., & Lee, K.-F. (2024). Adapting Education Shifts in Malaysia After COVID-19: A Comprehensive Review of Flexible Assessments, Lifelong Learning Initiatives, and Diversified Learning

Trajectories. *Asian Journal of Assessment in Teaching and Learning*, 14(1), 1-14. https://doi.org/10.37134/AJATEL.VOL14.1.1.2024

ASLAN İngilizce Öğretmeni, K., Koleji, T., SOLMAZ Doç, O., Üniversitesi, D., Gökalp Eğitim Fakültesi, Z., & Diller Eğitimi Bölümü, Y. (2023). An Exploratory Study of EFL Teacher Candidates' Webinar Experiences during and After the COVID-19 Pandemic. *Journal of Uludag University Faculty of Education, 36*(2), 475-492. https://doi.org/10.19171/UEFAD.1256068

Bansal, S. K., & Dalrymple, O. (2016). Instructional module development system (IMODS). Annual Conference on Innovation and Technology in Computer Science Education, ITiCSE, 11-13-July-2016, 258-259. https://doi.org/10.1145/2899415.2925506

Barabasch, A., & Cattaneo, A. (2019). Digital education in career and technical education and the support of creative professional development. In The Wiley Handbook of Global Workplace Learning. https://doi.org/10.1002/9781119227793.ch14

Bartholomew, J. B., Agley, J., Carlson, J., Lay, K., & Tidd, D. (2021). Interprofessional development case study of an SBIRT web-based app for education and practice. *Journal of Technology in Human Services, 39*(1), 92-109. https://doi.org/10.1080/15228835.2021.1871704

Berndt, A., Murray, C. M., Kennedy, K., Stanley, M. J., & Gilbert-Hunt, S. (2017). Effectiveness of distance learning strategies for continuing professional development (CPD) for rural allied health practitioners: A systematic review. *BMC Medical Education, 17*(1). https://doi.org/10.1186/s12909-017-0949-5

Bridges, S., Chang, J. W. W., Chu, C. H., & Gardner, K. (2014). Blended learning in situated contexts: 3-year evaluation of an online peer review project. *European Journal of Dental Education, 18*(3), 170-179. https://doi.org/10.1111/eje.12082

Chang, H.-Y., Hsu, Y.-S., & Hung, J.-Y. (2016). Adapting and customizing web-based inquiry science environments to promote Taiwanese students' learning of science. In Science Education Research and Practice in Asia: Challenges and Opportunities. https://doi.org/10.1007/978-981-10-0847-4_24

Chaves, O., & Guapacha, M. E. (2016). An Eclectic Professional Development Proposal for English Language Teachers. *Profile: Issues in Teachers' Professional Development, 18*(1), 71-96. https://doi.org/10.15446/profile.v18n1.49946

Ching, C. C., & Hursh, A. W. (2014). Peer modeling and innovation adoption among teachers in online professional development. *Computers and Education, 73*, 72-82. https://doi.org/10.1016/j.compedu.2013.12.011

Clark-Wilson, A., & Hoyles, C. (2019). A research-informed web-based professional development toolkit to support technology-enhanced mathematics teaching at scale. *Educational Studies in Mathematics, 102*(3), 343-359. https://doi.org/10.1007/s10649-018-9836-1

Corral-Granados, A. (2024). Challenges in continuing professional development on inclusion in early years in Spain. *Journal of Educational Change, 25*(1), 19-41. https://doi.org/10.1007/s10833-022-09473-3

Curran, V., Fleet, L., Simmons, K., Lannon, H., Gustafson, D. L., Wang, C., Garmsiri, M., & Wetsch, L. (2019). Adoption and Use of Mobile Learning in Continuing Professional Development by Health and Human Services Professionals. *Journal of Continuing Education in the Health Professions, 39*(2), 76 -85. https://doi.org/10.1097/CEH.0000000000000243

DeMers, M. N., Kerski, J. J., & Sroka, C. J. (2021). The Teachers Teaching Teachers GIS Institute: Assessing the Effectiveness of a GIS Professional Development Institute. *Annals of the American Association of Geographers, 111*(4), 1160-1182. https://doi.org/10.1080/24694452.2020.1799745

D'Souza, K., Henningham, L., Zou, R., Huang, J., O'Sullivan, E., Last, J., & Ho, K. (2017). Attitudes of health professional educators toward the use of social media as a teaching tool: Global cross-sectional study. *JMIR Medical Education, 3*(2). https://doi.org/10.2196/mededu.6429

Duvall, M., Lee, F. J., & Smith, B. K. (2018). Skyscraper games: Designing professional development for middle school teachers to promote computational thinking using custom tools. *Proceedings of International Conference of the Learning Sciences, ICLS, 3*(2018-June), 1579-1580. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-85053837536&partnerID=40&md5=2a61fe9eff6c31033eeb832f44ea1b5b

Galaterou, J. (2017). Teachers' Attitudes towards Inclusive Education: The Role of Job Stressors and Demographic

Parameters. *International Journal of Special Education, 32*(4), 643–658.

Gallagher, F., & Colohan, G. (2017). T(w)o and fro: using the L1 as a language teaching tool in the CLIL classroom. *Language Learning Journal, 45*(4), 485-498. https://doi.org/10.1080/09571736.2014.947382

Gao, L. X., & Zhang, L. J. (2020). Teacher Learning in Difficult Times: Examining Foreign Language Teachers' Cognitions about Online Teaching to Tide over COVID-19. *Frontiers in Psychology, 11*, 549653. https://doi.org/10.3389/FPSYG.2020.549653/BIBTEX

Goffard, A., Odou, P., El Aliouat, M., Aliouat-Denis, C.-M., Carnoy, C., Décaudin, B., Damien, C., Hamoudi, M., Pinçon, C., Quelennec, K., Zanetti, S., Ravaux, P., & Standaert, A. (2019). Development and evaluation of a hybrid course in clinical virology at a faculty of pharmacy in Lille, France. *JMIR Medical Education, 5*(1). https://doi.org/10.2196/10766

Gould, D., Papadopoulos, I., & Kelly, D. (2014). Tutors' opinions of suitability of online learning programmes in continuing professional development for midwives. *Nurse Education Today, 34*(4), 613-618. https://doi.org/10.1016/j.nedt.2013.06.006

Hammond, D. A., Alexander, K., Rech, M. A., Grgurich, P., Mulherin, D. W., Gonzales, J. P., & Berger, K. (2019). Professional benefits of a web-based journal club for critical care residents and their mentors. *American Journal of Pharmaceutical Education, 83*(7), 1520-1527. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073413523&partnerID=40&md5=19ab865b37d419dc91964059edad8dc1

Hegestedt, R., Nouri, J., Rundquist, R., & Fors, U. (2023). Data-Driven School Improvement and Data-Literacy in K-12: Findings from a Swedish National Program. *International Journal of Emerging Technologies in Learning, 18*(15), 189-208. https://doi.org/10.3991/ijet.v18i15.37241

Henderson, S., Dalton, M., & Cartmel, J. (2016). Using Interprofessional Learning for Continuing Education: Development and Evaluation of the Graduate Certificate Program in Health Professional Education for Clinicians. *Journal of Continuing Education in the Health Professions, 36*(3), 211-217. https://doi.org/10.1097/CEH.0000000000000093

Hollingsworth, H. L., & Lim, C.-I. (2015). Instruction Via Web-Based Modules in Early Childhood Personnel Preparation: A Mixed-Methods Study of Effectiveness and Learner Perspectives. *Early Childhood Education Journal, 43*(2), 77-88. https://doi.org/10.1007/s10643-014-0642-9

Huang, B.-R. (2016). Transformation and framework of teacher professional development in Taiwan. *Policy Futures in Education, 14*(7), 926-942. https://doi.org/10.1177/1478210316666428

Jacobs, J., Scornavacco, K., Harty, C., Suresh, A., Lai, V., & Sumner, T. (2022). Promoting rich discussions in mathematics classrooms: Using personalized, automated feedback to support reflection and instructional change. Teaching and Teacher Education, 112. https://doi.org/10.1016/j.tate.2022.103631

Jiménez, J. E., & Gutierrez, N. (2017). Effects of online tutorial system on classroom and support in-service teachers in the Canary Islands for the early instruction of students at risk for mathematics difficulties; [Efectos de un sistema de aprendizaje tutorial online en profesorado tutor y de apoyo de las Islas Canarias para la instrucción temprana de las matemáticas en población de riesgo]. *Psychology, Society and Education, 9*(1), 45-59. https://doi.org/10.25115/psye.v9i1.463

Jiménez, J. E., & O'Shanahan, I. (2016). Effects of web-based training on Spanish pre-service and in-service teacher knowledge and implicit beliefs on learning to read. *Teaching and Teacher Education, 55*, 175 -187. https://doi.org/10.1016/j.tate.2016.01.006

Kao, C.-P., Wu, Y.-T., Chang, Y.-Y., Chien, H.-M., & Mou, T.-Y. (2020). Understanding Web-Based Professional Development in Education: The Role of Attitudes and Self-efficacy in Predicting Teachers' Technology-Teaching Integration. *Asia-Pacific Education Researcher, 29*(5), 405-415. https://doi.org/10.1007/s40299-019-00493-x

Karlsson, G., & Nilsson, P. (2019). A web-based guiding framework for student teachers' self-reflective practice. *International Journal of Web-Based Learning and Teaching Technologies, 14*(3), 39-54. https://doi.org/10.4018/IJWLTT.2019070104

Kawas, S., Vonessen, L., & Ko, A. J. (2019). Teaching accessibility: A design exploration of faculty professional development at scale. SIGCSE 2019 - Proceedings of the 50th ACM Technical Symposium on Computer

Science Education, 983-989. https://doi.org/10.1145/3287324.3287399

Khitrova, I. V., & Treshina, I. V. (2022). Distance Learning & English Language Teachers' Professional Development. *Professional Discourse & Communication, 4*(2), 90-111. https://doi.org/10.24833/2687-0126-2022-4-2-90-111

Kholoshyn, I., Nazarenko, T., Bondarenko, O., Hanchuk, O., & Varfolomyeyeva, I. (2021). The application of geographic information systems in schools around the world: a retrospective analysis. *Journal of Physics: Conference Series, 1840*(1), 012017. https://doi.org/10.1088/1742-6596/1840/1/012017

Kitching, F., Winbolt, M., MacPhail, A., & Ibrahim, J. E. (2015). Web-based social media for professional medical education: Perspectives of senior stakeholders in the nursing home sector. *Nurse Education Today, 35*(12), 1192-1198. https://doi.org/10.1016/j.nedt.2015.05.013

Kunicki, M., Staffen, M., Cushman, J. E., Lyons, R., Phelps, L., & Sullivan, K. (2022). A Self-Assessment Approach to Understanding 4-H Professional Development Needs in the Northeast. *Journal of Youth Development, 17*(3), 138-155. https://doi.org/10.5195/jyd.2022.1201

Lai, C., & Jin, T. (2021). Teacher professional identity and the nature of technology integration. *Computers & Education, 175*, 104314. https://doi.org/10.1016/J.COMPEDU.2021.104314

Lawdis, K., Baist, H., & Pittman, C. O. (2017). Use of online training modules for professional development with school-based therapists: Outcome project. *Journal of Occupational Therapy, Schools, and Early Intervention, 10*(3), 300-314. https://doi.org/10.1080/19411243.2017.1335261

Li, D., & Zhang, L. (2022). Exploring teacher scaffolding in a CLIL-framed EFL intensive reading class: A classroom discourse analysis approach. *Language Teaching Research, 26*(3), 333-360. https://doi.org/10.1177/1362168820903340

Lim, F. V., Cope, B., & Kalantzis, M. (2022). A Metalanguage for Learning: Rebalancing the Cognitive with the Socio-Material. *Frontiers in Communication, 7*, 830613. https://doi.org/10.3389/FCOMM.2022.830613/BIBTEX

Linde, I., Sarva, E., & Daniela, L. (2023). The Impact of an Online Professional Development Course on Teachers' Comprehension and Self-Efficacy in Developing Students' Self-Regulated Learning Skills. *Sustainability, 15*(12), 9408. https://doi.org/10.3390/SU15129408

Márquez-Hernández, V. V, Gutiérrez-Puertas, L., Granados-Gámez, G., Rodríguez-García, M. C., Gutiérrez-Puertas, V., & Aguilera-Manrique, G. (2019). Development of a web-based tool to evaluate competences of nursing students through the assessment of their clinical skills. *Nurse Education Today, 73*, 1-6. https://doi.org/10.1016/j.nedt.2018.11.010

Matuk, C., Gerard, L., Lim-Breitbart, J., & Linn, M. (2016). Gathering Requirements for Teacher Tools: Strategies for Empowering Teachers through Co-Design. *Journal of Science Teacher Education, 27*(1), 79-110. https://doi.org/10.1007/s10972-016-9459-2

Mitchell, J. T., Roy, G., Fritch, S., & Wood, B. (2018). GIS professional development for teachers: lessons learned from high-needs schools. *Cartography and Geographic Information Science, 45*(4), 292-304. https://doi.org/10.1080/15230406.2017.1421482

Mohammadi, M., Yousefi, M. H., & Salimi, A. (2023). Effects of Intercultural Sensitivity and Critical Thinking Trainings on Teachers' Professional Development. *Journal of Intercultural Communication Research, 52*(3), 334-356. https://doi.org/10.1080/17475759.2023.2199299

Moser, K. M., & Wei, T. (2023). Professional Development in Collaborative Online Spaces: Supporting Rural Language Teachers in a Post-Pandemic Era. *The New Educator, 19*(1), 1-32. https://doi.org/10.1080/1547688X.2023.2174279

Mueller, S. K., Pascal, C., Spiers, J., & Seely, E. W. (2023). Implementation and Utilization of a Web-Based Departmental Annual Faculty Review Program. *Journal of Continuing Education in the Health Professions, 43*(3), 198-204. https://doi.org/10.1097/CEH.0000000000000488

Pålsson, P., Cederborg, A., Johansson, M., Hult, H. V., Naredi, S., & Jood, K. (2024). Clinical supervisors' experience of a first-time application of entrustable professional activities in clinical supervision of medical students: findings from a Swedish pilot study. *BMC Medical Education, 24*(1). https://doi.org/10.1186/s12909-024-05211-w

Pasha, S. (2012). Readiness of Urban Primary Schools for Inclusive Education in Pakistan. *Journal of Research and Reflections in Education, 6*(2), 113-128. Retrieved from http://www.ue.edu.pk/journal.asp

Petrides, L., Jimes, C., & Karaglani, A. (2014). Assistant principal leadership development: A narrative capture study. *Journal of Educational Administration, 52*(2), 173-192. https://doi.org/10.1108/JEA-01-2012-0017

Platz, M., Krieger, M., Niehaus, E., & Winter, K. (2017). Electronic proofs in mathematics education - A South African Teacher Professional Development (TPD) course informing the conceptualisation of an e-proof system authoring support workshop. 2017 IST-Africa Week Conference, IST-Africa 2017. https://doi.org/10.23919/ISTAFRICA.2017.8102360

Powell, S. R., Berry, K. A., & Tran, L. M. (2020). Performance Differences on a Measure of Mathematics Vocabulary for English Learners and Non-English Learners with and without Mathematics Difficulty. *Reading & Writing Quarterly, 36*(2), 124-141. https://doi.org/10.1080/10573569.2019.1677538

Rakap, S., Jones, H. A., & Emery, A. K. (2015). Evaluation of a web-based professional development program (project ACE) for teachers of children with autism spectrum disorders. *Teacher Education and Special Education, 38*(3), 221-239. https://doi.org/10.1177/0888406414535821

Ramsden, R., Colbran, R., Christopher, E., & Edwards, M. (2022). The role of digital technology in providing education, training, continuing professional development and support to the rural health workforce. *Health Education, 122*(2), 126-149. https://doi.org/10.1108/HE-11-2020-0109

Raper, S. E., Resnick, A. S., & Morris, J. B. (2014). Simulated disclosure of a medical error by residents: Development of a course in specific communication skills. *Journal of Surgical Education, 71*(6), e116-e126. https://doi.org/10.1016/j.jsurg.2014.06.020

Raumer-Monteith, L., Kennedy, M., & Ball, L. (2023). Web-Based Learning for General Practitioners and Practice Nurses Regarding Behavior Change: Qualitative Descriptive Study. *JMIR Medical Education, 9*. https://doi.org/10.2196/45587

Rhode, J., Richter, S., & Miller, T. (2017). Designing Personalized Online Teaching Professional Development through Self-Assessment. *TechTrends, 61*(5), 444-451. https://doi.org/10.1007/s11528-017-0211-3

Salleh, K. M., & Sulaiman, N. L. (2019). The impact of organizational and professional development on human resource development practitioners in Malaysian organizations. *Journal of Social Sciences Research, 5*(3), 683-689. https://doi.org/10.32861/jssr.53.683.689

Sato, T., & Haegele, J. A. (2017). Professional development in adapted physical education with graduate web-based professional learning. *Physical Education and Sport Pedagogy, 22*(6), 618-631. https://doi.org/10.1080/17408989.2017.1310832

Shannon, D., Snyder, P., & McLaughlin, T. (2015). Preschool teachers' insights about web-based self-coaching versus on-site expert coaching. *Professional Development in Education, 41*(2), 290-309. https://doi.org/10.1080/19415257.2014.986819

Sharma, S. A., Kasten, W. C., Smolen, L. A., Gupta, A., Kidd, J. K., Wright, T. S., & Clifton, Y. (2016). Preparing culturally responsive teachers to meet the diverse needs in today's classroom: Phase one of A National Study of Literacy Teacher Educators. *International Journal of Pedagogy and Curriculum, 23*(2), 59-74. https://doi.org/10.18848/2327-7963/cgp/v23i02/59-74

Shawaqfeh, A. T., & Khasawneh, M. A. S. (2023). Incorporating Corpus Linguistics Tools in the Training and Professional Development of Lecturers in Translation Studies. *Studies in Media and Communication, 11*(7), 260-273. https://doi.org/10.11114/SMC.V11I7.6379

Shin, C. J., Yusof, Z. M., & Misiran, M. (2023). Perception of Undergraduate Students Toward Mode of Learning in Higher Education Institution: The Impact of COVID-19. *Asian Journal of Assessment in Teaching and Learning,* 13(2), 10–22. https://doi.org/10.37134/AJATEL.VOL13.2.2.2023

Sider, S., Maich, K., Specht, J., Treadgold, C., & Winger, H. (2023). "Choose Your Own Adventure": Web-Based Case Studies of Inclusive Education as a Form of Professional Learning for School Principals. *Journal of Research on Leadership Education, 18*(1), 132-154. https://doi.org/10.1177/19427751211046978

Smith, C., & Gillespie, M. (2023). Research on Professional Development and Teacher Change: Implications for Adult Basic Education. Review of Adult Learningand Literacy: VOLUME 7: Connecting Research, *Policy, and Practice, 7*, 205-244.

https://doi.org/10.4324/9781003417996-7/RESEARCH-PROFESSIONAL-DEVELOPMENT-TEACHER-CHANGE-IMPLICATIONS-ADULT-BASIC-EDUCATION-CRISTINE-SMITH-MARILYN-GILLESPIE

Spurava, G., & Kotilainen, S. (2023). Digital literacy as a pathway to professional development in the algorithm-driven world. *Nordic Journal of Digital Literacy, 18*(1), 48-59. https://doi.org/10.18261/NJDL.18.1.5

Stephens, M. (2014). 23 mobile things: Self-directed and effective professional learning. *Library Management, 35*, 582-593. https://doi.org/10.1108/LM-02-2014-0034

Tuan, H.-L., Yu, C.-C., & Chin, C.-C. (2017). Investigating the Influence of a Mixed Face-to-Face and Website Professional Development Course on the Inquiry-Based Conceptions of High School Science and Mathematics Teachers. *International Journal of Science and Mathematics Education, 15*(8), 1385-1401. https://doi.org/10.1007/s10763-016-9747-5

Ul-Abdin, Z., & Svensson, B. (2015). Towards teaching embedded parallel computing: An analytical approach. Workshop on Computer Architecture Education, WCAE 2015. https://doi.org/10.1145/2795122.2795130

Ull, A. C., & Agost, R. (2020). Communicative language teaching: Is there a place for L1 in L2 learning? A case study in Spain and Norway. *European Journal of Language Policy, 12*(1), 55-83. https://doi.org/10.3828/ejlp.2020.4

Vega, H., Howell, E., Kaminski, R., & Bates, C. C. (2024). Reaching teachers of early multilingual learners through professional development: a systematic literature review. *Journal of Multilingual and Multicultural Development*. https://doi.org/10.1080/01434632.2024.2322071

Whyte, S. (2014). Bridging the gaps: Using social media to develop technopedagogical competences in pre-service language teacher education. *Recherche et Pratiques Pedagogiques En Langues de Specialite - Cahiers de l'APLIUT, 33*(2), 143-169. https://doi.org/10.4000/apliut.4432

Williams, E., Fernandes, R. Del, Choi, K., Fasola, L., & Zevin, B. (2023). Learning Outcomes and Educational Effectiveness of E-Learning as a Continuing Professional Development Intervention for Practicing Surgeons and Proceduralists: A Systematic Review. *Journal of Surgical Education, 80*(8), 1139-1149. https://doi.org/10.1016/j.jsurg.2023.05.017

Wu, X. V., Selvam, U. P., Wang, W., Ang, E. N. K., Devi, K. M., Chan, Y. S., Wee, F. C., Zhao, S., Sehgal, V., & Chi, Y. (2022). A web-based clinical pedagogy program to promote professional development for nurse preceptors: A quasi-experimental study. *Nurse Education in Practice, 59*. https://doi.org/10.1016/j.nepr.2022.103288

Wuryaningsih, Susilastuti, D. H., Darwin, M., & Pierewan, A. C. (2019). Effects of web-based learning and F2F learning on teachers achievement in teacher training program in Indonesia. *International Journal of Emerging Technologies in Learning, 14*(21), 123-147. https://doi.org/10.3991/ijet.v14i21.10736

Xing, W., & Wang, X. (2022). Understanding students' effective use of data in the age of big data in higher education. *Behaviour and Information Technology, 41*(12), 2560-2577. https://doi.org/10.1080/0144929X.2021.1936176

Yang, S. (2018). Investigating teacher learning using a web-based writing platform. *Asia-Pacific Journal of Teacher Education, 46*(1), 78-97. https://doi.org/10.1080/1359866X.2016.1245408

Yeo, S. P. (2023). Teachers' Followership Behaviours and Principals' Leadership Effectiveness in Malaysian Public Secondary Schools: A Case Study in Sarawak Southern Region. *Asian Journal of Assessment in Teaching and Learning*, 13(1), 42–49. https://doi.org/10.37134/AJATEL.VOL13.1.5.2023

Yuan, B., Wang, M., Kushniruk, A. W., & Peng, J. (2017). Deep learning towards expertise development in a visualization-based learning environment. *Educational Technology and Society, 20*(4), 233-246. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-85032196209&partnerID=40&md5=fbd0ea5e4680b36dda2e8c7fb9432bfa

Zueger, P. M., Katz, N. L., & Popovich, N. G. (2014). Assessing outcomes and perceived benefits of a professional development seminar series. *American Journal of Pharmaceutical Education, 78*(8). https://doi.org/10.5688/ajpe788150

Acknowledgments

The authors wish to thank the UCSI University, Kuala Lumpur for supporting this research.

Authors contributions

Dr. Li Xiaochao & Dr. Adenan Ayob were responsible for research designing. Dr. Li Xiaochao & Hisbulloh Als Mustofa was responsible for data collection and literature review. Dr. Li Xiaochao & Dr. Adenan Ayob drafted the manuscript and Hisbulloh Als Mustofa revised it. All authors read and approved the final manuscript.

Funding

This study was not supported by any grants from funding bodies in the public, private, or not-for-profit sectors.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.