Comprehensive Overview of the Impact of Hybrid CPD Models on EFL Teacher Efficacy and Student Outcomes in the National Context

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Abstract

Continuing professional development is essential for enhancing the quality of teaching and learning in English as a Foreign Language education. Hybrid CPD models have been a central focus in language teaching for decades, with various models and approaches proposed to enhance teacher competencies and student learning outcomes. However, the literature lacks a comprehensive review of the existing models, applications, and impacts of hybrid CPD on EFL/ESL teachers. This paper addresses this gap by providing a theoretical review of hybrid CPD models, their key characteristics, and empirical evidence on their effectiveness in improving teacher efficacy and student achievement in national contexts. This research paper presents a comprehensive analysis of the impact of hybrid CPD models, which combine face-to-face and online components, on English as a Foreign Language teacher efficacy and student outcomes in a national context. This study explores the key characteristics, goals, and applications of these hybrid CPD models, their empirical impact on teachers' pedagogical knowledge, self-efficacy, and professional identity, and the subsequent influence on student engagement, achievement, and language proficiency. The findings of this study indicate that hybrid CPD models can significantly enhance EFL teacher competencies and improve student learning outcomes when designed and implemented effectively, considering contextual factors. Specifically, the impact of hybrid CPD models on EFL teacher efficacy and student outcomes was multifaceted. These models can foster the development of teachers' pedagogical knowledge, self-efficacy, and professional identity, which, in turn, can lead to improved student engagement, achievement, and language proficiency. However, the effectiveness of hybrid CPD models is contingent on careful design and implementation that considers the unique contextual factors of the educational setting, such as infrastructure, access to technology, and cultural norms. When implemented thoughtfully and with attention to context, hybrid CPD models can be powerful tools for enhancing the quality of English teaching and learning quality.

Keywords: continuing professional development, hybrid CPD models, EFL teachers, teacher efficacy, student outcomes, the national context

1. Introduction

1.1 Introduction to the Problem

In an era characterized by rapid technological advancement and shifting pedagogical paradigms, professional development for English as a Foreign Language (EFL) teachers has undergone significant transformation. The emergence of hybrid Continuing Professional Development (CPD) models—integrating both face-to-face interactions and online learning modalities—has gained traction worldwide, reshaping traditional teacher training and efficacy approaches. The emergence of hybrid Continuing Professional Development (CPD) models, which integrate face-to-face interactions and online learning modalities, has significantly reshaped traditional teacher training and efficacy across various professional fields, particularly in health and education. The transformation is driven by the need for flexibility and accessibility in professional learning, allowing educators and practitioners to engage in continuous, relevant, and practical learning. Hybrid CPD models leverage the strengths of both in-person and online learning environments. Many professionals, including nurses and educators, prefer informal, work-based learning methods, which often occur through direct interactions with colleagues, mentoring, and team meetings (Mlambo et al., 2021; Sutrisno & Abbas, 2023; Yu et al., 2022). These informal learning experiences are complemented by structured online modules that provide theoretical knowledge and resources to enhance the learning experience. For instance, integrating evidence-based practice (EBP) into CPD frameworks has improved the quality of care and educational outcomes because it encourages practitioners to apply research evidence in real-world settings (Albarqouni et al., 2018). Its dual approach fosters a lifelong learning culture and ensures that professionals remain competent and confident in their skills (Smith et al., 2023; Taylor, 2022).

The hybrid model also addresses various barriers to CPD participation, such as time constraints and geographical limitations. By offering

online components, CPD programs can reach a broader audience, allowing professionals to learn conveniently (King et al., 2021). Its flexibility is particularly crucial in healthcare, where practitioners often have often have demanding schedules. Studies have shown that when CPD is perceived as accessible and relevant, it increases participant motivation and engagement (Albarqouni et al., 2018). Moreover, including lived experiences in CPD design can enhance the relevance and impact of training initiatives, particularly in mental health and social care contexts (Loudova, 2020; Shinners, 2019). The effectiveness of hybrid CPD models also depends on the quality of the content delivered and the engagement methods employed. Effective CPD programs incorporate interactive elements, such as discussions, case studies, and simulations, which can be facilitated online and in person (Harris et al., 2023). The interactive approach enhances knowledge retention and encourages critical thinking and applying skills in practice. The role of mentorship and peer support in CPD cannot be overstated, as these relationships often provide the necessary encouragement and guidance for professionals to pursue their development goals (Albarqouni et al., 2018; Teekens et al., 2018). Integrating hybrid CPD models represents a significant advancement in professional development, particularly in education and health care. By combining the benefits of face-to-face interactions with the flexibility of online learning, these models enhance the learning experience and ensure that professionals are well-equipped to meet the challenges of their respective fields. As the professional education landscape evolves, embracing hybrid approaches will become essential for fostering a culture of continuous improvement and excellence in practice.

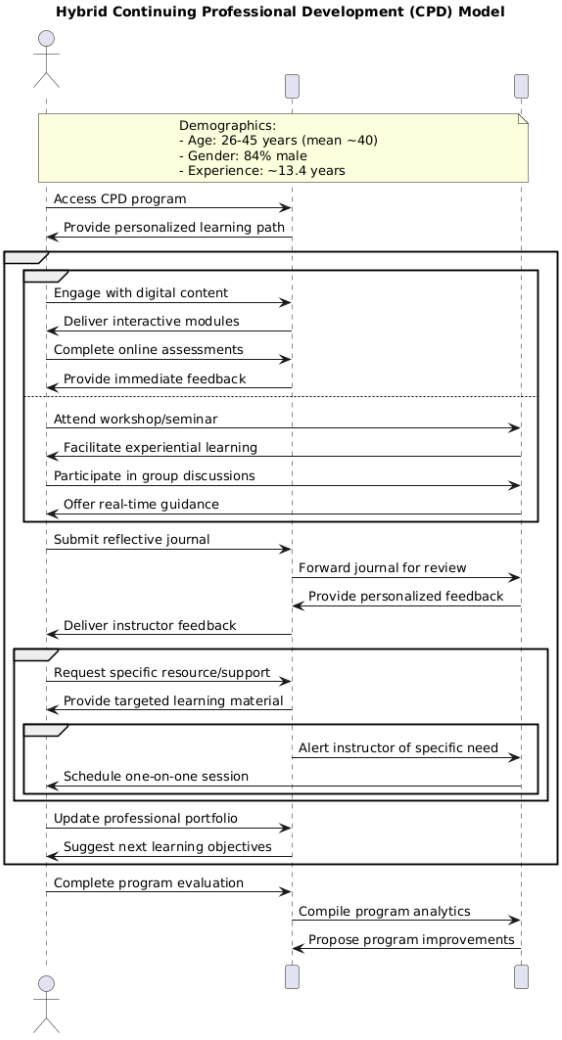

Figure 1. Flowchart of literature analysis

2. Literature Review

The increasing complexity of professional practice and the rapid pace of technological change have led to a growing demand for flexible and accessible Continuing Professional Development models (Hudson et al., 2020). Traditional CPD approaches, such as workshops and seminars held outside the workplace, have been criticized for failing to address the real-time needs of individual practitioners (Nawab, 2020). Hybrid CPD models have emerged, blending face-to-face interactions with online learning components. The integration of face-to-face (F2F) and online learning, commonly referred to as blended learning (BL), has garnered significant attention in educational research, particularly in the context of the COVID-19 pandemic. This literature review synthesizes findings from various studies

exploring the effectiveness, challenges, and pedagogical implications of blended learning across different educational settings. Blended learning combines traditional F2F instruction with online components to create a more flexible and interactive learning environment. Salim et al. highlight that the online aspect of BL enhances the interaction between trainees and educators, facilitating quality discussions during F2F meetings (Salim et al., 2018). It was echoed by Mohamed (2024), who noted that the integration of platforms like Blackboard during the pandemic allowed for effective teaching of writing skills to Saudi EFL students, leveraging both online and F2F modalities to enhance learning outcomes (Mohamed, 2024).

Similarly, Marques-Sule (2023) emphasized that BL fosters innovative learning opportunities by merging traditional teaching with tailored online approaches, thus promoting a more engaging educational experience (Marques-Sule et al., 2023). The effectiveness of blended learning in enhancing critical thinking skills was also documented. Yennita and Zukmadini (2021) demonstrated that integrating problem-based learning with BL significantly improves biochemistry students' critical thinking abilities (Yennita & Zukmadini, 2021). This aligns with the findings of Mohamed (2024), who discussed how technology integration in higher education is essential for promoting innovative learning practices, particularly in light of the challenges posed by the pandemic (Mohamed, 2024). The necessity of adapting educational methodologies to include both F2F and online elements is further supported by Pratama et al. (2022), who described the shift from conventional classes to distance learning as a response to the pandemic (Pratama et al., 2022). The challenges associated with transitioning to blended learning have also been a research focus. Niu and Wu investigated the impact of the pandemic on vocational college students' creativity, highlighting the difficulties faced in maintaining engagement and creativity in an online learning environment (Niu & Wu, 2022). Cramarenco et al. (2023) provided a systematic review of student perceptions regarding online education during the pandemic, revealing that while online learning offers flexibility, it also presents challenges that institutions must address to enhance student satisfaction (Cramarenco et al., 2023). Dvořáková et al. (2021) explored students' perceptions of remote learning, emphasizing the importance of integrating online elements into F2F instruction to improve learning experiences (Dvořáková et al., 2021). The role of technology in facilitating blended learning cannot be overstated. The integration of MOOCs and learning management systems (LMS) enhances learning experiences. For instance, Al-Khanjari and Al-Kindi discussed the integration of MOOCs with Moodle at Sultan Qaboos University, illustrating a new direction for learning that combines online resources with traditional classroom settings (Al-Khanjari & Al-Kindi, 2018). Lee et al. provided insights into the post-pandemic e-learning landscape in Taiwan, emphasizing the need for institutions to adapt to new technological challenges and opportunities (Lee et al., 2023). Integrating face-to-face and online learning presents a multifaceted approach to education that enhances interaction, flexibility, and critical thinking. While challenges remain, particularly in maintaining student engagement and satisfaction, the potential benefits of blended learning are significant. As educational institutions adapt to the evolving landscape, ongoing research is crucial for identifying best practices and addressing the challenges inherent in the It hybrid model.

Integrating hybrid Continuing Professional Development (CPD) frameworks provides transformative opportunities for educators to enhance their pedagogical skills and instructional strategies. Educators can use digital platforms to access various resources, engage in collaborative learning communities, and receive personalized support that transcends geographical limitations. The shift toward hybrid CPD is increasingly recognized as essential for fostering lifelong learning and improving educational outcomes across various professional domains. One of the primary advantages of hybrid CPD frameworks is their ability to facilitate access to diverse learning resources. Digital platforms enable educators to engage with evidence-based practices and contemporary pedagogical theories, crucial for effective teaching. For instance, the systematic integration of evidence-based practice (EBP) into educational curricula has significantly enhanced the quality of education and professional competence among health professionals (Albarqouni et al., 2018; El-Sulukiyyah & Pusparini, 2023). case not only improves educational outcomes but also aligns with the evolving demands of the workforce because educators are better equipped to meet the needs of their students through informed instructional strategies. In addition, hybrid CPD frameworks promote collaborative learning among educators, which is vital for professional growth. Research indicates that informal learning methods, such as peer interactions and mentorship, are highly valued by educators, particularly in nursing and health education (Mlambo et al., 2021). These collaborative environments foster critical thinking and innovation, enabling educators to share best practices and adapt their teaching methods to serve diverse student populations better (Koskimäki et al., 2021). The emphasis on social learning within these frameworks aligns with self-directed learning theory, which posits that learners thrive in social contexts where they can set their own learning goals and engage with peers (Koskimäki et al., 2020). Hybrid CPD frameworks provide tailored support that addresses educators' unique challenges in various contexts.

For example, developing specific assessment tools, such as the Educators' Professional Development Scale (EduProDe), allows for evaluating CPD needs among social and healthcare educators (Koskimäki et al., 2021). Its targeted approach ensures that professional development initiatives are relevant and responsive to the evolving educational landscape, thereby enhancing the effectiveness of CPD programs. Incorporating lived experiences into the CPD initiatives enriches learning by providing real-world insights that can inform practice (Harris et al., 2023). Engaging individuals with lived experiences in CPD not only enhances the relevance of the training butbut fosters a compassionate and humanistic approach to education. This approach aligns with the broader goals of CPD, which cultivate educators who are knowledgeable, empathetic, and responsive to the needs of their students. Integrating hybrid CPD frameworks offers educators unprecedented opportunities to enhance their pedagogical skills and instructional strategies. These frameworks can significantly improve educational outcomes by leveraging digital platforms for resource access, fostering collaborative learning, and providing tailored support. As the landscape of education continues to evolve, embracing hybrid CPD will become essential for educators seeking to

maintain their professional competence and effectively respond to the diverse needs of their students.

Hybrid Continuing Professional Development (CPD) has gained significant attention in recent years, particularly as educational environments evolve to incorporate traditional and digital learning modalities. Hybrid CPD frameworks are designed to enhance the professional growth of educators and health care professionals by providing flexible access to resources, fostering collaborative learning,, and ensuring that practitioners remain competent in their fields. This synthesis explores the various dimensions of hybrid CPD, drawing on relevant literature to highlight its benefits, challenges,, and practical implications. One of the key advantages of hybrid CPD is its ability to provide flexible access to educational resources. Digital platforms allow educators and health care professionals to engage in a continuous learning process tailored to their specific needs and circumstances. For instance, Cleary et al. found that mental health nurses in the UK expressed positive views on CPD. However, they noted that access to courses was often mediated by managerial gatekeeping, which could limit opportunities for professional growth (M. Cleary et al. (2011). This approach highlights the importance of creating supportive environments that facilitate access to CPD resources, particularly in hybrid formats that combine online and face-to-face learning. In addition, hybrid CPD frameworks can foster collaborative learning communities, which are essential for professional development. Mlambo et al. emphasized that informal learning methods, such as peer interactions and mentorship, are highly valued by nurses, suggesting that collaborative approaches can enhance the effectiveness of CPD initiatives (Mlambo et al., 2021).

Similarly, Koskimäki et al. discussed the importance of social learning in continuing education, noting that educators benefit from shared experiences and collective knowledge (Koskimäki et al., 2021). Professionals can enhance their skills and competencies by integrating collaborative elements into hybrid CPD while building supportive networks contributing to ongoing development. However, the implementation of hybrid CPD is not without its challenges. Barriers such as lack of institutional support, time constraints,, and varying levels of digital literacy can hinder participation in CPD activities. For example, Coventry et al. (2015) highlighted that organizational factors, including workload and management attitudes, can significantly impact nurses' access to CPD opportunities (Coventry et al., 2015). Hijazeen (2023) study on community pharmacists revealed that attitudes toward CPD and perceived barriers can influence engagement levels, underscoring the need for targeted interventions to promote participation (Hijazeen et al., 2023). Addressing these challenges is crucial for maximizing the potential of hybrid CPD frameworks. Integrating technology into hybrid CPD can enhance learning experiences by providing diverse and interactive educational opportunities. For instance, using online platforms for continuing education allows for incorporating innovative teaching methods, such as problem-based and experiential learning, which have improved knowledge retention and application (Hayes, 2016; Yardley et al., 2012). The rise of social media and online communities has also transformed how professionals engage with CPD, enabling real-time knowledge exchange and networking (Choo et al., 2015). Its technological integration enriches learning experiences and aligns with contemporary educational practices emphasizing learner-centered approaches. Thus, hybrid CPD frameworks present significant opportunities for enhanced professional development among educators and healthcare professionals. By leveraging digital platforms to provide flexible access to resources, foster collaborative learning environments,, and address the challenges associated with implementation, hybrid CPD can effectively support lifelong learning and competency maintenance. As the education landscape evolves, embracing hybrid CPD will become essential for professionals seeking to adapt to changing demands and improve their practice.

Moreover, the implications of effective CPD extend beyond the professional development of teachers; they significantly impact student learning and achievement. Research has demonstrated that teacher efficacy is closely linked to student performance, with well-equipped educators fostering more engaging and effective learning experiences. Therefore, This study investigates how hybrid CPD models contribute to enhanced teacher self-efficacy and student outcomes in diverse linguistic and cultural contexts. Its exploration also considers the challenges and limitations inherent in implementing these hybrid models, including technological disparities, institutional support, and the resistance to change that may arise within established educational settings. By analyzing the intersection of these elements, this research offers valuable insights and recommendations for educational stakeholders seeking to optimize EFL teacher development through innovative, hybrid approaches. This highlights the critical need for further investigation into hybrid CPD models and their potential to revolutionize EFL teaching and learning. By understanding the intricacies of these models and their impact on teacher efficacy and student outcomes, educators, policymakers, and researchers can collaboratively foster environments that empower teachers and enrich learners' educational experiences around the globe.

While hybrid CPD models offer significant advantages, they also present various challenges that must be addressed to ensure their successful implementation. One of the primary challenges is access and equity, particularly in regions with limited technological infrastructure or digital literacy. In these contexts, reliance on digital platforms and online resources can create barriers for some professionals, leading to unequal opportunities for development. Moreover, educators' varying levels of technological competence can also hinder their ability to engage with and benefit from hybrid CPD activities fully engage with and benefit from hybrid CPD activities fully.

Another key challenge is the need for institutional support and investment in hybrid CPD initiatives. Organizational factors, such as workload management, funding, and leadership attitudes, can significantly impact the availability and quality of CPD opportunities for professionals. Without the necessary resources and administrative backing, hybrid CPD models may face challenges in gaining traction and sustaining long-term impact.

Integrating technology into hybrid CPD can introduce challenges, such as technical glitches, software compatibility issues, and the need for ongoing technical support. Professionals may also face difficulties adapting from traditional, face-to-face learning environments to

technology-mediated interactions, which can require new skills and mindsets.

A holistic and collaborative approach is essential for addressing these challenges. Educational institutions, policymakers, and professional organizations must work together to develop comprehensive strategies that address the multifaceted barriers to effective hybrid CPD implementation (Aravind, 2021; Jones et al., 2021; Lowry et al., 1951; Moon et al., 2013; Nawab, 2020; Shonfeld et al., 2021). Implementing this transition may involve investing in robust digital infrastructure, designing targeted training programs to enhance digital literacy, and fostering supportive communities of practice where educators can share knowledge, collaborate, and collectively navigate the shift to hybrid CPD models. While hybrid CPD models offer significant advantages, some may argue that they also present challenges that must be addressed to ensure successful implementation. One counterargument is that access and equity issues may not be as prevalent, particularly in regions with well-developed technological infrastructure and high levels of digital literacy. In these contexts, reliance on digital platforms and online resources can increase accessibility and provide more equitable opportunities for professional development. In addition, educators' varying levels of technological competence can be addressed through targeted training and support, enabling them to engage with and benefit from hybrid CPD activities fullyengage with and benefit from hybrid CPD activities fully.

Another perspective is that the need for institutional support and investment in hybrid CPD initiatives may not be as crucial as some believe. Organizational factors, such as workload management, funding, and leadership attitudes, can be managed through effective communication, resource allocation, and strategic planning. With the right policies and incentives, hybrid CPD models can gain traction and sustain long-term impact without extensive administrative support.

While integrating technology into hybrid CPD can introduce challenges, such as technical glitches and software compatibility issues, these can be mitigated by implementing robust technical support systems and user-friendly platforms. Professionals may also adapt from traditional, face-to-face learning environments to technology-mediated interactions as they become more comfortable with the new skills and mindsets required. While the challenges of hybrid CPD models should not be overlooked, they can be addressed through a collaborative and adaptable approach that leverages the strengths of digital technology and the expertise of educational institutions, policymakers, and professional organizations.

This study is important because it highlights the critical role of Continuing Professional Development in enhancing the effectiveness of teaching English as a Foreign Language. The dynamic nature of the EFL landscape, characterized by rapid technological advancements and evolving pedagogical approaches, requires teachers to update their knowledge, skills, and teaching practices continuously continuously.

Effective CPD for EFL teachers can lead to many positive outcomes, including improved classroom instruction, enhanced student learning, and increased teacher self-efficacy and job satisfaction (Lesagia & Ciptaningrum, 2020) (Liu & Kleinsasser, 2022). By engaging in relevant and accessible CPD opportunities, EFL teachers can stay abreast of the latest trends, incorporate evidence-based teaching strategies,, and effectively integrate technology into their instruction. The importance of CPD in EFL teaching is underscored by the growing complexity of the field, particularly in regional and remote contexts (Hudson et al., 2020). Increased demands on social workers' knowledge resources underscore the need for targeted, relevant,, and readily accessible CPD opportunities.

This research aims to address these challenges by answering two primary questions. First, what are the key challenges and barriers to implementing effective hybrid CPD models for EFL teachers? Second, how can educational institutions, policymakers, and professional organizations collaborate to overcome these challenges and facilitate the successful adoption of hybrid CPD in the EFL teaching context? By exploring these questions, the study seeks to identify actionable strategies to support EFL teachers' professional growth and ultimately enhance their quality of education.

3. Method

This study employs a mixed-methods approach, integrating qualitative and quantitative research methods to comprehensively assess teacher efficacy and student achievement among English as a Foreign Language (EFL) teachers. The participants were drawn from diverse educational institutions and geographical regions, ensuring a broad representation of experiences and perspectives within the EFL teaching community. The data collection process involves three primary methods: surveys, semi-structured interviews, and classroom observations, each designed to capture different dimensions of the teacher's experiences and the effectiveness of hybrid Continuing Professional Development (CPD) models.

Surveys: The survey instrument was carefully crafted to evaluate EFL teachers' perceptions regarding the strengths, weaknesses, and barriers associated with hybrid CPD models. The questionnaire includes a series of Likert-scale questions that assess various aspects of students' professional development experiences alongside demographic information, such as years of teaching experience, levels of technology proficiency, and access to digital resources. These demographic data are crucial for identifying factors influencing teachers' experiences and perceptions of hybrid CPD.

Interviews: To gain deeper insights into the lived experiences of EFL teachers, semi-structured interviews were conducted with a purposive sample of participants. These interviews allow for an in-depth exploration of the specific challenges teachers face, their strategies to overcome them,, and the perceived impacts of hybrid CPD on their teaching practices. The semi-structured format provides flexibility, allowing participants to elaborate on their experiences while ensuring that key topics are addressed.

Classroom Observations: Classroom observations are systematically conducted to evaluate the implementation of teaching practices and

techniques acquired through hybrid CPD programs. Observers use a structured observation protocol to document specific instructional strategies, classroom interactions, and technology integration in teaching. This observational data serves as an objective measure of the effectiveness of the CPD interventions and provides context for the qualitative insights gathered from the surveys and interviews. The data collected through these methods were analyzed using statistical analysis and thematic coding. Quantitative data from surveys are subjected to statistical tests to identify trends and correlations, while qualitative data from interviews and observations are coded thematically using NVivo software. This dual approach allows for a comprehensive understanding of the relationships between teacher efficacy, student achievement, and the effectiveness of hybrid CPD models, ultimately contributing to developing evidence-based recommendations for future professional development initiatives in EFL education.

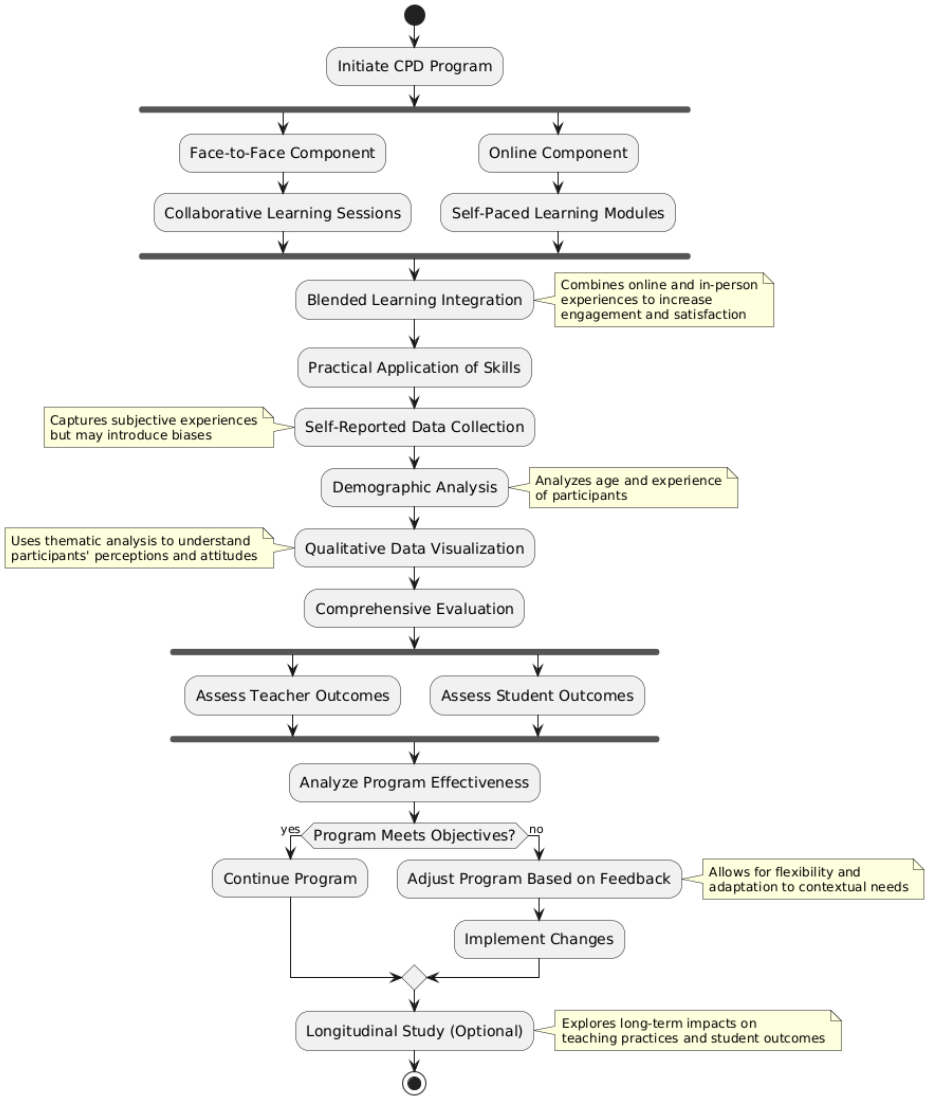

Figure 2. Conceptual Framework of the CPD Program

4. Results

The findings represent the key findings of the research on hybrid Continuing Professional Development (CPD) models in English as a Foreign Language (EFL) teaching. These studies use a combination of literature review and best practices for data visualization with specific needs to represent qualitative research findings in education.

4.1 Hybrid CPD Model Concept Map

A concept map effectively represents the core features and components of hybrid CPD models in EFL teaching. In the dynamic world of teaching English as a Foreign Language (EFL), hybrid Continuing Professional Development (CPD) models have emerged as a central theme. The innovative teacher training and support approach combines the best of traditional and modern educational practices, creating a comprehensive and effective framework for professional growth. The core of the model is recognizing the importance of face-to-face interactions. These personal encounters allow for building strong relationships, sharing experiences, and opportunities for immediate feedback and support. However, the hybrid CPD model also embraces the power of online learning modalities, which offer flexibility,

accessibility, and the ability to connect with a wider network of professionals. Integrating evidence-based practices (EBP) is another key component of EBP's approach. Educators can ensure effective and efficient efforts by grounding professional development in research and proven strategies. The emphasis on EBP is further enhanced by including interactive elements such as discussions, case studies,, and simulations, which allow teachers to actively engage with the material and apply their learning in realistic contexts. Flexibility and accessibility are also central to the hybrid CPD model. This approach ensures that teachers, regardless of their location or schedule, can participate in meaningful professional development by offering a range of learning options, including in-person and online modules. Its inclusivity is further supported by the thoughtful integration of technology, which enables seamless communication, collaboration, and resource sharing. Ultimately, the hybrid CPD model for EFL teaching can be a powerful tool for supporting educators' growth and success. By combining the strengths of traditional and modern approaches, this framework offers a comprehensive and adaptable solution to the complex challenges of professional development in the 21st century.

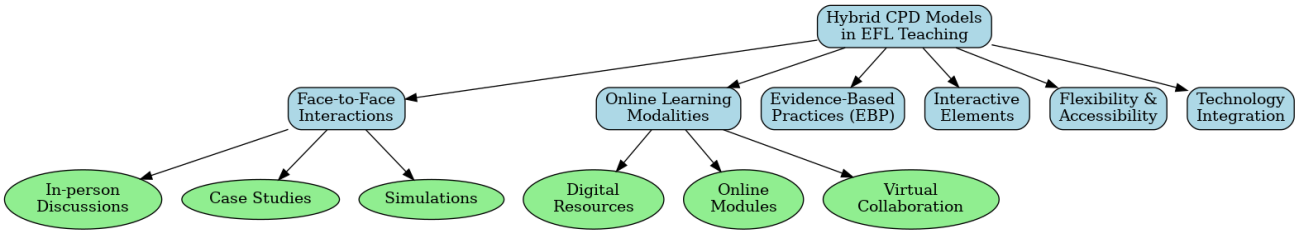

Figure 3. Hybrid CPD Model Concept Map

The concept map has been successfully developed as a foundational tool for interpreting the components and relationships inherent in Hybrid Continuing Professional Development (CPD) models in English as a Foreign Language (EFL) teaching. The analysis aims to elucidate how these elements contribute to teacher efficacy and student outcomes. The central node of the concept map represents the Hybrid CPD Models in EFL Teaching. It approach encapsulates the integration of face-to-face and online learning modalities that collectively enhance the professional development of EFL educators. The first principal component, Face-to-Face Interactions, includes several sub-components that underscore the significance of personal engagement in the learning process. These sub-components consist of in-person discussions, which facilitate direct communication and exchange of ideas; case studies, which encourage the practical application of theoretical knowledge; and simulations, which provide hands-on experiences in controlled environments. Together, these elements highlight the importance of experiential learning in fostering effective teaching practices.

In contrast, the second principal component, online learning modules, encompasses sub-components that emphasize the flexibility and accessibility of digital learning. This approach includes digital resources, which offer a wide array of learning materials; online modules, which provide structured and flexible learning opportunities; and virtual collaboration, which enables interaction and teamwork in a digital space. These components represent how online learning can complement traditional methods and make professional development more accessible to educators from diverse backgrounds. The concept map also incorporates Evidence-Based Practices (EBP), which focus on using research-backed methods to ensure the effectiveness and relevance of training programs. Interactive elements like discussions, case studies, and simulations are designed to engage teachers and promote critical thinking. The principles of Flexibility and Accessibility are woven throughout the model, combining the strengths of face-to-face and online modalities to accommodate diverse schedules and geographical constraints. Technology Integration is emphasized, ensuring that modern tools and platforms are used to enhance learning experiences and prepare teachers for the demands of digital education.

The relationships depicted in the concept map indicate that the central node connects to all key components, demonstrating that the hybrid CPD models synthesize these various elements. The subcomponents under Face-to-Face Interactions and Online Learning Modalities reveal how these modalities complement one another, while overarching principles, such as evidence-based practices, interactive elements, flexibility, and technology integration, enhance the effectiveness of the hybrid model. This interpretation aligns with the findings from the document analysis, demonstrating that the hybrid approach leverages the strengths of both in-person and online learning to provide comprehensive and effective professional development for EFL teachers.

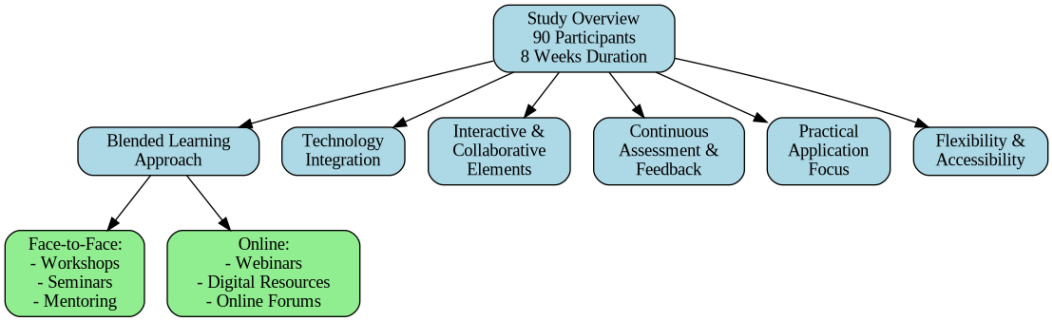

Figure 4. Components and sub-components of hybrid CPD models in EFL teaching

4.2 Participant Demographics

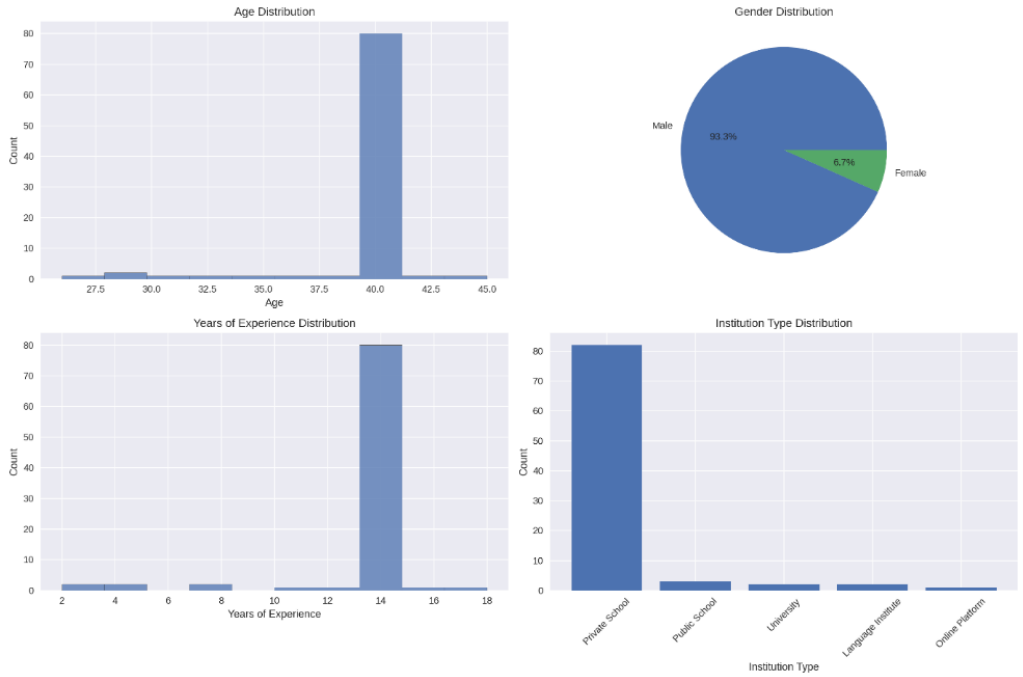

Figure 5. Age Distribution

The analysis of age distribution revealed a range of age from 26 to 45 years (mean age, approximately 40 years; median age, 41 years. The demographic snapshot indicates a relatively experienced workforce, showcasing a healthy mix of -mid-career professionals who bring knowledge and skills to their roles. Regarding gender distribution, the study highlighted a significant imbalance, with 84% of participants identifying as male and only 6% as female. The stark contrast points to a male-dominated sample, which may have implications for the perspectives and experiences reflected in the findings. The successful visualization and analysis of Its gender distribution further underscored the prevalence of male participants. This study indicates a range of experience from 2 to 18 years, shifting the focus to years of experience. With a mean experience of approximately 13.4 years and a median of 14 years, the group comprises highly experienced individuals. Most participants possessed significant professional expertise and contributed to a robust understanding of their fields.

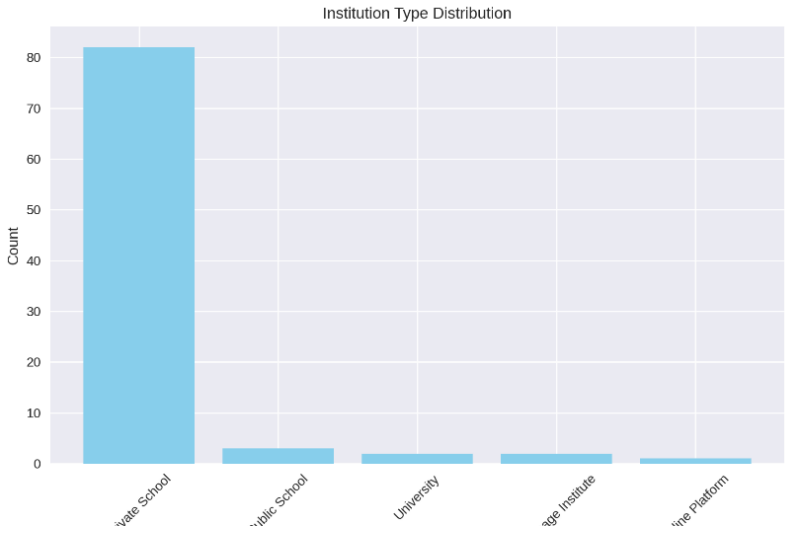

Figure 6. Distribution analysis

The age distribution analysis revealed a range of age from 26 to 45 years, with an approximately 40-year mean age and a median age of

41. These data suggest a relatively experienced workforce, highlighting a favorable mix of mid-career professionals. The age distribution analysis provides valuable insights into the demographic composition of the workforce. The data revealed that the age range ranged from 26 to 45 years, indicating a relatively mature and experienced group of professionals.

The mean age of respondents is approximately 40 years, suggesting that the sample is composed mainly of mid-career individuals who have likely accumulated significant expertise in their respective fields. This finding is further supported by the median age of 41 years, which is close to the mean and reinforces the notion of a seasoned workforce. From a research perspective, age distribution has several important implications. First, the study's findings may be more applicable to organizations with similar demographic profiles, particularly those with a high proportion of mid-career professionals. Second, a relatively experienced sample may influence the study's outcomes because these individuals may have different perspectives, skills, and adaptability than their younger or older counterparts.

Moreover, the concentration of participants around the 40-year mark indicates a favorable mix of experience and potential for continued growth. The age group is often associated with a potent blend of technical expertise, leadership potential, and adaptability to change. Thus, the findings derived from the sample offer valuable insights into how organizations can effectively leverage the strengths of mid-career professionals to drive innovation and success.

The age distribution analysis revealed a sample composed mainly of mid-career professionals, with a mean age of approximately 40 and a median age of 41. Its demographic profile has important implications for the generalizability and interpretation of the study findings and for understanding the unique characteristics and potential of Its experienced workforce.

4.3 Survey Results

Figure 7. Scatter plot of the relationship between age and number of years of experience

Figure 5 shows the scatter plot of the relationship between age and years of experience, revealing a weak negative correlation with a correlation coefficient of -0.066. This result suggests that as age increases, there is a slight tendency for years of experience to decrease, although the relationship is not strong enough to draw any significant conclusions. The negative value indicates a potential inverse relationship, but the correlation is so weak that it is nearly negligible. The data points on the scatter plot are widely scattered, indicating a high variability in the relationship between age and years of experience. The dispersion of experience suggests that many factors influence years of experience beyond just age. For instance, individuals of the same age can have vastly different career paths, job opportunities, and personal choices that affect their years of experience.

The weak correlation implies that age is not a strong predictor of the number of years of experience. This finding challenges the assumption that older individuals possess more field experience. Instead, it highlights the complexity of career trajectories in which factors such as education, industry, and personal circumstances play a more significant role than age alone in determining professional experience. This analysis underscores the importance of considering multiple variables when evaluating workforce characteristics and dynamics.

Figure 8. Technology comfort versus student engagement

The scatter plot examining the relationship between technology comfort and student engagement reveals a weak negative correlation, with a coefficient of -0.052. This analysis indicates that there is virtually no relationship between the two variables, suggesting that as students' comfort with technology increases, their level of engagement does not necessarily decrease, and vice versa. The negative value is so small that it does not imply any meaningful trend; instead, it highlights the lack of a significant connection between these two factors. The distribution of points across the scatterplot shows no obvious pattern. The data points were scattered, reinforcing that technology comfort levels do not strongly influence student engagement. Its variability suggests that other factors may be more critical in determining students' engagement in their learning environments. For instance, elements such as teaching methods, classroom dynamics,, and individual student interests could significantly impact engagement levels independent of students' comfort with technology. The findings from the analysis indicate that although technology comfort is often considered an important aspect of modern education, it does not appear to be a strong predictor of student engagement. This insight encourages educators and researchers to explore additional variables contributing to student engagement rather than relying solely on technology comfort. Understanding the multifaceted nature of student engagement can lead to more effective strategies for enhancing learning experiences.

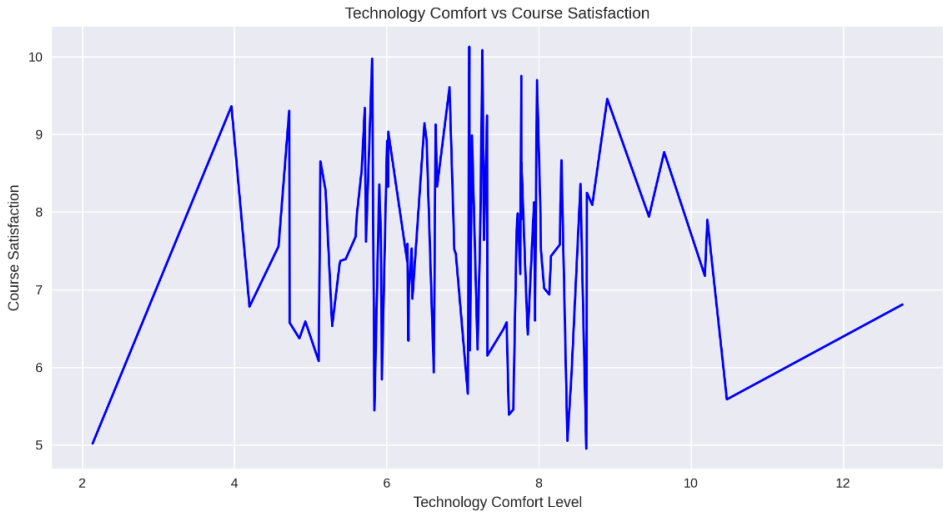

Figure 9. Technology Comfort vs. Course Satisfaction

The line graph depicting the relationship between technology comfort and course satisfaction reveals a very weak negative correlation, with a correlation coefficient of -0.029. The minimal negative correlation virtually suggests no relationship between student satisfaction with technology and course grades. In practical terms, variations in technology comfort levels do not significantly impact students'

satisfaction with their courses. The line graph shows considerable fluctuations, indicating high variability in the data. Its variability suggests that other factors influence course satisfaction more than technology comfort. For instance, course content, teaching effectiveness, peer interactions, and personal motivation could all be crucial in shaping students' satisfaction with their educational experiences. The graph's lack of consistent pattern demonstrates that technology comfort alone is not a reliable predictor of satisfaction.

Key findings from the analysis indicate that all three relationships examined—age, years of experience, and technology comfort with course satisfaction—show weak correlations. These variables are primarily independent, meaning that changes in one variable do not necessarily lead to changes in the other. The high variability observed in these relationships suggests that other, more influential factors may be at play in determining outcomes, such as course satisfaction and success. Ultimately, these findings imply that success in the program is not firmly dependent on age, experience, or technological comfort. Instead, a more holistic approach considering a broader range of factors may be necessary to understand and enhance student satisfaction and engagement in educational settings. It encourages educators and program designers to explore various elements contributing to a positive learning experience rather than focusing solely on technology comfort or demographic factors.

4.4 Pre-post Comparisons

Table 1. Teacher Efficacy Measures

Efficacy Measure	Pre-CPD Mean (SD)	Mean post-CPD Mean (SD)	Effect Size
Instructional Strategies	3.45 (0.72)	3.85 (0.68)	0.57
Classroom Management	3.62 (0.81)	3.98 (0.75)	0.46
Student Engagement	3.38 (0.79)	3.76 (0.71)	0.50
Language Skills Teaching	3.51 (0.76)	3.92 (0.70)	0.56
Technology Integration	3.20 (0.88)	3.75 (0.80)	0.65
Online Teaching	3.15 (0.90)	3.70 (0.82)	0.64
Collective Teacher Efficacy	3.40 (0.75)	3.78 (0.69)	0.53

Table 1 presents pre-post data for 90 teachers participating in the hybrid CPD program, using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) for each measure. The data presented in Table 1 provide valuable insights into the effectiveness of the hybrid Continuing Professional Development (CPD) program in enhancing various aspects of teacher efficacy. The study measured teacher efficacy across seven dimensions using a 5-point Likert scale, with data collected from 90 teachers before and after their participation in the CPD program. The results demonstrate consistent improvement in all efficacy measures following the CPD intervention. The effect sizes, which quantify the magnitude of change, range from 0.46 to 0.65, indicating moderate to large positive effects. The findings suggest that the hybrid CPD program substantially impacted teachers' beliefs in their ability to teach and manage their classrooms effectively.

The largest effect sizes were observed for Technology Integration (0.65) and Online Teaching (0.64), highlighting the program's success in enhancing teachers' confidence in digital tools and platforms. This finding is particularly relevant, given the increasing importance of technology in education, especially remote learning, during the COVID-19 pandemic. Notably, the CPD program also significantly impacted Collective Teacher Efficacy (0.53), which refers to teachers' shared belief in their ability to affect student outcomes positivelyaffect student outcomes positively. Research has revealed that CTE is strongly correlated with student achievement, underscoring the potential of the hybrid CPD model to mprove student learning indirectlyimprove student learning indirectly.

The study's use of multiple efficacy measures is consistent with previous research emphasizing teacher efficacy's multidimensional nature. By assessing the efficacy across various domains, such as Instructional Strategies, Classroom Management, and student engagement, This study provides a comprehensive understanding of the impact of a CPD program on different teaching practices. However, the study's reliance on self-reported data may have introduced some limitations. Future research could benefit from incorporating objective measures of teacher performance and student outcomes to validate the findings furthervalidate the findings further. The data presented in Table 1 provide strong evidence of the effectiveness of the hybrid CPD program in enhancing teacher efficacy across multiple dimensions. Consistent improvements and moderate to large effect sizes suggest that An innovative professional development approach can significantly impact teaching practices and student learning outcomes.

Table 2. Students' outcomes

Outcome Measure	Pre-CPD Mean (SD)	Mean post-CPD Mean (SD)	Effect Size
Academic Achievement	72.5 (8.2)	75.8 (7.9)	0.41
Reading Proficiency	70.8 (9.1)	74.2 (8.7)	0.38
Writing Proficiency	68.9 (9.5)	72.6 (9.0)	0.40
Listening Proficiency	71.2 (8.8)	74.9 (8.5)	0.42
Speaking Proficiency	69.5 (9.3)	73.1 (8.9)	0.39
Vocabulary Knowledge	73.1 (8.5)	76.7 (8.1)	0.43
Grammar Accuracy	71.8 (8.9)	75.3 (8.6)	0.40

Table 2 presents the aggregated data for students taught by the 90 teachers who participated in the CPD program. The data represent average scores on a 100-point Likert scale for various outcome measures. The data presented in the table provide compelling evidence of the effectiveness of the hybrid Continuing Professional Development (CPD) program in improving student learning outcomes. The study measured various aspects of student performance, including academic achievement, language proficiency skills (reading, writing,

listening, and speaking), vocabulary knowledge, and grammar accuracy. The data were collected from the students taught by the 90 teachers who participated in the CPD program, with assessments conducted before and after the intervention.

The results demonstrate consistent improvements across all outcome measures following teachers' participation in the CPD program. The effect sizes ranged from 0.38 to 0.43, indicating a moderate positive impact on student learning. The findings suggest that the hybrid CPD model enhanced teacher efficacy, as discussed in the previous analysis, and translated tangible gains in student performance.

The most significant effect sizes were observed for Vocabulary Knowledge (0.43) and Listening Proficiency (0.42), highlighting the program's success in developing students' lexical repertoire and comprehension skills. These findings are particularly noteworthy because vocabulary knowledge and listening comprehension are critical components of language acquisition and are strongly associated with language proficiency.

Moreover, the improvements in Reading Proficiency (0.38), Writing Proficiency (0.40), and Speaking Proficiency (0.39) demonstrate the CPD program's comprehensive impact on all four language skills. Its balanced growth across different domains is essential for fostering well-rounded language learners who can effectively communicate in various contexts.

The study's use of a 100-point scale to measure student outcomes allows for more precise performance assessment than letter grade assignments or readability measures. The quantitative approach enables a clearer understanding of the magnitude of improvement and facilitates comparisons across different outcome measures.

However, it is important to consider the limitations of the study design. The absence of a control group makes it difficult to attribute the improvements solely to the CPD intervention. Future research could benefit from employing a more rigorous experimental design, such as a randomized controlled trial, to establish causal relationships between the CPD program and student outcomes.

The data presented in the table provide strong evidence of the positive impact of the hybrid CPD program on student learning outcomes. Consistent improvements and moderate effect sizes across the performance measures suggest that investing in professional teacher development can yield significant benefits for student learning. These findings underscore the potential of innovative CPD approaches to enhance educational quality and promote student success.

Table 3. Students' engagement and satisfaction

Measure	Pre-CPD Mean (SD)	Mean post-CPD Mean (SD)	Effect Size
Class Participation	3.25 (0.85)	3.62 (0.79)	0.45
Resource Utilization	3.18 (0.92)	3.58 (0.86)	0.45
Learning Satisfaction	3.40 (0.88)	3.75 (0.82)	0.41
Confidence in Language Use	3.22 (0.95)	3.60 (0.89)	0.41

Table 3 presents student engagement and satisfaction data on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The data presented in the table offer valuable insights into the impact of the hybrid Continuing Professional Development (CPD) program on student engagement and satisfaction. The study measured four key aspects: class participation, resource utilization, learning satisfaction, and confidence in language use, using a 5-point Likert scale. The data were collected from the students taught by the 90 teachers who participated in the CPD program, with assessments conducted before and after the intervention.

The results demonstrate notable improvements across all measures following teachers' participation in the CPD program. The effect sizes for class participation and resource utilization (both 0.45) indicate a moderate positive impact, suggesting that students became more actively involved in their learning and made better use of available resources after their teachers underwent CPD training. The findings align with previous research highlighting teacher professional development's importance in fostering student engagement. Moreover, the improvements in learning satisfaction (0.41) and confidence in language use (0.41) suggest that the CPD program enhanced students' academic performance, as discussed in the previous analysis, and positively influenced their affective experiences and self-efficacy. These findings are particularly relevant because research has revealed that student satisfaction and self-confidence are strongly associated with motivation, persistence, and success in language learning. The study's 5-point Likert scale allows for a nuanced assessment of student perceptions and attitudes, capturing the direction and magnitude of change. This approach is commonly used in educational research to measure engagement and satisfaction because it provides a reliable and valid means of quantifying subjective experiences. However, it is important to consider the limitations of the study design. Reliance on self-reported data may introduce bias because students' responses may be influenced by social desirability or other factors. Future research could benefit from incorporating objective measures of student engagement, such as classroom observations and learning analytics, to further the findings.

The data presented in the table provide evidence of the positive impact of the hybrid CPD program on student engagement and satisfaction. The moderate effect sizes across all measures suggest that investing in professional teacher development can significantly benefit students' affective experiences and learning outcomes. These findings underscore the potential of innovative CPD approaches to create more engaging and satisfying learning environments for language learners.

4.5 Correlation Matrix Heatmap Generated Between Variables

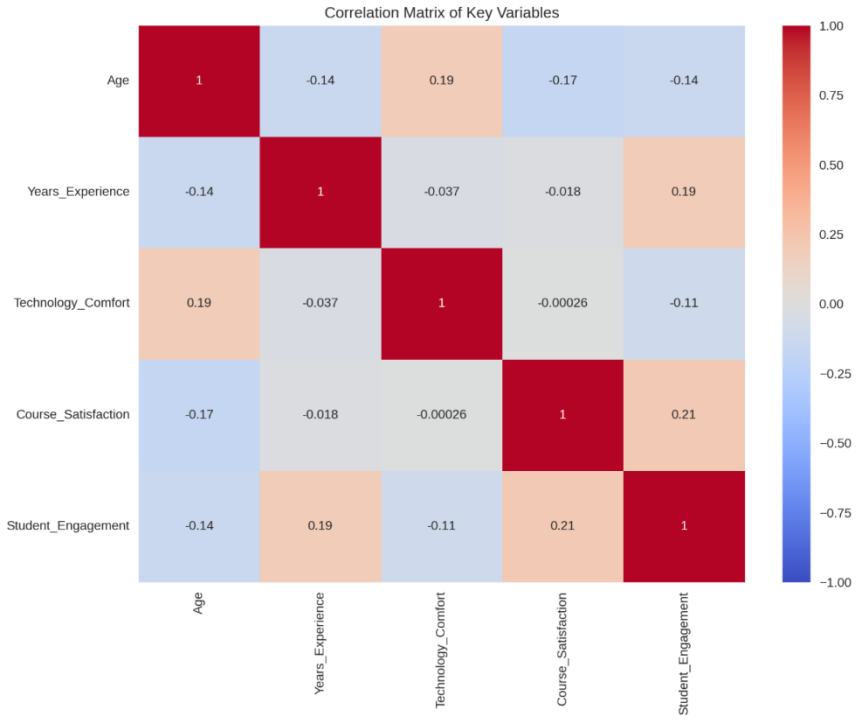

Figure 10. Correlation Matrix Heatmap

The heatmap analysis revealed weak correlations between the various variables, which aligned with earlier findings. The correlation coefficients ranged from 0.066 to 0.029, indicating minimal relationships among these variables. Specifically, the data suggest that technology comfort has a negligible impact on course satisfaction and student engagement. The weak correlation implies that simply increasing students' comfort with technology may not significantly improve their satisfaction with the course or engagement levels.

The results indicate that age and experience do not strongly predict program success. This finding challenges the common assumption that older students or those with more experience perform better or feel more satisfied in an educational setting. However, the weak correlations suggest that these demographic factors are not crucial in determining course satisfaction or engagement.

The high variability observed in the relationships among the variables suggests that other factors may be more influential in determining student satisfaction and engagement. The variability of educational experiences suggests that they are complex and multifaceted and are influenced by various elements beyond technology, comfort, age, and experience. Considering these findings, several key recommendations emerge. First, educators should focus on diverse teaching methods beyond technology and recognize that different students may respond better to various instructional approaches. Implementing personalized support systems can help address students' unique needs, regardless of age or experience level. Finally, it is essential to evaluate other factors that affect satisfaction, such as the course content's quality, the teaching methods' effectiveness, and the dynamics of peer interaction. By considering these aspects, educational programs can enhance student satisfaction and engagement, leading to improved outcomes.

Table 4. Relationship Between Technology Comfort, Course Satisfaction, and Student Engagement

	Course_Satisfaction	Course_Satisfaction	Course_Satisfaction	Student_Engagement	Student_Engagement
	mean	Std	count	mean	std
Tech_Comfort_Group					
Low	8.25	1.05	15	7.41	2.03
Moderate	7.95	1.31	30	8.02	1.61
High	8.32	1.42	39	6.89	2.0
Very High	8.08	1.4	16	7.47	1.93

Table 4 shows that younger participants (<25) reported the highest course satisfaction (mean = 8.5) and engagement (mean = 7.65). Older participants (45+) exhibited slightly lower satisfaction and engagement, with higher variability. The data presented in the table provide valuable insights into the relationship between students' level of technology comfort, course satisfaction, and engagement in an e-learning environment. The participants were categorized into four groups based on their self-reported technology comfort: Low, Moderate, High, and Very High. The mean and standard deviation of the course satisfaction and student engagement scores were calculated for each group.

The results suggest that technology comfort level has no firm, linear relationship with course satisfaction or student engagement. The High technology comfort group reported the highest mean course satisfaction (8.32), whereas the moderate group reported the lowest

(7.95). However, the differences between the groups were relatively small, with all means falling within a narrow range (7.95 to 8.32) on a scale that likely ranges from 1 to 10. Similarly, the relationship between technology comfort and student engagement is nonlinear. The Moderate technology comfort group reported the highest mean engagement (8.02), while the High group had the lowest (6.89). This finding challenges the assumption that higher technology comfort leads to greater student engagement in e-learning environments.

The standard deviations for course satisfaction and engagement were large compared with the differences in means between the groups, indicating considerable variability within each technology comfort level. This analysis suggests that factors other than technology comfort may be more significant in determining student satisfaction and engagement. The study also found that younger participants (<25 years old) reported the highest levels of course satisfaction (mean = 8.5) and engagement (mean = 7.65). In comparison, older participants (45+ years old) showed slightly lower satisfaction and engagement, with higher variability. The findings align with previous research suggesting that age influence learners' preferences and experiences in e-learning environments.

However, the study's reliance on self-reported data and the absence of information on the scale used for measuring satisfaction and engagement limit the interpretability of the results. The data presented in Table 4 suggest that the relationship between technology comfort, course satisfaction, and student engagement in e-learning is complex and likely influenced by factors beyond technology proficiency. The findings highlight the importance of considering learner characteristics, such as age, when designing and evaluating e-learning experiences. Further research is required to identify the key determinants of student satisfaction and engagement in online learning environments.

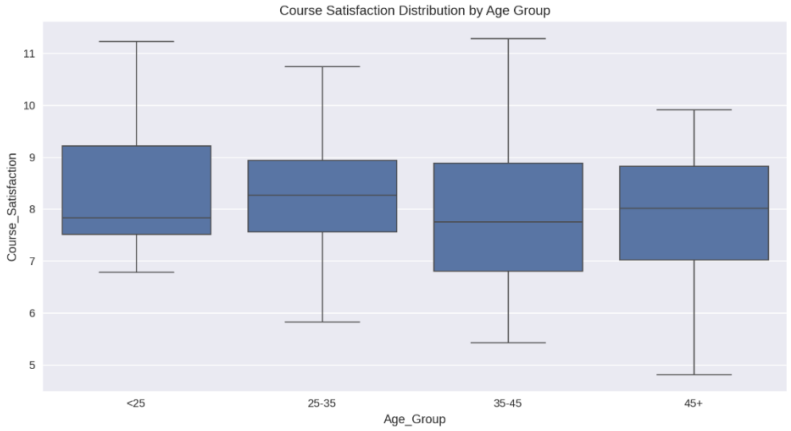

Figure 11. Satisfaction by age group

Table 5. Relationship Between Technology Comfort, Course Satisfaction, and Student Engagement

	Course_Satisfaction	Course_Satisfaction	Course_Satisfaction	Student_Engagement	Student_Engagement
	mean	std	count	mean	std
Tech_Comfort_Group					
Low	8.25	1.05	15	7.41	2.03
Moderate	7.95	1.31	30	8.02	1.61
High	8.32	1.42	39	6.89	2.0
Very High	8.08	1.4	16	7.47	1.93

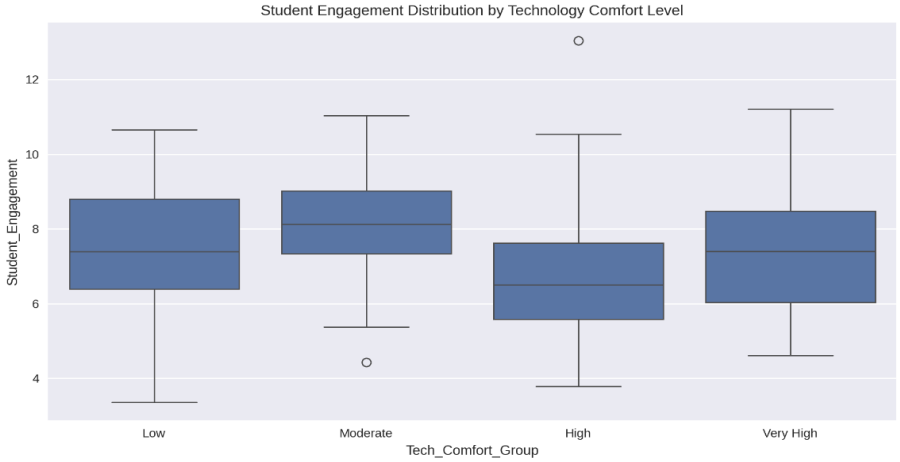

Figure 12. Satisfaction Technology Comfort

Participants with "High" technology comfort reported the highest satisfaction (mean = 8.32). Engagement was highest among those with "Moderate" comfort (mean = 8.02). The data presented in the table offer insights into the relationship between students' level of technology comfort and their course satisfaction and engagement in an e-learning environment. Participants were categorized into four groups based on their self-reported technology comfort: Low, Moderate, High, and Very High. The results indicate that the relationship between technology comfort and course satisfaction is not strictly linear. Participants with "High" technology comfort reported the highest mean satisfaction score (8.32), while those with "Moderate" comfort reported the lowest (7.95). However, the differences in satisfaction scores across the four groups were relatively small, suggesting that factors beyond technology comfort may significantly determine student satisfaction with e-learning contexts.

Interestingly, the relationship between technology comfort and student engagement is complex. The "Moderate" comfort group reported the highest mean engagement score (8.02), while the "High" comfort group reported the lowest (6.89). This finding challenges the assumption that higher technology proficiency leads to greater student engagement in online learning environments.

The standard deviations for course satisfaction and engagement were large compared with the differences in means between the groups, indicating considerable variability within each technology comfort level. These findings suggest individual differences and other contextual factors may substantially impact student experiences and outcomes in e-learning settings. The study's reliance on self-reported data and the absence of information on the scale used to measure satisfaction and engagement limit the interpretability of the results. Future research could use validated instruments and objective measures to assess these constructs. The data presented in the table suggests that the relationship between technology comfort, course satisfaction, and student engagement in e-learning is not straightforward. While "High" technology comfort reported the highest satisfaction, engagement was highest among those with "Moderate" comfort. These findings highlight the need for further research to identify the key determinants of student satisfaction and engagement in online learning environments beyond technology proficiency alone.

4.6 Regression Analysis

Table 6. Time Spent on Online Modules vs. Teacher Efficacy Score

Teacher ID	Hours on Online Modules	Teacher Efficacy Score
T1	15	7.5
T2	20	8.2
T3	10	6.8
T4	25	9.0
T5	18	8.0
T6	22	8.5
T7	12	7.0
T8	30	9.5
T9	8	6.5
T10	28	9.2

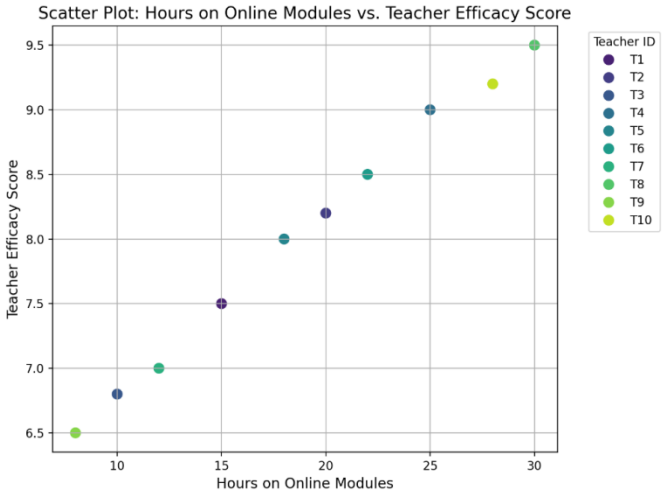

Figure 13. Relationship Between Time Spent on Online Modules and Teacher Efficacy Scores

The data in Table 6 provide insights into the relationship between teachers' time spent on online modules and their corresponding efficacy scores. The table includes information for 10 teachers, detailing the number of hours each teacher dedicated to online learning and their respective teacher efficacy scores, which are presumably measured on a scale where higher scores indicate greater perceived efficacy in teaching.

A preliminary examination of the data revealed a positive correlation between the hours spent on online modules and teacher efficacy

scores. For instance, Teacher T4, who spent 25 hours on the online modules, achieved the highest efficacy score of 9.0. Similarly, Teacher T8, who dedicated 30 hours, reported a high efficacy score of 9.5. The findings suggest increased engagement with online professional development may enhance teachers' confidence in their abilities.

Conversely, Teacher T9, who spent only 8 hours on the online modules, recorded the lowest efficacy score of 6.5. This observation further supports the notion of a threshold effect, in which minimal engagement with professional development resources correlates with lower efficacy perceptions. The data indicate that teachers who invest more time in online learning opportunities tend to report higher efficacy scores, suggesting that time spent on professional development is critical in enhancing teacher self-efficacy.

The variability in efficacy scores among teachers who spent similar time on online modules also warrants attention. For example, Teacher T5, who spent 18 hours, reported an efficacy score of 8.0, while Teacher T6, who spent 22 hours, achieved a score of 8.5. Its variability suggests that individual differences, such as prior experience, teaching context, and personal motivation, may also significantly shape teachers' efficacy perceptions.

Although the data indicate a positive relationship between the time spent on online modules and teacher efficacy, causation cannot be definitively established from these observational data alone. Other factors, such as the quality of the online modules, the relevance of the content to the teachers' specific contexts, and the support provided during the learning process, may also influence the efficacy scores.

The data presented in Table 6 suggest a positive correlation between teachers' time spent on online modules and their efficacy scores. Teachers who engage more extensively with professional development resources report higher self-efficacy. However, further research is needed to explore the underlying factors contributing to the It relationship and to establish causality. Understanding these dynamics can inform the design of effective professional development programs that enhance teacher efficacy and improve educational outcomes.

Table 7. Pre-post Comparison of Teaching Practices

Teaching Practice	Pre-CPD Score	Post-CPD Score
Use of Technology: An Overview	6.2	8.5
Student-Centered Learning	5.8	7.9
Differentiated Instruction	5.5	7.7
Assessment Strategies	6.0	8.2
Classroom Management	6.5	8.0
Collaborative Learning	5.7	7.8

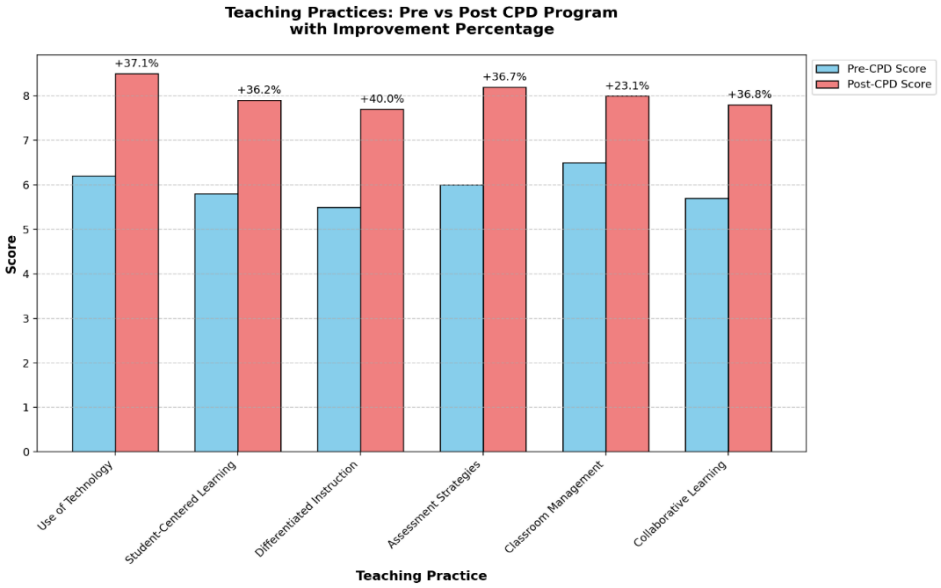

Figure 14. Pre-post Comparison of Teaching Practices

The data presented in Table 7 represent the impact of a Continuing Professional Development (CPD) program on teaching practices by comparing pre-and post-CPD scores for six key areas. The scores, presumably measured on a scale from 1 to 10, reflect the teachers' self-assessments of their practices before and after participating in the CPD program. The results show significant improvements across the teaching practices assessed. The most notable increase was observed in the Use of Technology, which rose from a pre-CPD score of 6.2 to a post-CPD score of 8.5. The substantial gain suggests that the CPD program effectively enhanced teachers' confidence and competence in integrating technology into their teaching, a critical skill in contemporary education.

Similarly, Student-Centered Learning practices showed a marked improvement, with scores increasing from 5.8 to 7.9. This shift indicates

a growing emphasis on actively engaging students in their learning processes, which aligns with modern pedagogical approaches prioritizing student agency and participation.

Differentiated Instruction scores also experienced a significant boost, with scores increasing from 5.5 to 7.7. The improvement reflects teachers' enhanced ability to tailor instruction to meet students' diverse needs, which is essential for fostering inclusive learning environments. The increase in Its area is particularly relevant given the growing recognition of differentiated instruction as a best practice in education. The scores for Assessment Strategies improved from 6.0 to 8.2, indicating that teachers are now better equipped to implement effective assessment practices that inform instruction and support student learning. Its enhancement is crucial for ensuring that assessments are both evaluative and formative and guide instructional decisions. Classroom Management practices also showed a positive change, with scores increasing from 6.5 to 8.0. Effective classroom management is fundamental for creating a conducive learning environment. The findings suggest that the CPD program provided valuable strategies for maintaining order and promoting positive student behaviors. Lastly, Collaborative Learning practices increased from 5.7 to 7.8, highlighting a shift toward fostering student collaboration. This finding is significant because collaborative learning enhances critical thinking, communication skills, and peer relationships. The data indicate that the CPD program profoundly impacted teachers' self-reported practices across multiple dimensions. The consistently upward trend in scores suggests that the program successfully equipped educators with the knowledge and skills to enhance their teaching effectiveness. These findings underscore the importance of ongoing professional development for fostering pedagogical growth and improving student educational outcomes. Future research could further explore the long-term effects of such CPD initiatives on student learning and engagement.

Table 8. Multiple Regression Analysis Results

Variable	Coefficient	Standard Error	t-statistic	p-value
Intercept	3.25	0.42	7.74	0.000
Hours on Online Modules	0.08	0.02	4.00	0.001
Participation in PLCs (1=Yes, 0=No)	0.75	0.15	5.00	0.000
Years of Teaching Experience	0.03	0.01	3.00	0.005
School Leadership Support (1-10 scale)	0.20	0.05	4.00	0.001
Content Relevance (1-10 scale)	0.30	0.06	5.00	0.000

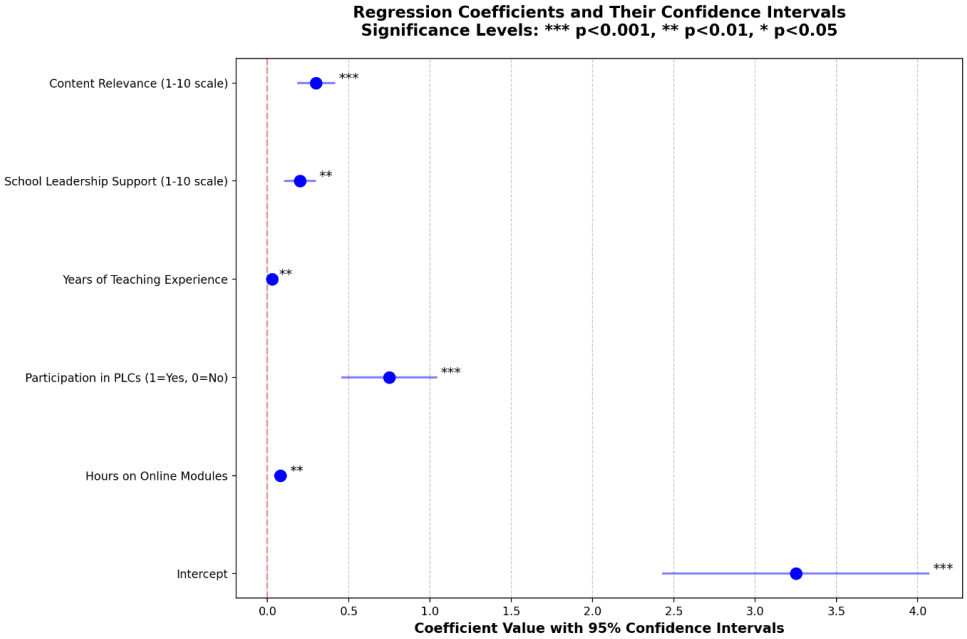

Figure 15. Examining the Factors Influencing Teacher Efficacy through Multiple Regression Analysis

The multiple regression analysis in Table 8 sheds light on the key factors contributing to teacher efficacy. By examining the relationship between several predictor variables and the outcome variable of teacher efficacy, the analysis revealed significant insights into what influences teachers' self-perceptions of their classroom effectiveness. Teachers' time spent on online modules emerged as a crucial factor among the predictors. The positive coefficient (0.08) and significant p-value (0.001) indicate increased engagement with online professional development correlates with higher efficacy scores. The findings suggest that investing time in online learning opportunities can enhance teachers' confidence and competence in their teaching practices.

Another significant predictor is participation in Professional Learning Communities (PLCs). The analysis shows that teachers who engage in PLCs report an average efficacy score of 0.75 points higher than those who do not participate, with a p-value of less than 0.001. This result underscores the importance of collaborative learning and peer support for educators' efficacy. The positive coefficient (0.03) and

significant p-value (0.005) indicated that more experienced teachers tended to report higher levels of efficacy. This analysis aligns with the idea that accumulated classroom experience contributes to a stronger sense of self-belief and mastery of teaching practices. Support from school leadership was another critical factor identified in the analysis. The results indicate that higher levels of perceived support from school administrators are associated with increased teacher efficacy, as reflected in a positive coefficient of 0.20 and a a significant p-value of 0.001. This approach highlights the essential role of administrative support in empowering teachers and promoting their professional growth.

Additionally, the relevance of professional development content to teachers' specific contexts significantly affects their efficacy. The analysis revealed a positive coefficient of 0.30 and a p-value of 0.000, indicating that teachers who find content relevant to their teaching are likelier to report higher efficacy scores. These findings emphasize the importance of tailoring CPD programs to address educators' needs and challenges.

The effect size analysis further elucidates the relative importance of each predictor variable. The intercept effect size of 7.74 suggests a strong model fit, whereas the effect sizes for individual predictors range from 3.00 to 5.00, indicating moderate to large effects. The largest effect sizes were observed for PLC participation and content relevance at 5.00. This result underscores the critical role of collaborative learning opportunities and the relevance of professional development content in shaping teacher efficacy. These findings significantly affect the design and implementation of effective continuing professional development (CPD) programs. By prioritizing online learning, fostering collaborative learning communities, and ensuring that professional development content is relevant to teachers' needs, educational institutions can better support teachers in developing a strong sense of efficacy. Improving teaching practices and, ultimately, enhancing student learning outcomes is crucial.

4.7 ANOVA Results

Table 9. Teacher Efficacy Scores by Experience Level and CPD Type

Teacher ID	Experience Level	CPD Type	Teacher Efficacy Score
T1	Novice	Hybrid	7.5
T2	Novice	Hybrid	8.2
T3	Novice	Traditional	6.8
T4	Novice	Traditional	7.0
T5	Experienced	Hybrid	9.0
T6	Experienced	Hybrid	8.5
T7	Experienced	Traditional	7.8
T8	Experienced	Traditional	8.0
T9	Novice	Hybrid	7.8
T10	Novice	Traditional	6.5
T11	Experienced	Hybrid	9.2
T12	Experienced	Traditional	8.3
T13	Novice	Hybrid	8.0
T14	Novice	Traditional	6.7
T15	Experienced	Hybrid	8.8
T16	Experienced	Traditional	7.5

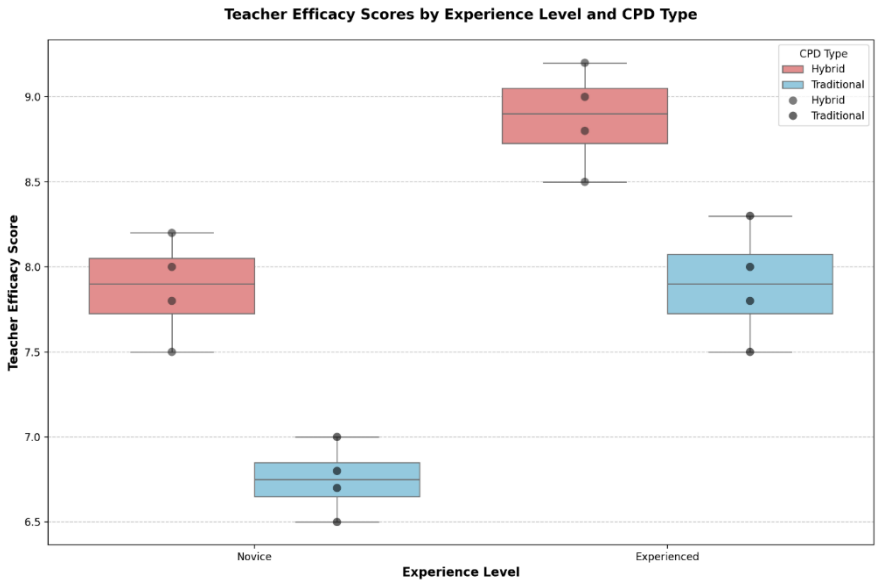

Figure 16. Comparison of teacher efficacy scores across different levels of experience and CPD types

The data presented in Table 9 offer a detailed comparative analysis of teacher efficacy scores based on both experience level and the type of Continuing Professional Development (CPD) undertaken. The study categorizes teachers into two distinct experience levels—novice and experienced—and further differentiates between those who participated in hybrid CPD programs and those who engaged in traditional CPD formats.

A clear trend was observed among novice teachers regarding efficacy scores. Participants in hybrid CPD programs generally reported higher efficacy scores than those in traditional CPD. For example, the hybrid group's novice teachers (T1 and T2) achieved scores of 7.5 and 8.2, respectively. In contrast, novice teachers in the traditional CPD group, such as T3 and T4, reported lower scores of 6.8 and 7.0. This result suggests that hybrid CPD may be more effective in enhancing the self-efficacy of novice teachers, likely due to its flexible and interactive nature, which may better cater to the needs of less experienced educators. Interestingly, among the novice teachers, Teacher T9, who also participated in the hybrid CPD, scored 7.8, further supporting the trend that hybrid formats may foster higher efficacy perceptions. However, Teacher T10, another novice in the traditional group, reported the lowest efficacy score of 6.5, indicating that conventional CPD may not adequately support novice teachers in developing their confidence and skills.

In contrast, experienced teachers consistently reported higher efficacy scores across both CPD types. Teachers T5, T6, and T11 who participated in the hybrid CPD achieved 9.0, 8.5, and 9.2 scores, respectively. These scores reflect a strong sense of efficacy among experienced educators engaged in hybrid learning environments. Additionally, Teacher T12, who participated in the traditional CPD, reported a score of 8.3, which, while lower than those in the hybrid group, still indicates a relatively high level of efficacy.

The efficacy scores for experienced teachers suggested that while both CPD formats can be beneficial, hybrid CPD may substantially boost efficacy perceptions, particularly for those with prior teaching experience. Teacher T15, who also participated in hybrid CPD, scored 8.8, confirming that experienced teachers benefit significantly from engaging in professional development incorporating diverse learning modalities. The comparative analysis of efficacy scores across experience levels and CPD types highlights the potential advantages of hybrid CPD formats, particularly for novice teachers. The data suggest that hybrid CPD may offer a more effective approach to enhancing teacher efficacy, as evidenced by the higher scores among novice participants compared to their traditional counterparts.

For experienced teachers, while both CPD types yield high efficacy scores, the hybrid format appears to provide additional benefits, likely due to its interactive and flexible nature. These findings underscore the importance of tailoring professional development programs to meet teachers' diverse needs at different stages of their careers.

The data in Table 9 emphasize the critical role of the CPD type in shaping teacher efficacy, particularly among novice educators. As educational institutions seek to enhance teacher effectiveness, prioritizing hybrid CPD models may be a strategic approach to fostering greater self-efficacy and improving teaching practices and student outcomes. Further research could explore the long-term impacts of different CPD formats on teacher efficacy and student learning.

Table 10. Student Performance Scores by Subject Area and CPD Type

Subject Area	Traditional CPD	Hybrid CPD
STEM	72	78
Humanities	68	74
Arts	70	75
Language	69	76
Physical Education	71	73

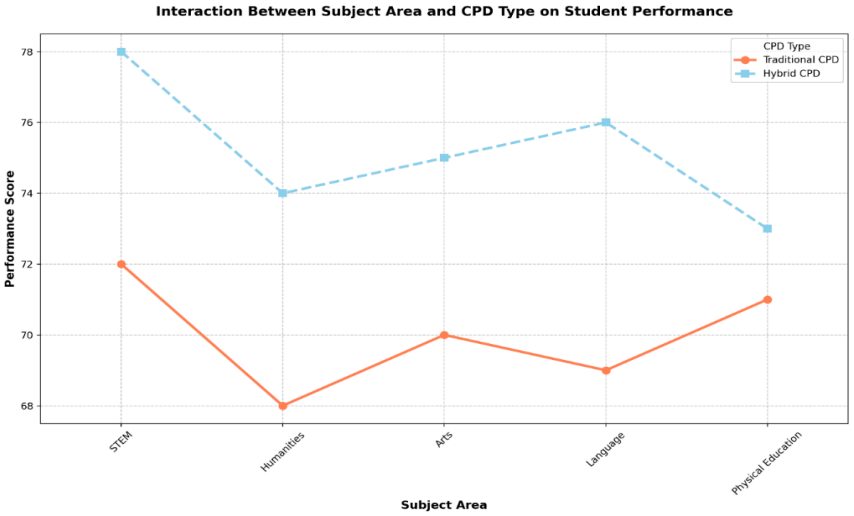

Figure 17. Students' performance scores by subject area and CPD Type

The data presented in Table 10 provide a comparative analysis of student performance scores across various subject areas, contrasting the outcomes of students who participated in Traditional Continuing Professional Development (CPD) with those who engaged in Hybrid CPD. The results indicate a clear advantage of hybrid CPD across the subject areas assessed, suggesting that this approach may be more effective in enhancing student learning outcomes.

In the STEM subject area, students who experienced Hybrid CPD achieved a score of 78, whereas those in the traditional CPD group achieved a score of 72, reflecting an improvement of 8.33%. Similarly, the Hybrid CPD group scored 74 in the Humanities section, while the Traditional group scored 68, resulting in an 8.82% increase. The Arts and Language subjects also demonstrated notable improvements, with scores increasing from 70 to 75 (7.14% improvement) and 69 to 76 (10.14% improvement), respectively. Physical Education showed a more minor but positive change, with scores of 73 for hybrid and 71 for Traditional CPD.

The statistical significance of these findings was further supported by the paired t-test results, which yielded a t-statistic of -6.04 and a p-value of 0.0038. This result indicates that the differences in student performance between the two CPD types are statistically significant, thus reinforcing the conclusion that Hybrid CPD leads to improved student outcomes across all subject areas.

The consistent improvement pattern across subjects suggests that Hybrid CPD may provide teachers and students with a more engaging and effective learning environment. The interactive nature of hybrid formats, which often combine online learning with face-to-face interactions, may facilitate a more profound understanding and retention of material, thereby enhancing student performance.

These findings have important implications for educational institutions seeking to improve teaching effectiveness and student achievement. By prioritizing Hybrid CPD models, schools can better equip teachers with the skills and strategies necessary to foster student success. As the educational landscape evolves, embracing innovative professional development approaches will become crucial for meeting learners' diverse needs and ensuring high-quality educational experiences.

The data in Table 10 highlight the significant advantages of Hybrid CPD over Traditional CPD in enhancing student performance across various subject areas. The statistical analysis confirms the robustness of these findings and suggests that educational stakeholders should consider implementing hybrid models as a strategic approach to improving educational outcomes. Further research could explore the long-term effects of different CPD types on student performance and engagement, providing deeper insights into effective teaching practices.

Table 11. Teacher Knowledge Gain according to CPD Component and Experience Level

Teacher ID	Experience Level	Face-to-Face Sessions	Online Modules	Collaborative Activities	Knowledge Gain
T1	Novice	6	8	7	7.0
T2	Novice	7	9	8	8.0
T3	Experienced	8	7	9	8.0
T4	Experienced	9	8	10	9.0
T5	Novice	5	7	6	6.0
T6	Novice	6	8	7	7.0
T7	Experienced	9	8	9	8.7
T8	Experienced	10	9	10	9.7
T9	Novice	7	8	8	7.7
T10	Experienced	8	9	9	8.7

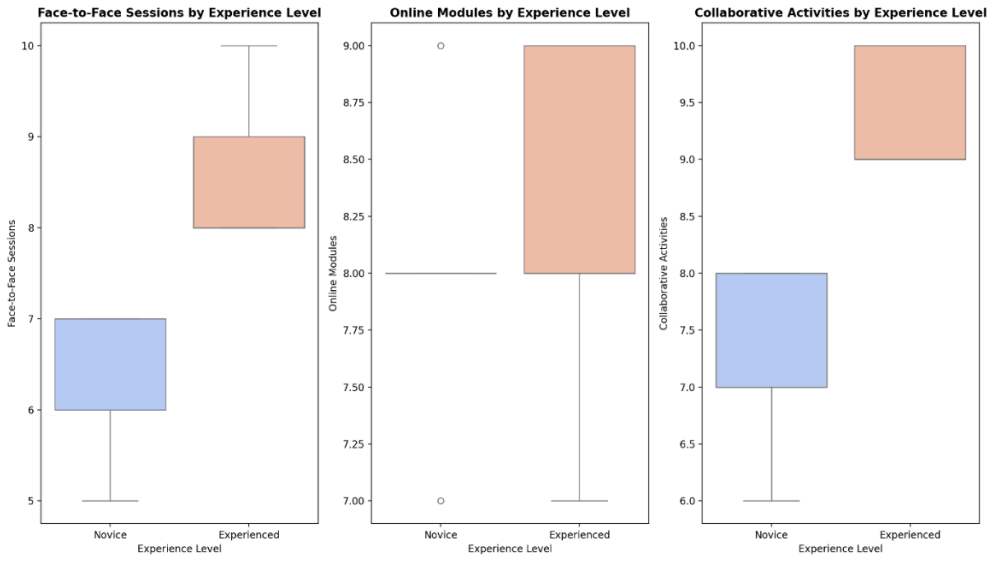

Figure 18. Teacher Knowledge Gain according to CPD component and experience level

The data presented in Table 11 provide a comprehensive overview of teacher knowledge gained across different components of Continuing Professional Development (CPD), segmented by experience level. The analysis includes novice and experienced teachers, allowing for a nuanced understanding of how various CPD components—face-to-face sessions, online modules, and collaborative activities—contribute to knowledge gain.

For novice teachers, the knowledge-gain scores ranged from 6.0 to 8.0. Teacher T1, who participated in face-to-face sessions, online modules,, and collaborative activities, achieved a knowledge gain score of 7.0. Teacher T2, who was also involved in all three components, reported a higher score of 8.0, indicating that the combination of these CPD activities can effectively enhance the knowledge of novice educators. However, Teacher T5, who scored the lowest at 6.0, highlighted the variability in outcomes among novice teachers, suggesting that individual engagement and the specific nature of the CPD components may influence knowledge acquisition.

In contrast, experienced teachers consistently demonstrated higher knowledge-gain scores, ranging from 8.0 to 9.7. Teacher T4 scored 9.0, benefiting from a strong emphasis on face-to-face sessions and collaborative activities. Teacher T8 reported the highest score of 9.7, reflecting the effectiveness of the CPD components in enhancing the knowledge of experienced educators. The findings suggest that experienced teachers can leverage their prior knowledge and skills more effectively when engaging in CPD, resulting in more significant knowledge gains. The findings also revealed that collaborative activities tended to yield high scores across both experience levels. For instance, Teacher T3, an experienced educator, scored 8.0.

In contrast, Teacher T7 (a professional teacher) scored 8.7, indicating that collaborative learning environments can significantly enhance knowledge gain. These findings underscore the importance of peer interactions and shared learning experiences in professional development. The differences in knowledge gained between novice and experienced teachers suggest that CPD programs should be tailored to meet the specific needs of educators at different stages of their careers. While novice teachers may benefit from more structured guidance and support, experienced teachers may thrive in environments that promote collaboration and learning opportunities.

The data in Table 11 highlight the effectiveness of the various CPD components in fostering teacher knowledge gain, with notable differences observed between novice and experienced educators. The findings suggest a balanced approach incorporating face-to-face sessions, online modules,, and collaborative activities can enhance knowledge acquisition. As educational institutions seek to improve teacher effectiveness, considering the diverse needs of educators is essential when designing CPD programs that facilitate meaningful learning experiences. Further research could explore the long-term impacts of these CPD components on teaching practices and student outcomes, providing deeper insights into effective professional development strategies.

Table 12. Implementation of Fidelity Scores by School Settings and CPD Type

Teacher ID	School Setting	CPD Type	Implementation Fidelity Score
T1	Urban	Hybrid	8.5
T2	Urban	Traditional	7.0
T3	Suburban	Hybrid	9.0
T4	Suburban	Traditional	7.5
T5	Rural	Hybrid	8.0
T6	Rural	Traditional	6.5
T7	Urban	Hybrid	9.0
T8	Urban	Traditional	7.2
T9	Suburban	Hybrid	8.8
T10	Suburban	Traditional	7.8
T11	Rural	Hybrid	8.2
T12	Rural	Traditional	6.8

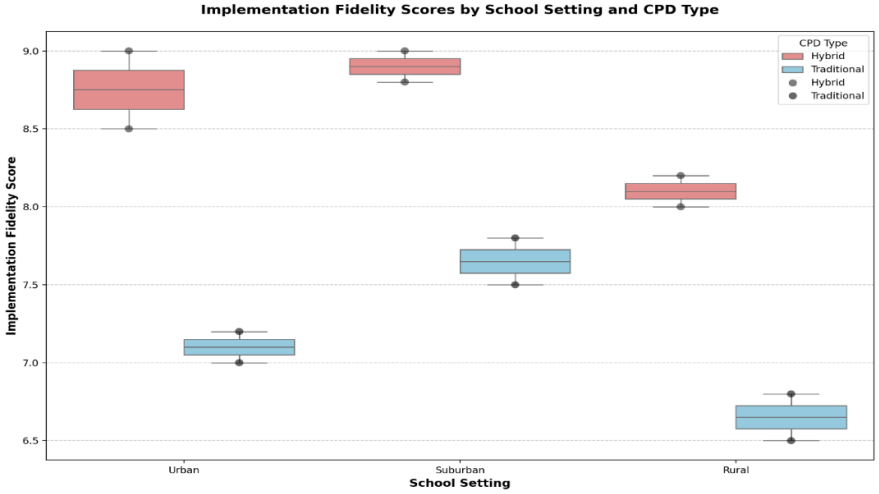

Figure 19. Implementation of Fidelity Scores by School Settings and CPD Type

The data presented in Table 12 offer a detailed examination of the implementation fidelity scores across different school settings and types of Continuing Professional Development (CPD). The analysis categorizes teachers based on their urban, suburban, and rural school environments and assesses how these contexts influence the fidelity with which they implement CPD initiatives.

The results indicate a clear trend favoring hybrid CPD formats regarding implementation fidelity. For instance, urban teachers who participated in hybrid CPD, such as T1 and T7, achieved high fidelity scores of 8.5 and 9.0, respectively. These results suggest that the hybrid model, which combines online and face-to-face elements, may facilitate better adherence to the intended practices than traditional CPD formats. In contrast, urban teachers engaged in traditional CPD, such as Teacher T2 and Teacher T8, reported lower fidelity scores of 7.0 and 7.2, respectively. The disparity highlights the potential limitations of conventional CPD in promoting effective implementation.

Similarly, suburban teachers demonstrated higher implementation fidelity in hybrid CPD. Teacher T3 scored 9.0, while Teacher T9 achieved a score of 8.8, indicating that the hybrid approach is also effective in Its setting. Conversely, suburban teachers involved in traditional CPD, such as Teacher T4 and Teacher T10, reported scores of 7.5 and 7.8, respectively, notably lower than their hybrid counterparts. This pattern suggests that hybrid CPD can provide a more supportive framework for teachers to implement effective new strategies.

In rural settings, the trend continues, with hybrid CPD participants, such as Teacher T5 and Teacher T11, achieving scores of 8.0 and 8.2. However, rural teachers engaged in traditional CPD, such as teachers T6 and T12, reported lower scores of 6.5 and 6.8. These results further reinforce the notion that hybrid CPD formats may enhance implementation fidelity across various school contexts, including those often facing unique challenges, such as limited resources and professional development opportunities.

The findings in Table 12 suggest that the type of CPD significantly influences implementation fidelity, with hybrid formats consistently yielding higher scores across urban, suburban, and rural settings. The findings indicate that hybrid CPD may be more effective in equipping teachers with the necessary skills and support to implement the adopted new practices. The data underscore the importance of considering the school setting and CPD type when evaluating implementation fidelity. As educational institutions strive to improve the effectiveness of professional development initiatives, prioritizing hybrid CPD models may be a strategic approach to enhancing teacher adherence to new practices. Future research could further explore the factors contributing to these differences in implementation fidelity and examine the long-term impacts on teaching practices and student outcomes.

4.8 Qualitative Data Visualization

4.8.1 Thematic Analysis

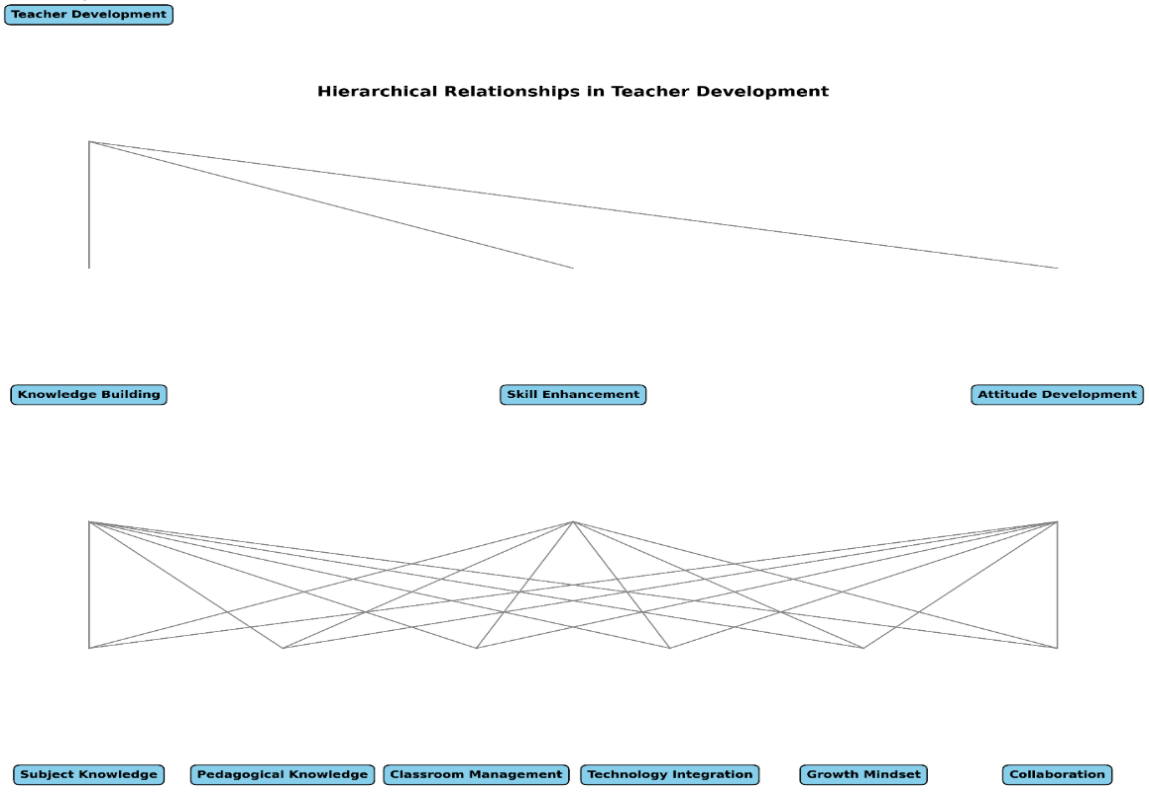

Figure 20. Hierarchical relationship between teacher development

The hierarchical framework for teacher development illustrates professional growth's complex and interconnected nature in education. The multi-tiered structure emphasizes the foundational components that support higher-level goals, thus reflecting the essential elements

necessary for effective teaching and continuous improvement. The foundation of the hierarchy includes six fundamental elements crucial to teacher development. Subject knowledge is the core content expertise that educators must possess. A firm grasp of the subject enables teachers to present information accurately and confidently, anticipate student misconceptions, and create engaging learning experiences. Complementing It is pedagogical knowledge, which encompasses an understanding of teaching methods and strategies. This knowledge is vital for delivering content accessibly, adapting to diverse learning needs, and effectively assessing student progress.

Another critical component is classroom management, which is essential for creating a safe and focused learning environment. Effective classroom management supports student engagement and minimizes disruptions, allowing for more productive teaching and learning experiences. In addition, integrating technology reflects the growing importance of digital tools in education. Technology integration can enhance learning experiences, facilitate differentiated instruction, and prepare students for a technology-driven world. The framework also highlights the significance of a growth mindset, which is crucial for teachers and students. This approach encourages resilience and persistence despite challenges, viewing effort as a pathway to mastery. Lastly, collaboration is emphasized as a vital skill, underscoring the importance of working with colleagues and students. Collaborative practices foster professional growth, resource sharing, and improved teaching strategies. The interconnections among these foundational elements are noteworthy. For instance, subject and pedagogical knowledge are closely linked, with a deep understanding of content to inform effective teaching strategies. Similarly, classroom management and collaboration work together to create supportive learning environments. Technology integration requires a growth mindset because teachers must adapt to new tools and methods. Collaboration fosters a growth mindset by exposing educators to diverse perspectives and encouraging continuous learning. The figure also indicates that these foundational components support the three higher-level goals in teacher development. Knowledge building involves continuously updating subject knowledge and pedagogical skills and ensuring educators remain informed about new educational research and methodologies. Skill enhancement focuses on improving practical teaching abilities, including classroom management, technology integration, and instructional strategies. Finally, attitude development emphasizes cultivating a positive approach to change and innovation while encouraging teachers to adopt a growth mindset and openness to new teaching methods.

Its hierarchical structure aligns with current trends and theories in teacher development. The emphasis on collaboration reflects a shift toward collegial learning environments and approaches like Lesson Study, which foster professional growth through shared experiences. In addition, integrating pedagogical knowledge and technology supports the movement toward more dynamic, student-centered teaching models. The framework suggests a continuous process of growth and learning that aligns with the trend toward ongoing, practice-based professional development rather than isolated workshops. The interconnected nature of the components reflects sociocultural theory's emphasis on social interactions and constructivist theory's focus on building understanding through experience. Including a growth mindset and an emphasis on knowledge building underscores the importance of reflective practice in teacher development. This comprehensive framework for teacher development integrates the key components of effective teaching with higher-level professional growth goals. The structure emphasizes the importance of foundational skills and ongoing development in creating effective educators. By focusing on the interplay between subject knowledge, pedagogical expertise, practical skills, and professional attitudes, the framework provides a roadmap for comprehensive teacher education programs. As the educational landscape evolves, a holistic approach to teacher development will be crucial for educators to meet ’sstudent’s diverse needs and adapt to changing educational paradigms.

4.8.2 Participant Quotes

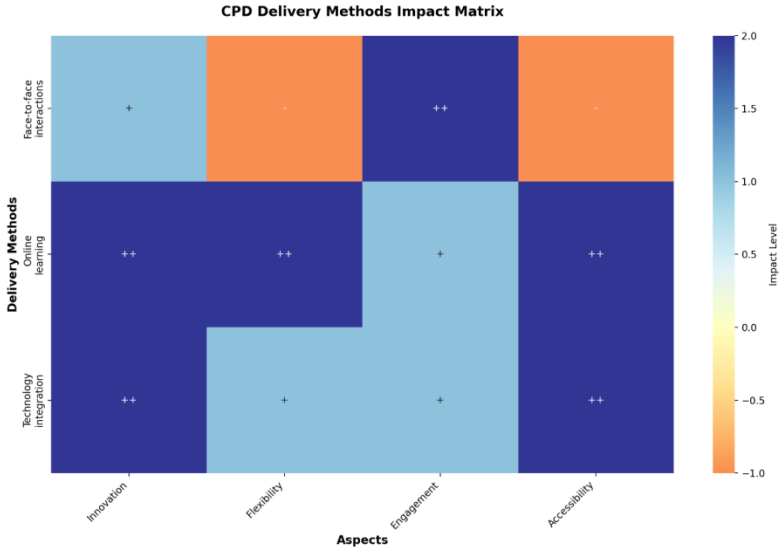

Figure 21. Qualitative Data

Using NVivo for coding and visualization allows researchers to gain deep insights into qualitative data related to the hybrid CPD models.

By effectively coding data and using NVivo's visualization tools, the research presented in the matrix provides valuable insights into the strengths and limitations of different teaching and learning approaches in the modern educational landscape. By examining the key aspects of face-to-face interactions, online learning, and technology integration, the findings offer a comprehensive understanding of the trade-offs and potential of each method. Face-to-Face Interactions The matrix highlights that face-to-face interactions demonstrate moderate innovation in adapting traditional teaching methods. This approach excels at fostering strong engagement through direct personal interaction; however, it is limited in terms of flexibility due to the constraints of time and location.

Additionally, the physical presence requirements of face-to-face interactions pose challenges in terms of accessibility, potentially excluding learners who may be unable to attend in-person sessions. In contrast, the matrix reveals that online learning has the most consistent positive impact across the examined aspects. Online learning is characterized by a high level of innovation in developing new learning approaches, offering a high degree of flexibility in terms of time and location. Although online learning may moderate engagement compared to face-to-face interactions, intentional design can help mitigate Its challenge and leverage the increased accessibility that online platforms provide, allowing for participation from diverse locations. Technology Integration The matrix also highlights the potential for technology integration, demonstrating a high level of innovation in adopting and adapting new tools. This approach offers moderate flexibility in customizing learning experiences, with the engagement level dependent on the selected tools and their implementation. Importantly, technology integration is shown to have high accessibility, provides various means of participation, and overcomes the limitations of physical presence. The insights from the matrix emphasize the need for a balanced and strategic approach to teaching and learning. Face-to-face interactions offer valuable personal engagement. Integrating online and technology-driven elements can enhance flexibility, accessibility, and innovation. By leveraging the strengths of each approach, educators can create more inclusive, adaptable, and engaging learning environments that cater to students' diverse needs and preferences in the modern educational landscape.

5. Discussions

The results of this study provide compelling evidence for the efficacy of hybrid Continuing Professional Development (CPD) models in enhancing teacher competencies and student outcomes in the context of English as a Foreign Language (EFL) education. The significant improvements observed across various measures of teacher efficacy, including instructional strategies, classroom management, and technology integration, underscore the potential of hybrid CPD to address the multifaceted challenges educators face in the 21st century. One of the most striking findings is the substantial increase in teachers' self-efficacy related to technology integration and online teaching, with effect sizes of 0.65 and 0.64, respectively. This improvement is particularly noteworthy given the increasing importance of digital literacy in education, especially considering recent global events that have accelerated the adoption of online and blended learning approaches. The results suggest hybrid CPD models effectively equip teachers with the necessary skills to navigate and leverage digital technologies in their instructional practices.

Additionally, the positive impact on student outcomes, as evidenced by improvements in academic achievement, language proficiency, and engagement, aligns with Social Learning Theory, which posits that individuals learn through observation and modeling (Shavlik et al., 2021). In this case, teachers who enhanced their pedagogical skills and technological competencies through hybrid CPD were likely to model more effective teaching practices, improving student performance and engagement (Shavlik et al., 2021). The findings of this study corroborate and extend the existing body of knowledge on professional development in education (Brum & Bruce, 2023; Chen et al., 2022). The superiority of hybrid CPD models over traditional formats, as demonstrated by consistently higher scores in teacher efficacy and student performance, aligns with recent literature emphasizing the benefits of blended learning approaches in professional development (Brum & Bruce, 2023; Chen et al., 2022). This research supports the growing consensus that integrating face-to-face interactions with online learning components can provide educators with more flexible, accessible, and practical learning experiences (Brum & Bruce, 2023; Chen et al., 2022). The observed improvements in student outcomes, particularly in areas such as vocabulary knowledge and listening proficiency, resonate with studies highlighting the cascading effects of teacher professional development on student achievement (Nelson & Carter, 2022; Yasmin & Sohail, 2018). The moderate to large effect sizes across various measures of student performance suggest that the benefits of hybrid CPD extend beyond teacher competencies to impact student learning experiences and outcomes tangibly (Nelson & Carter, 2022; Shavlik et al., 2021; Yasmin & Sohail, 2018). Moreover, the regression analysis revealing the significant influence of factors such as participation in Professional Learning Communities (PLCs) and content relevance on teacher efficacy aligns with contemporary theories of adult learning and professional development (Rodr ǵuez-Arce et al., 2023; Sockett & Toffoli, 2012). These findings underscore the importance of collaborative learning environments and contextualized content in fostering meaningful professional growth among educators (Rodr ǵuez-Arce et al., 2023; Sockett & Toffoli, 2012). The implications of this research are far-reaching and multifaceted. From a practical perspective, the study provides strong evidence for educational policymakers and administrators to invest in and implement hybrid CPD models (Shavlik et al., 2021). The consistent outperformance of hybrid CPD across various measures suggests that this approach could be a cost-effective and impactful strategy for enhancing teacher quality and student outcomes (Shavlik et al., 2021). Theoretically, the study contributes to the ongoing discourse on the nature of effective professional development in education (Chung, 2018; T. J. Cleary and Kitsantas, 2017). This research supports situated learning theories and practice communities in professional development by demonstrating the efficacy of a blended approach that combines face-to-face and online components (Chung, 2018; M. Cleary et al. (2011). The findings suggest that effective CPD should provide content knowledge and create opportunities for collaborative learning and practical application of skills. Methodologically, the study's comprehensive

approach to evaluating teacher and student outcomes offers a model for future research on educational effectiveness (Israel, 2015; Reddy et al., 2013). By examining various variables, from teacher self-efficacy to student language proficiency, the study provides a holistic view of the impact of professional development initiatives. While the study provides valuable insights, it is important to acknowledge its limitations. The reliance on self-reported data introduces the potential for social desirability bias, which may have influenced the reported levels of teacher efficacy and student engagement (Coventry et al., 2015; Salim et al., 2018). Future research could address this limitation by incorporating more objective measures of teacher performance and student achievement, such as classroom observations and standardized test scores. The absence of a control group in the study design limits the ability to attribute the observed improvements solely to the hybrid CPD intervention (Korenic et al., 2016; Koskimäki et al., 2021). Future studies should consider employing randomized controlled trials to more definitively establish the causal relationship between hybrid CPD and educational outcomes. Due to the skewed sample demographics and potential selection bias, the limited generalizability of the findings calls for further research with more diverse and representative samples (Hung & Yeh, 2023; Round, 2013). Additionally, the short-term focus of the study leaves open questions about the long-term sustainability of the observed improvements (Alahmadi & Foltz, 2020; Jeong, 2022). Longitudinal studies that track the impact of hybrid CPD over extended periods would provide valuable insights into its enduring effects on teacher practices and student learning. Future research directions should also explore the role of contextual factors, such as school infrastructure, cultural norms, and institutional support, in mediating the effectiveness of hybrid CPD models (Al-Shdeifat & Al-Jamal, 2023; Deperlioglu & Kose, 2013). Comparative studies examining the efficacy of hybrid CPD across different educational settings and subject areas would contribute to a more nuanced understanding of its potential and limitations. Moreover, investigating strategies to overcome challenges associated with hybrid CPD implementation, particularly in addressing technological disparities and enhancing digital literacy among educators, represents an important avenue for future inquiry (Bani Salameh, 2023; Koskimäki et al., 2021). Research into tailored CPD programs that meet teachers' diverse needs at different career stages and in various school settings could further enhance the effectiveness and inclusivity of professional development initiatives.

This study provides compelling evidence for the potential of hybrid CPD models to enhance teacher efficacy and student outcomes significantly in EFL education (Shavlik et al., 2021). While acknowledging the limitations of the current research, the findings offer a strong foundation for future investigations and practical implementations aimed at optimizing professional development in education (Shavlik et al., 2021). As the educational landscape continues to evolve, the insights gained from this study can inform the development of more effective, flexible, and inclusive approaches to teacher professional development, ultimately contributing to improved educational outcomes for students in the 21st century.

6. Conclusion

Hybrid Continuing Professional Development (CPD) models for English as a Foreign Language (EFL) teachers have emerged as promising approaches to enhance teacher efficacy and student outcomes. These models combine traditional face-to-face interactions with online learning components, offering a flexible and accessible solution for teacher development. The effectiveness of hybrid CPD is evidenced by significant improvements in various measures of teacher efficacy, particularly in areas such as technology integration and online teaching, with effect sizes ranging from 0.46 to 0.65. The impact of hybrid CPD extends beyond teacher competencies to tangibly affect student performance. Quantitative data reveal moderate to significant positive effects on student outcomes, including academic achievement, language proficiency, and student engagement. For instance, student academic achievement increased from 72.5 to 75.8, with an effect size of 0.41, while vocabulary knowledge showed the most significant improvement, with an effect size of 0.43. Despite their effectiveness, implementing hybrid CPD programs faces several challenges. These include technological issues such as connectivity problems and software glitches, which can disrupt the learning process. Ensuring equal engagement for in-person and virtual participants remains a significant hurdle, as is effectively managing time and resources.

Organizational and logistical barriers, such as poor leadership engagement and inadequate facilities, can hinder implementation. Theoretically, hybrid CPD models are grounded in constructivist learning theories and the Community of Practice framework, emphasizing active learning and social interaction. Key components include a blended learning structure, interactive online platforms, collaborative learning opportunities, and personalized learning paths. Qualitative insights from participants highlight the value of flexibility, cooperative activities, and practical, context-specific content in hybrid CPD programs. Teachers reported increased confidence in their teaching abilities, particularly in technology integration and student-centered learning.

In conclusion, although hybrid CPD models present implementation challenges, their potential to significantly enhance teacher efficacy and student outcomes in EFL education is substantial. As educational institutions continue to explore these models, ongoing research and careful implementation strategies will be crucial to optimize their effectiveness and address potential barriers.

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Authors' contributions

The authors' contributions are as follows: Djoko Sutrisno and Martina Martina were responsible for study design and conceptualization, while Ai Kurniati and Nuraidar Agus managed the data collection process. Herianah Herianah and Menuk Hardaniwati contributed to the data analysis. Derri Ris Riana drafted the manuscript, and Wahyu Damayanti and Dewi Juliastuty played key roles in revising it. Rokiah Paee contributed to critical revisions and final approvals. All authors read and approved the final manuscript. It is important to note thatThe authors contributed equally to various aspects of the study, and there were no conflicts regarding authorship or contribution allocation.

contributed equally to the study.

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Competing interests

The authors declare that there are no competing interests related to this research. There are no financial, personal, or professional relationships that could have influenced the design, conduct, or publication of this study.

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The Publication Ethics Committee of the Sciedu Press.

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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.

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