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Why should e-mentoring be preferred over traditional mentoring in teacher professional development: a systematic review

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ABSTRAK

Peningkatan kompetensi profesional guru menjadi salah satu komponen yang harus terus dicapai untuk meningkatkan kualitas pendidikan. E-mentoring muncul sebagai alternatif yang lebih baik dibanding mentoring secara tradisional dengan menawarkan kemudahan akses dan fleksibilitas. Penelitian ini bertujuan untuk menganalisis dan mengevualuasi e-mentoring dan mentoring tradisional secara bersama-sama untuk pengembangan profesional guru tentang mengapa e-mentoring mungkin lebih disukai daripada mentoring tradisional untuk mendukung kompetensi profesional guru. Metode penelitian ini menggunakan systematic literature dengan 15 artikel yang diakses dari tahun 2020-2024. Hasil penelitian menunjukkan bahwa di antara keduanya, e-mentoring menawarkan lebih banyak kemudahan aksesibilitas dan fleksibilitas, sementara mentoring tradisional unggul dalam membangun hubungan interpersonal yang kuat. Faktor-faktor yang mempengaruhi efektivitas meliputi kualitas hubungan mentor-mentee, penggunaan teknologi, dan desain program. Meskipun e-mentoring menunjukkan potensi besar, terutama dalam mengatasi hambatan geografis, efektivitasnya bergantung pada implementasi yang cermat dan dukungan teknologi yang memadai.

ABSTRACT

The improvement in teachers' professional competence is one of the key components to be continuously pursued to enhance the quality of education. E-mentoring has surfaced as a superior option, in contrast to conventional mentoring, by providing accessibility and adaptability. This research aims to analyse and evaluate e-mentoring and traditional mentoring for teachers' professional development, focusing on why e-mentoring might be preferred over traditional mentoring to support teachers' professional competence. The research method employs a systematic literature review of 15 articles accessed from 2020-2024. The results indicate that e-mentoring offers more accessibility and flexibility, while traditional mentoring excels in building strong interpersonal relationships. Factors influencing effectiveness include the quality of the mentor-mentee relationship, the use of technology, and the program design. Although e-mentoring shows great potential, particularly in overcoming geographical barriers, its effectiveness depends on careful implementation and adequate technological support.

INTRODUCTION

Professional development for teachers is an essential aspect of escalating the quality of education and student learning outcomes (Darling-Hammond et al., 2017). Teacher competency is an absolute ability that teachers and other workers must have to improve their personalities (Laili et al., 2022), contribute to professional development (McGarr & McDonagh, 2021; Van Veldhuizen, et al. 2021), and how a teacher can carry out their duties efficiently, be responsible, and worthy. Indriawati et al. (2023) explain that in the workplace, competency is a combination of knowledge, ability, and application. According to Law No. 14 of 2005, as mentioned in Situmorang & Iriani (2022) concerning "Teachers and Lecturers", teachers must possess the following competencies: pedagogical competence, personality competence, professional competence, and social competence. Teacher competency refers to logical actions and actions to meet specific standards in carrying out educational tasks (Andarini & Mulyono, 2022).

The concept of pedagogical competence details three main aspects, namely learning planning, learning implementation, and learning evaluation. Learning planning involves preparing a learning design, which involves selecting learning objectives, methods, and materials. Learning implementation includes the teacher's active involvement in delivering material and classroom management. Meanwhile, learning evaluation refers to the teacher's ability to evaluate learning processes and outcomes (Nadia, 2023). Recent studies have highlighted the increasing importance of technological integration in teacher development (Daniel, 2014). The three main aspects of pedagogical competence -learning planning, implementation, and evaluation- now require additional digital literacy skills to meet modern educational demands (Asif et al., 2020). In addition, research has shown that e-mentoring can significantly impact teacher professional development across different contexts. Studies by Krishna (2023) demonstrated that e-mentoring platforms facilitated more frequent interactions between mentors and mentees -compared to traditional approaches. Similarly, Wang & Wu (2024) found that digital mentoring tools enabled more structured feedback and documentation of professional growth.

A pre-survey conducted at a school in Jakarta, Indonesia, found several instructional problems, such as teachers feeling that they did not have the opportunity to receive training in terms of increasing competency, the absence of stable motivation to work, and also a lack of resources to provide training and mentoring. However, traditional face-to-face mentoring has long been used to support teacher growth, but electronic mentoring has emerged as a potentially more flexible and scalable alternative in recent years (Single & Single, 2005). However, there is still debate about whether e-mentoring can be as effective as traditional mentoring for teacher professional development. Several studies have examined various e-mentoring programs for teachers (Alemdag & Erdem, 2017), but a comprehensive systematic review comparing E-mentoring with traditional mentoring is still lacking.

Additionally, most research focuses on specific subject areas or grade levels rather than teacher professional development more broadly (Alemdag & Erdem, 2017). There is a need to synthesize existing evidence across contexts to determine if and when e-mentoring may be preferable. Theoretically, e-mentoring has several potential advantages compared to traditional mentoring. It can overcome geographic and scheduling barriers, provide more frequent communication, and facilitate connections with more mentors (Shang et al., 2022). The asynchronous nature of many e-mentoring interactions can also encourage deeper reflection (Thompson et al., 2010). In addition, E-mentoring can provide continuous professional development (Kovalchuck & Vorotnykova, 2017). As technology evolves, the use of e-mentoring, and thus, the need to better understand it, will grow (Neely et al., 2017). However, e-mentoring tends to lack the personal connection and modeling of face-to-face mentorings.

Given the increasing adoption of e-mentoring for teacher professional development, there is an urgent need to critically examine its effectiveness compared to traditional approaches. E-mentoring provides flexibility to teachers because it can be accessed anytime and anywhere according to each person's time availability without location barriers, as shown in a study by (Jones et al., 2023). With the e-mentoring platform, teachers are no longer limited by rigid training schedules and can access material more easily (Mutiarin et al., 2023). Besides, e-mentoring has been proven to escalate teachers' pedagogical competence (Erdoğan et al., 2022; Retnowati et al.,

2018). School leaders and policymakers need evidence-based guidance on when to implement e-mentoring versus traditional mentoring programs. Teachers also need to understand the relative benefits and drawbacks of each approach.

Therefore, this literature research aims to analyze and evaluate e-mentoring and traditional mentoring together for teacher professional development regarding why e-mentoring may be preferable to traditional mentoring to support teacher professional competence. These findings will inform evidence-based recommendations for effectively utilizing e-mentoring to support teacher growth and ultimately improve educational quality. To combine the direction of this research, researchers provide research questions to answer the problems they want to analyze.

1. How is the effectiveness of the comparison between e-mentoring and traditional mentoring for teacher professional development?
2. What factors influence the effectiveness of e-mentoring compared to traditional mentoring?
3. What are the main advantages and disadvantages of e-mentoring compared to traditional mentoring for supporting teacher development?

METHOD

Design

This research uses a systematic literature review to analyze and evaluate the comparison between e-mentoring and traditional mentoring for teacher professional development. The design framework is used to provide an integrated critique and synthesis of the topic and produce a comprehensive comparison. This paper will provide a better understanding of the relative effectiveness of e-mentoring programs versus traditional mentoring for supporting teacher growth. The methodology involved five steps as outlined by Cooper (2001): problem formulation, data collection from relevant empirical studies, study evaluation, data analysis, and interpretation and presentation of findings.

Search methods

The literature search will use two primary academic databases: Science Direct published. Search terms will include a combination of key terms related to e-mentoring, traditional mentoring, teacher professional development (see Table 1), and PRISMA Screening (Figure 1). Given the rapid evolution of e-mentoring technology, the review will focus on articles published between 2020-2024. The selection of articles in the 2020-2024 time frame is based on several crucial considerations. Given the rapid development of digital technology and e-mentoring platforms, research in this period reflects more relevant current capabilities and practices. In addition, the transformation of educational practices during the COVID-19 pandemic has accelerated the adoption of online mentoring approaches, making the latest studies invaluable to review. This period also captures the latest developments in the professional development needs of teachers and competency demands in the digital era. By limiting coverage to the last four years, the findings and recommendations of the study can be more applicable to the current context of education and technological infrastructure. An initial search is expected to yield several hundred articles of interest. This number was reduced by reviewing articles, titles, and abstracts and only including research studies that directly compare e-mentoring and traditional mentoring for teacher professional development. The search terms are as in Table 1.

Selection criteria

The selected article should explicitly discuss the comparison between e-mentoring and traditional mentoring, with a particular focus on the context of teacher professional development. To ensure the quality of the findings, only studies that present empirical data or formal program evaluations were included, with an emphasis on measurable or observable outcomes in mentoring practice.

On the other hand, some types of articles were excluded from the analysis to maintain the depth and relevance of the research. Opinion articles, editorials, and literature reviews without systematic analysis were not included in this review. Studies that only discuss one type of mentoring without a comparative element were also excluded as they did not provide the needed comparative insights. Those that do not focus on the educational context or have a sample of fewer

than ten participants were also excluded to ensure the validity and generalisation of the findings. Similarly, program reports that do not include formal evaluations are not included in the analysis.

Among a total of 28,501 articles identified at the initial search, this rigorous selection process resulted in 15 final articles that met all the requirements for in-depth analysis. This number, although relatively small, represents high-quality studies that provide substantial insight into the comparative effectiveness of e-mentoring and traditional mentoring in teacher professional development. The selection process can be seen in Figure 1.

Search outcomes

Fifteen articles were in the final inclusion and exclusion criteria. A series of article selection processes can be seen in Figure 1. Evaluative studies were prioritized to assess the relative effectiveness of e-mentoring versus traditional mentoring, while descriptive studies can offer valuable information about the implementation process and contextual factors. These results will address each of these variables to develop a comprehensive understanding of when and why e-mentoring may be better than traditional mentoring in supporting teacher professional development.

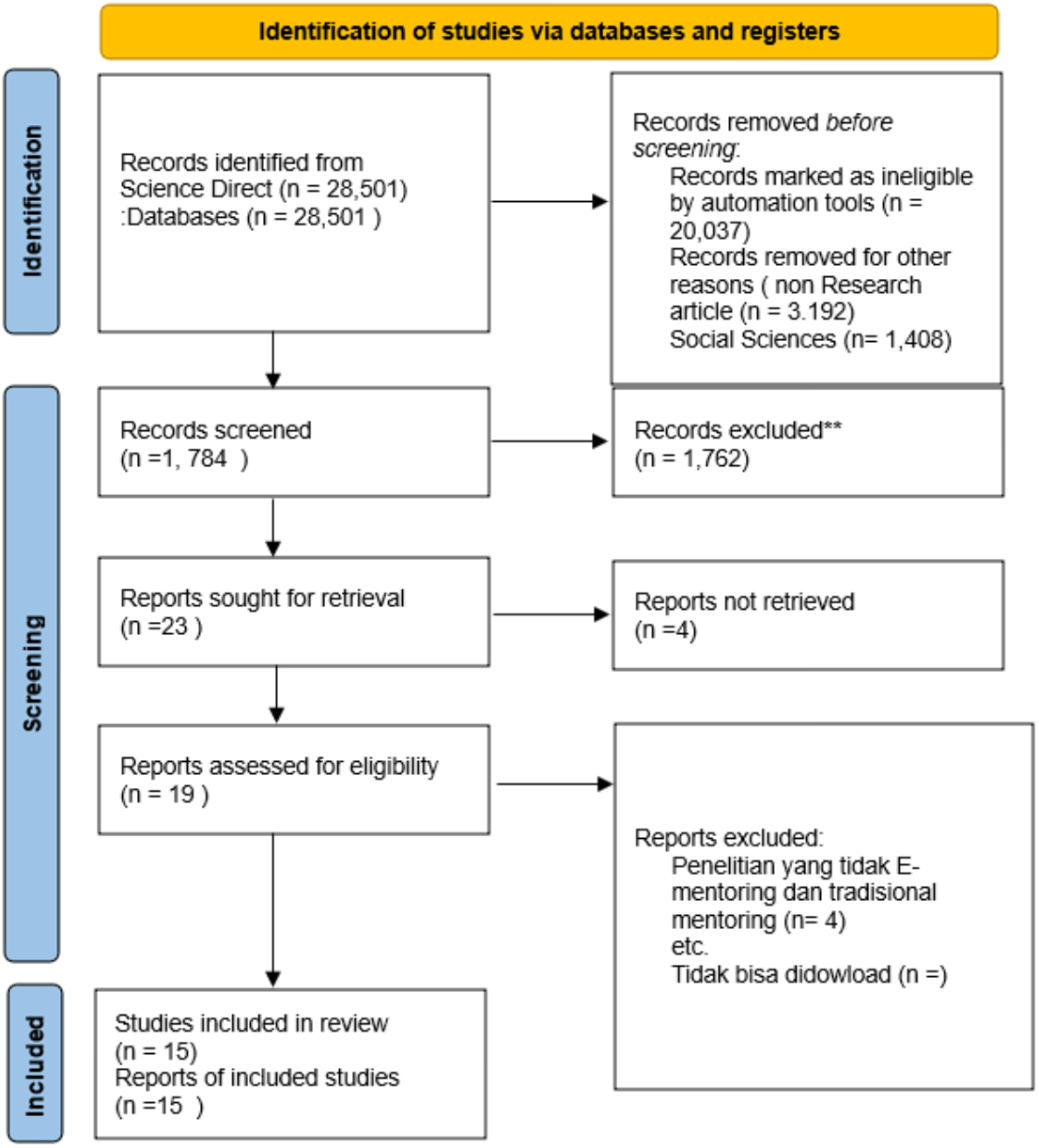

Figure 1. Selection process of the related studies using PRISMA framework

FINDINGS

What are the results of e-mentoring compared to traditional mentoring?

The identification results of the 15 selected articles show a comparison of the effectiveness of e-mentoring compared to traditional mentoring for teacher professional development. The results provide advantages and challenges regarding each model. For example, traditional mentoring shows strong evidence for teacher development. Research from Reister found that traditional mentors increased students' academic success and connection, helping mentees understand their roles and achieve goals (Reister, 2023). Supportive relationships formed through face-to-face interactions are highlighted as a key factor influencing effectiveness (Soto-Lillo & Quiroga-Lobos, 2021). Shang et al. noted that good relationships between mentors and students lead to better outcomes in terms of academic performance and career development (Shang et al., 2022)

However, traditional mentoring has challenges, such as research from Sherman et al. suggests that faculty mentors often face competing demands that limit their capacity for effective mentorship (Sherman et al., 2023). They also note that power imbalances in traditional faculty-student groups can inhibit discussions about personal challenges, potentially leading to social isolation and anxiety for students.

The presence of E-mentoring provides an approach that is able to overcome these challenges uniquely. For example, research from Güler & Çelik (2022) found that e-mentoring improved novice teachers' lesson analysis skills, with participants showing significant improvements in post-intervention assessments. The virtual format overcomes the barriers of time and distance, allowing for more consistent support and guidance (Sherman et al., 2023). Alexander and Bloom note that accessibility is increased due to the virtual format, maximizing opportunities for geographically and locationally distant participants (Alexander & Bloom, 2023). E-mentoring also appears to foster certain skills and interactions that may be particularly valuable for teacher development.

Research from Carvalho & Santos (2022) found that virtual mentors significantly increased metacognitive awareness and improved collaborative skills through digital technology. The structured nature of many e-mentoring programs encourages reflection and goal setting among participants (Alexander & Bloom, 2023). However, e-mentoring is not without challenges. Carvalho & Santos (2022) explains that technical issues can hinder effectiveness in remote scenarios, and motivation levels can decrease over time due to these challenges. Further information can be seen in Table 2 below, the researcher presents a comparison between the two approaches based on several key aspects identified.

The results of a comparative analysis between e-mentoring and traditional mentoring reveal some interesting differences in their implementation and effectiveness for teachers' professional development. In terms of accessibility, e-mentoring shows a significant advantage with its ability to overcome geographical and time barriers. This allows teachers to engage in professional development without being limited by location or tight schedules. As Alexander & Bloom (2023) points out, this increase in accessibility is especially beneficial for teachers in remote areas or those with busy schedules.

The consistency of support between these two approaches has different characteristics. E-mentoring facilitates more regular and continuous interaction through digital platforms, allowing for periodic monitoring and faster feedback. In contrast, traditional mentoring, while offering rich face-to-face interactions, is often limited by schedule clashes and various time demands of mentors (Sherman et al., 2023).

When it comes to skill development, each approach has its own advantages. E-mentoring excels in developing metacognitive awareness and digital collaboration skills, with various studies showing improved online professional reflection and communication skills (Carvalho & Santos, 2022). Meanwhile, traditional mentoring shows particular strength in modeling classroom practices and direct support in the implementation of teaching strategies.

The quality of mentor-mentee relationships is manifested differently in each format. Traditional mentoring does facilitate direct personal connections through face-to-face interactions, but e-mentoring has also succeeded in building trust and professional relationships

through structured virtual engagement (Güler & Çelik, 2022). Both approaches support effective reflection and goal-setting, although e-mentoring often provides more structured documentation of progress through digital platforms.

What influences the effectiveness of e-mentoring compared to traditional mentoring?

The results of the review show several specific differences that influence the effectiveness between e-mentoring and traditional mentoring in the context of teacher competency development. Several key influencing points such as accessibility and flexibility; content and engagement approaches and motivations for technology use; relationship quality According to Güler & Çelik (2022) emphasizes that e-mentoring is able to overcome time and distance barriers, providing greater flexibility than traditional mentoring. Here are some findings explained in Table 1.

Figure 2 indicates that these findings suggest that the effectiveness of e-mentoring compared to traditional mentoring is influenced by a variety of factors, including accessibility, use of technology, quality of relationship, content approach, and participant motivation and engagement. Understanding these factors can help in designing, implementing, and selecting more effective mentoring for development according to teacher competency needs.

First, the technological and accessibility dimensions play an important role. The research from Güler & Çelik (2022) identified that the success of e-mentoring is highly dependent on the quality of the digital infrastructure and the adaptability of participants to the platforms used. Their research shows that mentors and mentees who have good digital literacy achieve more optimal results.

Second, the quality of interaction and interpersonal relationships is a determining factor. A study from Alexander & Bloom (2023) found that even though it is done virtually, building trust and mutual respect remains an essential foundation. They note that successful e-mentoring programs are those that are able to create a strong "social presence" through structured and meaningful virtual interactions.

Third, program design and implementation play a crucial role. The research from Carvalho & Santos (2022) emphasizes the importance of a clear program structure, including goal setting, regular meeting schedules, and measurable evaluation mechanisms. Programs that blend asynchronous and synchronous elements show higher levels of participant engagement.

Table 1. Aspects comparison between e-mentoring and traditional mentoring

Aspect	E-mentoring	Traditional mentoring	Authors
Accessibility	Is able to overcome distance or time barriers.	Physical presence is needed, limiting the accessibility of it.	Güler & Çelik (2022) & Alexander & Bloom (2023)
Flexibility	Uses digital media to allow flexible interaction and easier video analysis.	Not as possible as e-mentoring, as it depends with face-to-face interactions.	Güler & Çelik (2022)
Technical Related Issues	Issues like poor internet connection likely happens during e-mentoring.	Less dependency on internet, resulting in fewer technical related issues.	Carvalho & Santos (2022)
Relationship Quality	Relationship in virtual world rely on mutual respect and trust.	Relationship is built through face-to-face interaction.	Alexander & Bloom (2023)
Connection With Human	Good for online learning context, but not able to fully replace connection between human.	Is able to give stronger sense of personal connection between mentor and mentees.	Alexander & Bloom (2023)
Content Approach	Is able to describe mentee's needs with a more customized and personal approach.	May focused more on theoretical contents during the mentoring.	Güler & Çelik (2022)

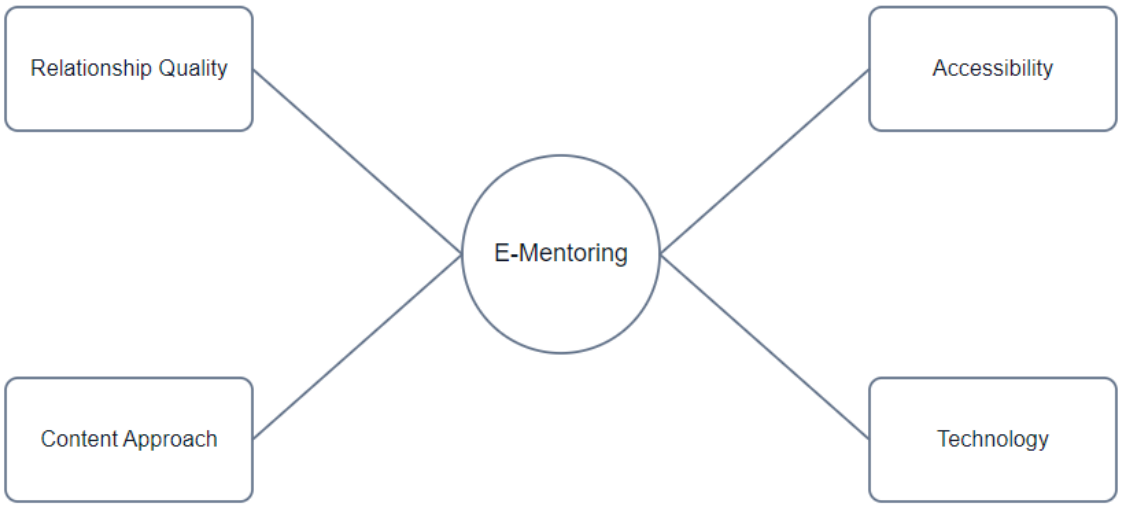

Figure 2. Key factors that influence e-mentoring effectiveness

E-mentoring is a new way for now?

Based on the results of the review, E-mentoring can be said to be a new alternative for developing teacher competency in the current digital era. For example, research from Güler & Çelik (2022) observed that e-mentoring can overcome time and distance barriers, supporting novice teachers effectively through flexible digital media. They noted improvements in lesson analysis skills through video integration in e-mentoring. The importance of this approach has been further highlighted during the COVID-19 pandemic (Alexander & Bloom, 2023), reporting the adaptation of e-mentoring to virtual contexts, allowing for greater communication flexibility and accessibility. Apart from that, research from Kung & Lee (2016) reinforces the benefits of e-mentoring in education, showing that the use of digital tools and social media can increase engagement and support, potentially even reducing student anxiety during clinical training. Carvalho & Santos (2022) added that e-mentoring not only supports synchronous interactions but also improves mentors' digital literacy and collaboration skills.

E-mentoring has become an innovative approach to developing professionalism, especially in training in the academic field. According to Tinoco-Giraldo et al. (2022), E-mentoring differs from traditional face-to-face mentoring models in that it uses electronic communication to build relationships, but the benefits are the same. E-mentoring provides the same informational, psychosocial, and instrumental benefits as those found in face-to-face mentoring models. E-mentoring has several key advantages. First, it allows mentors and mentees to overcome geographical and temporal constraints. Second, it offers more networking opportunities, including between institutions. The e-mentoring program also aims to provide a positive support role between mentors and mentees (Tinoco-Giraldo et al., 2022).

Research results from Tinoco-Giraldo et al. (2022) show that the e-mentoring program can improve professional competence, especially in four main competencies, namely project management, problem-solving, independent work, and teamwork. The mentors also confirmed a high level of satisfaction with the e-mentoring program through the design, objectives, and training provided, as well as an adequate level of professional, logistical, and technological support. However, it was also conveyed that the effective implementation of e-mentoring requires the primary considerations, namely ensuring reliable internet connectivity, adequate software and hardware required, training participants in the use of the platform, and maintaining data security and privacy (Tinoco-Giraldo et al., 2022).

Nevertheless, some researchers still emphasize the importance of traditional aspects in mentoring. Reister, for example, highlights the value of face-to-face interaction, while Sherman et al. noted that peer mentoring can include formal and informal methods, including virtual platforms. He then suggested the need for further research on the effectiveness of e-mentoring.

This suggests that e-mentoring offers a promising new way to support teachers' professional development, especially in contexts that demand flexibility and accessibility. However, their effectiveness may depend on careful implementation and consideration of the specific needs of a particular educational context.

DISCUSSION

This literature research aims to analyze and evaluate e-mentoring and traditional mentoring together for teacher professional development regarding why e-mentoring may be preferable to traditional mentoring to support teacher professional competence. The findings from the review article show that both models provide their respective advantages and disadvantages, but e-mentoring has emerged as a new alternative to overcome the shortcomings of traditional mentoring.

The main advantage of e-mentoring is unlimited capabilities and distance, providing greater flexibility for teachers to access and learn during training (Güler & Çelik, 2022). This is in line with previous research findings, which highlight the potential of e-mentoring to expand the reach and accessibility of teacher professional development programs (Borden et al., 2020; Brumovska, 2024). The ability of e-mentoring to provide more consistent and frequent support is also a significant advantage, especially for teachers in remote areas or with busy schedules (Sherman et al., 2023).

However, e-mentoring is not only about ease of accessibility but also the quality of interactions and relationships built virtually. This is confirmed by Alexander & Bloom (2023) who emphasised the importance of building trust and respect in virtual relationships, indicating that interpersonal aspects of relationships remain crucial even in online contexts. This raises the question of how to ensure that e-mentoring can facilitate the building of meaningful and supportive relationships, which is often considered a strength of traditional mentoring.

Technology in e-mentoring opens up new opportunities for in-depth analysis and reflection, as demonstrated by lesson analysis skills improvement through video integration (Güler & Çelik, 2022). This is in line with the argument that the asynchronous nature of many e-mentoring interactions can encourage deeper reflection. Previous research has defined an early understanding of the potential impact of e-mentoring on adolescent outcomes such as academic success, school attendance, and improved peer relationships (Shpigelman & Gill, 2013). It concluded mixed evidence for improving adolescent outcomes in varied domains (e.g., self-esteem, career readiness, academic achievement, etc.) and found that ongoing e-mentoring programs have benefited from clear guidelines, structures, and organizational tools (Kaufman, 2022).

Following the statement above, technical challenges such as internet connection problems can hinder effectiveness (Carvalho & Santos, 2022), indicating the need for adequate infrastructure and technical support for successful e-mentoring implementation. E-mentoring may be a better option in situations where accessibility and flexibility are top priorities in today's digital era, while traditional mentoring may be more appropriate when face-to-face interactions and hands-on modeling are considered crucial. Future research should further investigate factors that contribute to the effectiveness of e-mentoring, including program design, mentor training, and strategies for building strong relationships virtually.

This literature review research makes several important contributions to the field of teacher professional development and mentoring research. Theoretically, this study deepens our understanding of how different mentoring modalities affect teachers' professional growth, particularly highlighting the role of technology in mediating professional relationships and learning experiences. The study enriches the theoretical framework of professional development by identifying the key factors that influence the effectiveness of mentoring, both in virtual and traditional contexts.

From a methodological perspective, this study demonstrates the value of a systematic comparison between traditional and technology-based mentoring approaches, providing a structured framework for analyzing the effectiveness of mentoring programs that can be applied in future research. In practical terms, these findings offer evidence-based guidance for educational

institutions and policymakers in designing and implementing mentoring programs, especially in contexts where hybrid or flexible approaches may be beneficial. An in-depth analysis of the factors influencing the effectiveness of mentoring provides practical insights for program designers and managers to optimize both traditional and e-mentoring initiatives according to their contextual needs and resources.

CONCLUSION

This research has successfully identified the results that e-mentoring provides a new alternative to expand access and increase the flexibility of use and participants without boundaries and distance. This research produced several significant theoretical findings. First, the effectiveness of e-mentoring is not solely determined by technology but by a balanced integration of technological, pedagogical, and social elements. Second, the success of mentoring programs, both traditional and electronic, depends heavily on the quality of the interpersonal relationships that are built. Third, this study identifies a hybrid model that combines the strengths of traditional e-mentoring and mentoring as a promising approach for teachers' professional development in the future.

However, this study has some limitations. The focus on the 2020-2024 period, while providing an up-to-date perspective, may exclude valuable insights from previous studies. In addition, variations in the context of implementation and methodologies for measuring effectiveness between studies make generalizing findings a challenge. For further research, we recommend: (1) a longitudinal study comparing the long-term effectiveness of various mentoring models, (2) a more in-depth investigation of the role of emergent technologies such as AI in the context of e-mentoring, and (3) the development of more standardized metrics to measure the effectiveness of mentoring programs. Future research also needs to consider how cultural and organizational contexts affect the successful implementation of e-mentoring.

Author contributions

The authors made significant contributions to the study's conception and design. The authors were in charge of data analysis, interpretation, and discussion of results. The final manuscript was read and approved by the authors.

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Conflict of interest

The authors declare that there is no potential conflict of interest.

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