

Systematic Review

Faculty Development Interventions in Medical Education During the COVID-19 Pandemic: A Systematic Review

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Abstract: The onset of the COVID-19 pandemic in March 2020 began a series of disruptions that rapidly impacted medical education across the globe. This review collates current literature that relates to medical education faculties' development interventions as a result of the pandemic, with an emphasis on the effectiveness and type of strategies for intervention, such as the usefulness of hybrid and digitalised education. The study used PRISMA guidelines when conducting the literature survey with specified inclusion and exclusion criteria across numerous academic databases. From this survey, 1158 articles were found. The EndNote programme was used to identify and remove duplicate pieces. From this, 479 abstracts were reviewed. A total of 36 articles were selected for their relevance; from this, 11 were deemed to have met the inclusion criteria to warrant full-text analysis. To identify bias risk in these 11 studies, the Newcastle–Ottawa Scale (NOS) was utilised. The study findings have two major themes: (1) information about faculty development interventions; and (2) the nature of articles written in the pandemic. From this, it was indicated that faculty development initiatives are useful for improving teachers' competency and for enhancing teachers' adoption of digitalised learning to ultimately bolster the resilience of their teaching. The findings also show that there is a strong need to have robust frameworks in place for faculty development, and that such frameworks must be followed in and beyond the pandemic period to improve the long-term incorporation of online learning into medical education.



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1. Introduction

The COVID-19 pandemic gave rise to many difficulties in medical education, namely practical and theoretical learning, as a result of the need for physical separation to reduce viral infection, protective gear and equipment, sterility concerns in clinical environments, and general health concerns for both educators and students (Daniel et al., 2021). Consequently, students reported a decrease in their confidence in their studies exacerbated by several schools having pushed forward graduation dates in order to propel students into the wider healthcare workforce; such an action leaves potential for this lack of confidence to manifest in the long-term (Gordon et al., 2020; Naidoo et al., 2021). Students' chosen career specialisms were also affected by the pandemic as schools altered programmes and learning outcomes to align better with the current healthcare landscape (Gittler & Hamilton, 2021).

Faculty development was significantly impacted by the pandemic, necessitating rapid adjustments in the way these programmes are implemented (Nagpal et al., 2021). Faculty development programmes shifted to digital formats like webinars, virtual seminars, and

online resources through educational management systems in response to these difficulties (Khamees et al., 2022). To ensure such changes are beneficial in the long run and to identify how they may be improved in the future, it is essential to critically analyse these modifications (Miles et al., 2021).

There has been significant research on the impact of COVID-19 on the field of medical education. One study from Dedeilia et al. (2020) commented on this disruption while highlighting the innovations that grew out from it. Another study also reviewed advancements in a rapid systematic format and stated that further research in this area was essential (Gordon et al., 2020). Zuo and Miller Juvé (2021) examined five studies that investigated faculties' technology adoptions during the pandemic, offering insights and reflections into the usefulness and limitations of this new approach. Broader medical education trends in the pandemic were examined by Daniel et al. (2021), who noted that there is a dearth of studies on faculty development, which could be problematic as there is an increasing need for faculty training.

Research Questions: This review aims to address the following topics in light of the lack of research focused on faculty development during the COVID-19 pandemic:

1. In response to the COVID-19 pandemic, what kinds of faculty development initiatives were used in medical education?
2. Which teaching strategies were applied in these interventions, and to what extent did they help faculty members adjust to hybrid or digital teaching methods?
3. How did these approaches affect faculty development and evaluation results, specifically regarding the improvement of medical education delivery?

Currently, there is no encompassing review that focuses on faculty development interventions in the COVID-19 pandemic. The goal of this review is to address and help close this gap by laying out a comprehensive analysis and evaluation of faculty development interventions in medical education in response to the pandemic, with a concentration on intervention type and educational methods.

2. Methodology

PRISMA guidelines ("Preferred Reporting Items for Systematic Reviews and Meta-Analyses") (Takkouche & Norman, 2011) were used in the study selection process. This review adhered to a robust methodological approach to guarantee that the data collected was both comprehensive and obtained systematically.

2.1. Search Strategy

Five databases were used to search for the articles. Only studies in the English language were considered, and there were no restrictions on the publishing date so as to not exclude any potentially relevant information. Using multiple databases meant that we were confident in the spread of academic and grey literature. The following search strategies were used for each database:

- Scopus: TITLE-ABS-KEY(("faculty development" OR "faculty training" OR "teacher development" AND "medical education" OR "health education" OR "medical teaching" AND "COVID-19" OR "coronavirus" OR "pandemic" AND "intervention*" OR "programme*" OR "initiative*" OR "strategy").
- Web of Science: TS = ("faculty development" OR "faculty training" OR "teacher development" AND "medical education" OR "health education" OR "medical teaching" AND "COVID-19" OR "coronavirus" OR "pandemic" AND "intervention*" OR "programme*" OR "initiative*" OR "strategy").
- EBSCO: "faculty development" OR "faculty training" OR "teacher development" AND "medical education" OR "health education" OR "medical teaching" AND "COVID-

19" OR "coronavirus" OR "pandemic" AND "intervention*" OR "programme*" OR "initiative*" OR "strategy".

- Google Scholar: "faculty development" OR "faculty training" OR "teacher development" AND "medical education" OR "health education" OR "medical teaching" AND "COVID-19" OR "coronavirus" OR "pandemic" AND "intervention*" OR "programme*" OR "initiative*" OR "strategy".
- Covid: ("faculty development" OR "faculty training" OR "teacher development"), AND ("medical education" OR "health education" OR "medical teaching") AND ("COVID-19" OR "coronavirus" OR "pandemic") AND ("intervention*" OR "programme*" OR "initiative*").

Further databases were searched for any past or current systematic reviews relating to the focus of this study. Results were collated and repeated information was deleted from the study with EndNote software.

2.2. Study Selection

The studies were stored in EndNote (EndNote X9, [Clarivate, 2015](#)). Studies were included following independent approval from two different reviewers, so as to ensure best practice. The first reviewer undertook an evaluation of duplicate titles and abstracts; the second looked at the studies' data and resolved discrepancies. The following inclusion and exclusion criteria formed the basis of the study selection:

2.3. Inclusion Criteria

- Cross-sectional studies, case-control studies, quantitative studies, cohort studies, and qualitative research.
- Research carried out or released from December 2019 to the date of the current study.
- Research focused on medical education teaching staff.
- Research examining faculty development initiatives (e.g., webinars, online learning, training programmes, workshops, etc.) pertaining to medical education during the pandemic.
- Research published in the English language.

2.4. Exclusion Criteria

- Opinion pieces, editorials, letters to the editor, book reviews, non-peer-reviewed publications, and studies which are solely theoretical and lack empirical data.
- Research concentrated on students over teachers.
- Research that fails to address COVID-19-related faculty development initiatives for medical education.
- Research that does not discuss the effects of faculty development.
- Research that is not published in the English language.

To obtain and store data, Microsoft® Excel (version 2019) was utilised (Microsoft, Inc., Redmond, WA, USA).

2.5. Bias Assessment Methodology

To identify bias risk in the studies, the Newcastle–Ottawa Scale (NOS) was utilised. Studies were ranked low, medium, or high according to the bias in the selection stage, interventions, intervention deviation, absent data values, and results. Efforts were made to eradicate bias in the methodology. Selection was determined through our inclusion and exclusion criteria. Through our control elements and the consideration of allocation concealment, we assessed performance bias. Alongside this, we incorporated efforts to analyse data comprehensiveness, industry sponsorship, and overall bias. Uniformity and

eligibility were reviewed numerous times, and two reviewers were employed to close gaps in scoring prior to study selection.

3. Results

3.1. Search Results

A total of 1158 articles were initially collected across the 5 databases. The EndNote programme was used to identify and remove duplicate pieces (679 duplicates were removed). From this, 479 abstracts were reviewed and 433 were removed from consideration as they did not meet the criteria for this study. A total of 36 articles were selected for their relevance, but only 23 reached all the criteria. A further 12 studies were removed as they did not cover faculty development during the COVID-19 pandemic. Therefore, a final 11 studies were deemed to have met the complete inclusion criteria to warrant full-text analysis and inclusion in this review (see Figure 1).

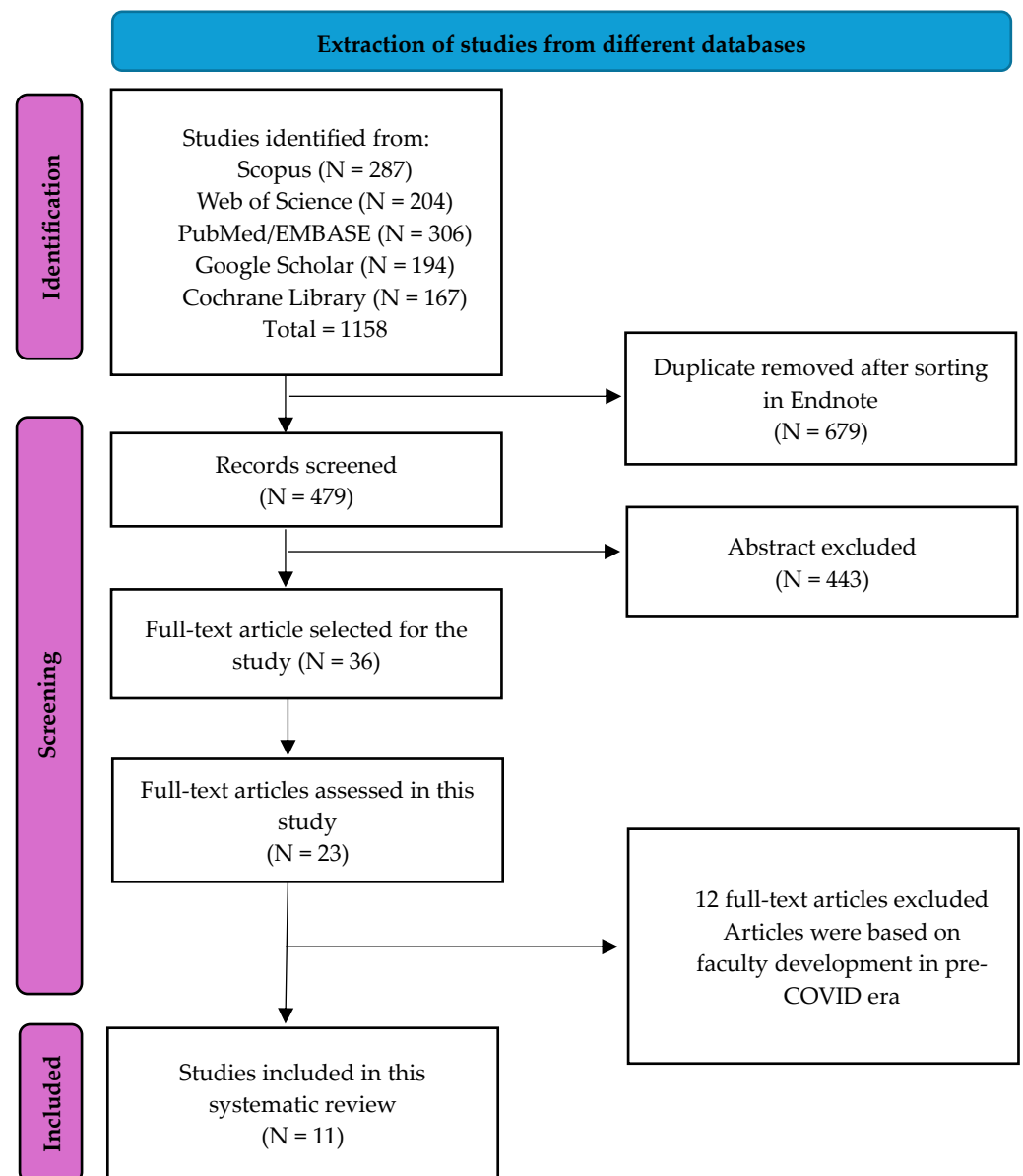


Figure 1. PRISMA flow chart for studies selection.

3.2. Risk of Bias Results

The Newcastle–Ottawa Scale (NOS) was used to assess the risk of bias and is reflected in Table 1. Among the studies, the following occurred:

- Eight were deemed to have a low risk of bias.
- One (Buckley et al., 2009) was deemed to have a moderate bias risk.
- The remaining studies were deemed to have a low risk of bias, signifying high research quality.

Table 1. A risk of bias assessment in the studies included in this systematic review.

Study	Selection	Comparability	Exposure	Rating
Singh et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Heldt et al. (2021)	★★★★	★★★★	★★★★	Low Risk
Paetsch and Drechsel (2021)	★★★★	★★★★	★★★★	Low Risk
Mulla et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Veerapen et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Lipscomb and Tate (2020)	★★★★	★★★★	★★★★	Low Risk
Eltayar et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Al-Kadri et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Buckley et al. (2009)	★★★	★★★	★★★	Moderate Risk
Keegan et al. (2020)	★★★★	★★★★	★★★★	Low Risk
Finn et al. (2020)	★★★★	★★★★	★★★★	Low Risk

Rating scale: 10–12 stars = low risk of bias; 7–9 stars = moderate risk of bias; 0–6 stars = high risk of bias.

Issues pertaining to control selection have impacted some studies and pose the risk of bias. One study had a narrative style as it utilised a subjective approach and was categorised as high risk. Further, the lack of randomised exposure in certain studies still posed a moderate risk.

However, overall, studies mainly presented a low risk of bias, according to GRADEpro GDT. This is because original research was used, which is inherently more reliable.

3.3. Characteristics of Included Studies

The 11 studies used in this review originated from countries including the USA, Canada, India, Germany, Egypt, Saudi Arabia, and the United Kingdom, highlighting the global interest in this area of study (see Table 2).

The interventions analysed were found to primarily focus on digital teaching skill development; some articles also discussed research elements and the incorporation of educational resources. The interventions were conducted synchronously (e.g., webinars) (see [Singh et al., 2020](#); [Heldt et al., 2021](#)) and asynchronously (e.g., videos, self-taught modules) (see [Mulla et al., 2020](#)).

According to Kirkpatrick’s model of evaluation, most of the research assessed outcomes at the reaction and results levels. [Singh et al. \(2020\)](#) and [Mulla et al. \(2020\)](#) concentrated on the results level, measuring the impact on teaching skills and digital instruction effectiveness, while [Heldt et al. \(2021\)](#) and [Paetsch and Drechsel \(2021\)](#) evaluated participants’ initial reactions to the interventions. Further, [Keegan et al. \(2020\)](#) assessed changes in behaviour as a result of online medical education.

The studies conducted in response to the SARS-CoV-2 pandemic incorporated various adaptations to ensure effective delivery and engagement. To advertise events and promote

engagement, social media and academic sites were utilised (Finn et al., 2020; Keegan et al., 2020; Al-Kadri et al., 2020). For instance, a number of studies incorporated the use of hashtags and digital calendar invites when events occurred beyond regular working hours. These adjustments helped widen the accessibility of the study.

Numerous studies in the research also demonstrated the need for easy access, clear instructions, and compatibility across platforms (Keegan et al., 2020; Eltayyar et al., 2020). To guarantee a wider range of viewpoints and optimise debates, facilitators also made efforts to include moderators from various institutes and have diverse voices in related discussions (Finn et al., 2020).

Table 2. Characteristics of included studies.

Citation	Publication Date	Country	Type of Intervention	Focus of Intervention	Method of Instruction	Evaluation Level
(Singh et al., 2020)	4 May 2020	India	Synchronously	Online skills for teaching	Webinar	Results level
(Heldt et al., 2021)	17 February 2021	USA	Synchronously	Online skills for teaching	Webinar	Reactions level
(Paetsch & Drechsel, 2021)	2 November 2021	Germany	Synchronously	Online skills for teaching	Webinar	Reactions level
(Mulla et al., 2020)	13 May 2020	USA	Asynchronous	Online skills for teaching	Videos	Reaction level
(Veerapen et al., 2020)	4 May 2020	Canada	Synchronously	Online skills for teaching	Online Workshop	Results level
(Lipscomb & Tate, 2020)	23 June 2020	USA	Synchronously	Online skills for teaching	Webinar	Not reported
(Eltayyar et al., 2020)	23 April 2020	Egypt	Synchronously and Asynchronous	Online skills for teaching	Videos and workshop	Reaction level
(Al-Kadri et al., 2020)	1 September 2020	Kingdom of Saudi Arabia	Synchronously	Online skills for teaching	Webinar	Not reported
(Buckley et al., 2009)	20 May 2020	Canada	Synchronously	Online skills for teaching	Webinar	Results level and reaction learning
(Keegan et al., 2020)	11 May 2020	Canada	Asynchronous	Curated medical education resource	Open access resource	Behavioural level
(Finn et al., 2020)	16 May 2020	United Kingdom	Synchronously and Asynchronous	Research skills	Live chat and videos	Results and reaction level

3.4. Challenges

Despite the above measures, obstacles including participant unfamiliarity with video conferencing equipment (Veerapen et al., 2020), scheduling conflicts across time zones, and larger workloads occurred. Alongside medical duties and general pandemic-related health concerns, this hindered participants' ability to play a full role in the study. These obstacles highlight the need for realistic goals in research and to ensure that participants are comfortable (Lipscomb & Tate, 2020; Buckley et al., 2009; Singh et al., 2020).

3.5. Educational Outcomes

With use of Kirkpatrick's model, eight articles (73%) showed positive outcomes at the reaction level, revealing an increase in drive and motivation across the participants (Buckley et al., 2009; Heldt et al., 2021; Paetsch & Drechsel, 2021; Mulla et al., 2020; Singh et al., 2020). Additionally, several studies documented decreased distractions and increased engagement during workshops (Eltayyar et al., 2020).

One study (12%) revealed that participants' confidence in implementing novel teaching strategies, such as virtual instruction, had increased at the learning level (Buckley et al., 2009). Further, high rates of online medical education resource utilisation were noted in one study by Keegan et al. (2020) that looked at behavioural impacts.

As a response to the social isolation brought on by the pandemic, four studies (50%) reported the development of fresh partnerships, improved collaborative abilities, and a

stronger sense of belonging throughout the interventions (Finn et al., 2020; Mulla et al., 2020; Veerapen et al., 2020). Further, in Buckley et al. (2009), participants valued the sense of community brought about by the intervention.

Building on the general educational outcomes identified, this section delves into the specific implications and opportunities for medical education faculty during the pandemic.

3.6. Educational Outcomes Specific to Medical Education

Faculty development interventions frequently targeted digital teaching competencies unique to the medical curriculum, such as online clinical simulations, virtual patient interactions, and asynchronous learning modules. For example, Singh et al. (2020) and Mulla et al. (2020) highlighted how real-time video conferencing was leveraged to simulate patient case studies, enhancing both teaching and the assessment of clinical skills. Finn et al. (2020) found that virtual small group discussions supported personalised feedback and interactive learning crucial for medical subjects like anatomy and pathology.

Furthermore, digital tools such as electronic medical record (EMR) simulations and telehealth practice modules specifically addressed emerging gaps in medical training. These tools ensured not only continuity of education but also prepared trainees for modern health-care models incorporating telemedicine. These findings emphasise the necessity of tailoring faculty development programmes to the practical, skill-based nature of medical education.

4. Discussions

The term faculty development is used to indicate the interventions in place to help medical teachers improve their teaching skills individually and within the collective pedagogical setting (Salajegheh et al., 2020a). Using existing data, this study aimed to examine how faculty development was utilised and adjusted in the field of medical education during the globally disruptive COVID-19 pandemic.

The review discovered that faculty development veered toward digitalisation due to the pandemic-imposed new environment of social and physical distance. The interventions manifested in many different ways, from synchronous modes (such as webinars and workshops) to asynchronous modes (such as video presentations). The review's outcomes concur with existing knowledge in the area that reveals how teachers rapidly changed their teaching methods so that they were able to continue educating their students (Gordon et al., 2020).

Furthermore, the review showed that faculty development interventions were geared primarily toward improving teachers' digital skillset, as found in studies by Al-Kadri et al. (2020), Buckley et al. (2009), and Eltayar et al. (2020). Despite this, there is still a need for virtual skills to grow beyond basic digital competencies and toward a more comprehensive and integrated teaching strategy that incorporates digital elements well into the permanent curricula, given that the presence of the online space is set to be a core part of teaching now and in the future. To achieve this, a structured framework is required (Qureshi et al., 2020; Tempiski et al., 2020).

Faculty development was conducted primarily in-person prior to the pandemic, with very few hybrid or online interventions (Steinert et al., 2016; Ahmed et al., 2020). The findings of this review highlight the significance of extending these efforts beyond the pandemic to guarantee that faculty have the necessary skills to handle future educational challenges. The transition to digital modes of education highlights the need to modify faculty development so that it stays current and efficient during times of crisis (Salajegheh et al., 2020b).

The research identified a number of obstacles, one of which was the inexperience of teachers with digital forms of education and the negative consequences of this on the impact of some interventions (Eltayar et al., 2020; Keegan et al., 2020; Singh et al., 2020).

To combat this and ensure teachers are better equipped for these new teaching methods, comprehensive training programmes should be integrated into current faculty development training schedules.

The studies also identified the need for dynamic student engagement and interactive teaching methods because it lessens the risk of student disengagement. The most effective examples of these, according to our analysis, include small group activities and performance critiques (Finn et al., 2020; Paetsch & Drechsel, 2021; Eltayar et al., 2020). Lecture recordings, an increase in learning resources, and features like digital “breakout rooms” were also found to be useful (Gordon et al., 2020). Going forward, interventions should focus on these sorts of activities, with synchronous and asynchronous approaches (Mohammadi et al., 2020).

Additionally, our study discovered that, together with feedback, the presence of a framework for knowledge application encourages active learning and improves teaching effectiveness (Salajegheh et al., 2020a). Follow-up sessions were used in a number of the studies examined in this review, and these sessions were effective in solving issues that arose following the first intervention (Eltayar et al., 2020; Buckley et al., 2009; Veerapen et al., 2020). Prospective faculty development programmes should prioritise this practice to guarantee ongoing education and the incorporation of innovative teaching techniques.

The evaluation of faculty development interventions is essential to ensure the programmes have been conducted successfully, yet the studies reviewed lacked this element; numerous studies concentrated instead on learner-oriented or content-oriented evaluation methods (Steinert et al., 2006; Ahmed et al., 2020). A better evaluation structure that includes student outcomes and looks toward prolonged effectiveness is needed to ensure these interventions run at their optimal state.

There was also a lack of structure in the programmes; only very few of the programmes we reviewed appeared to have a structured conceptual framework. A programme built around solid theory gives way to better outcomes and allows results to be more easily understood (Crespi, 2020). The developers of prospective interventions should make all efforts to ensure that they have this solid conceptual framework for enhanced design, delivery, and assessment.

Overall, through a focus on digitised learning, active engagement, and full evaluations, this review stresses the importance of faculty development interventions during the time of the COVID-19 pandemic. As there is now a large digital element in medical education, this review also notes the need to ensure these interventions have the potential to last over time by ensuring that educators possess the skills required for these new avenues of learning. If interventions and teaching skills are optimised, the medical education field will be far better equipped to tackle both short- and long-term challenges.

While the findings highlight several opportunities for faculty development, it is equally important to recognise the limitations of this review to provide a balanced understanding of its contributions and boundaries.

Study Limitations

This systematic review, while comprehensive, has several limitations. First, the study’s reliance on a relatively small sample size of 11 articles restricts the generalisability of the findings. Although the inclusion criteria ensured the relevance of the selected studies, the limited availability of free, full-text articles may have led to the exclusion of potentially valuable contributions.

Second, the heterogeneity of the studies included, particularly in terms of their methodologies and evaluation frameworks, posed challenges in drawing unified conclusions. For example, the varying approaches to measuring outcomes, from subjective self-reports to objective performance evaluations, limited the ability to make definitive comparisons.

Third, the review primarily focused on faculty development interventions during the COVID-19 pandemic, and the findings may not fully capture the nuances of pre-pandemic practises or their applicability in a post-pandemic context. Future research should aim to address these gaps through longitudinal studies that assess the sustained impact of digital faculty development programmes in medical education.

Finally, while the interventions discussed were tailored to the medical education field, the study's emphasis on digital tools and frameworks may overlook other critical areas, such as the development of in-person clinical teaching skills or the integration of interprofessional education.

5. Conclusions

The review studied the evidence on faculty development initiatives in the area of medical education following the COVID-19 pandemic. As distance learning grew to become a crucial component of medical education, the results show how faculty development interventions quickly shifted to digital modes. Plans for faculty development initiatives must evolve as medical education progresses to accommodate the varying difficulties and requirements of online instruction and to ensure that teachers have the relevant expertise.

Although successes have been found in the switch to digital learning, the biggest obstacle found from the research was a lack of teacher training in this area (Eltayar et al., 2020; Keegan et al., 2020; Singh et al., 2020). This challenge is a priority and should be key in the development of future interventions to ensure that faculty are confident and well equipped in all teaching strategies.

Practically speaking, this study highlights the need to design dynamic faculty development initiatives. Active teaching techniques include feedback-driven exercises, discussions in small groups, and synchronous and asynchronous exchanges were shown to increase faculty members' engagement and improve students' learning results. A combination of these tactics should be used in future programmes to increase student and teacher performance and participation in online learning environments. Additionally, a critical element underutilised in the evaluated research is programme assessment. For faculty development programmes to be successful and have a lasting influence, comprehensive assessment frameworks that evaluate implementation, content, and learner outcomes are necessary.

Future research should consider the potential of hybrid and asynchronous learning methods given their impact on teaching practises and education outcomes. Further, longitudinal research can help ascertain the lasting effects of digital learning and their sustained integration into the existing curricula. Research into the growth of teachers, both in the workplace and in their personal life, should be conducted alongside studies that investigate ways to incorporate the wider teaching community into new practises.

Key limitations include the size of the research sample, which was 11 studies. The results cannot be entirely generalised or used to make definitive statements on the entire field of medical education and faculty development interventions. The absence of programme evaluations also formed another limitation, as it was difficult to fully analyse the interventions' impact on development outcomes.

In sum, the pandemic-induced transition to digital learning has led to a number of benefits and concerns. Sustained innovation and adaptation are needed in the field of medical education when designing new programmes for faculty development so that the initiatives are robust and that teachers are adequately skilled. Government officials and education staff should take measures to ensure that this is implemented; the outcome would be professional and personal growth for teachers and improved education for learners. With the demand for distance learning expanding as times move forward, meeting these needs now is more crucial than ever before.

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