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Designing a Blended Learning Model in the Post-COVID Era with an Emphasis on the Mediating Variable of E-Learning Maturity

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ABSTRACT

Purpose: This study aims to design a blended learning model tailored for the post-COVID era, focusing on the mediating role of e-learning maturity.

Methods and Materials: This applied research used a descriptive-survey approach for data collection, combined with a qualitative-exploratory method. Data were collected cross-sectionally from a sample of 122 academic experts in distance education planning and educational technology, each with at least 15 years of experience. Purposive sampling with snowballing was applied until theoretical saturation was achieved. Data were gathered through literature reviews and semi-structured interviews, validated by experts, and ensured for reliability through repeated responses.

Findings: Key components identified for the blended learning model included: educational processes (e.g., operationalizing knowledge, collaborative learning approaches), progress processes (e.g., flexibility, customized development goals), support processes (e.g., technical and emotional support), evaluation processes (e.g., performance and creativity evaluation), quality control processes (e.g., technology-based quality monitoring), and management processes (e.g., resource allocation and educational management).

Conclusion: The proposed blended learning model provides a comprehensive framework for post-COVID education, emphasizing e-learning maturity to enhance adaptability, effectiveness, and quality in educational practices.

Keywords: Blended Learning, Post-COVID Era, E-Learning Maturity, Educational Technology, Distance Education

1. Introduction

The third millennium is an era of rapid transformation, with the contemporary world significantly influenced by technological changes. One of the areas profoundly affected by these changes is the field of education and learning. Today, e-learning has emerged as one of the most dynamic methods for delivering educational services, providing individuals with numerous learning opportunities previously unavailable (Taheri et al., 2018).

The COVID-19 pandemic led to global transformations, particularly in educational systems, bringing a range of challenges and opportunities in the post-COVID era (Momeni & Ahmadi, 2022). During the pandemic, virtual education gained substantial importance worldwide, integrating into formal schooling and replacing traditional teaching and learning methods. However, despite the opportunities virtual education created in the educational sphere, it cannot encompass all aspects of education in the post-COVID era. Students must attend school, utilizing a blended approach that combines in-person and virtual learning to achieve educational goals more effectively, especially for perceptual subjects (Chaudhary et al., 2022). In the post-COVID era, it is essential to preserve the hard-earned advancements in virtual education, ensuring that its capabilities as a critical infrastructure continue to expand daily (Faramarzi Babadi et al., 2024; Masoumifard, 2021; Shariati et al., 2024). Virtual education offers significant economic and educational benefits and can permanently constitute part of the learning experience for students. This new educational environment must be updated, leveraging its capabilities to reduce costs (Musaibi Ardakani et al., 2021).

Blended learning, with the advantages of both in-person and virtual education, presents an effective approach for enhancing learning effectiveness and accessibility to educational goals in the post-COVID era. However, e-learning systems in the post-COVID era face challenges such as low digital competence among students (Samadi, 2021), high dropout rates, increased individual differences among students in classrooms (Ronaghi & Hosseini, 2018), and greater educational infrastructure needs compared to traditional education (Espinoza-Guzmán & Georgina Gomez Zermeno, 2017).

Blended learning is an artful and comprehensive educational system, providing an opportunity for countries aspiring to advance technologically and transform their educational methods and environments to achieve modern

educational approaches. It is important to remember that each scientific approach, when properly designed and implemented, yields effective results within its scope. Therefore, expecting a short-term solution to all educational issues or changes in learners' behavior could be overly simplistic (Salimi & Fardin, 2019). Educational planners must devote utmost effort to mitigating current and potential issues, enabling learners to engage confidently, independently, and self-assuredly in desired activities, receiving necessary content. In the post-COVID conditions, these efforts should focus on addressing pre-existing issues and advancing e-learning trends (Al-Rikabi & Montazer, 2022; Isa Abadi, 2022).

Thus, in the post-COVID context, there is a strong need for a model that promotes e-learning maturity. The COVID-19 crisis introduced challenges in education, such as the deprivation of students from the social and lively environment of schools, the struggle for learning, collective living, and social engagement (Mendoza et al., 2022). Additionally, the lack of preparedness among authorities and families for this novel, substantial process in education has led to numerous issues that the virtual education plan has not only failed to mitigate but has, in some cases, exacerbated. Given the projected continuation of this trend, a sense of burnout could arise, with families and students bearing various negative impacts (Al-Rikabi & Montazer, 2022). Thus, there is a palpable need for models that can foster tangible e-learning maturity, along with the expectation that developing necessary infrastructure, such as nationwide internet expansion and speed enhancement, can support this goal.

In this context, the blended learning model becomes pertinent in advancing and enhancing the application of e-learning systems (Murphy, 2020). Through a maturity model, the current state can be identified, and an optimal state defined (Noor et al., 2022). E-learning can be considered mature when precise controls are in place, a comprehensive and flexible system network is established, and the organization can meet the needs of the information age (Thahir et al., 2023). The blended learning model extends interactions beyond temporal and spatial boundaries, transforming various forms of teaching and learning (Keivani et al., 2019). With an emphasis on the mediating variable of e-learning maturity, this model is designed to assist students in their learning processes within online environments. Different methods can be employed to implement the blended learning model. For instance, tailored

learning activities can be provided based on each student's skill level (Bazmi, 2023).

E-learning maturity refers to achieving full deployment and the highest degree of efficiency and use of electronic technologies for content delivery and instruction (Al-Khasawneh & Obeidallah, 2019). This instructional method involves using digital media, videos, software, and other electronic tools to assist students in learning, comprehension, and problem-solving (Semrithin & Sousanto, 2023). With e-learning maturity, students can access educational resources online at any time, expanding their knowledge conveniently, affordably, and with minimal time commitment (Virani et al., 2023).

As noted, the primary research question addresses the gap between current e-learning and blended learning advancements and full maturity. An appropriate model for attaining e-learning maturity could enhance the quality of this educational system. Therefore, this study investigates the design and validation of a blended learning model in the post-COVID era, with an emphasis on the mediating variable of e-learning maturity. Blended learning, a novel model in the learning system, intertwines information and communication technologies with in-person educational features, making education and learning more efficient and effective. Studies indicate that during the COVID era, students were compelled to learn to use educational tools and software, which has subsequently increased their digital literacy. Additionally, more electronic content and resources were developed during this period, and investments in technological infrastructure for e-learning rose. These factors collectively contribute to the maturation of e-learning within the blended learning framework. This trend appears likely to continue, with e-learning maturity playing a more central role in advancing blended learning within the educational system. However, research reveals a lack of substantial scholarly achievements in this area. Existing blended learning approaches in universities have not yielded optimal outcomes, highlighting the importance of enhancing students' e-learning maturity to participate effectively in blended learning processes. Sahri and Jamadi (2022), in a study examining blended learning as an optimal learning option in the post-COVID era, concluded that blended learning also describes other combinations, such as mixing various educational methods, approaches, and technologies (Sahari & Jamadi, 2022). Since blended learning has many interpretations, it is essential for researchers and practitioners to clarify what blended learning means to them, and it is suggested that alternative, more descriptive terms

may serve as complements or substitutes for blended learning. In a study titled "E-Learning: Identifying Challenges and Barriers in Virtual Learning during the COVID-19 Pandemic," Isa Abadi (2022) concluded that COVID-19 introduced numerous barriers in education, impacting teacher training. The pandemic and post-COVID periods saw many issues in virtual learning, such as internet addiction among students, uncertainty in content mastery, lack of oversight on assignments and verification, some teachers, parents, and students struggling with online platforms, inability of some parents to afford phones and internet, internet access issues, and inefficiencies in national educational broadcasts (Isa Abadi, 2022). Reyhani (2022), in a study titled "E-Learning: A Novel Process in Education and a Bridge to Future Education in the Post-COVID Era," concluded that e-learning has the potential to bridge barriers between parents and teachers, extending learning beyond the classroom. Employing modern educational technologies and e-learning has significantly contributed to the progress of students and teachers. However, teachers, as classroom leaders and facilitators of the learning process, play a crucial role in this system (Reyhani, 2022). In a study titled "Teaching and Learning during and Post-COVID: A Meta-Synthesis Approach," Ashouri (2023) found that the outcomes were divided into positive and negative categories. Following content analysis, 51 main consequences of expanding the virtual learning space were identified, with 30 positive and 21 negative outcomes. Ultimately, five major categories and 16 component areas emerged from the analysis of codes and concepts (Ashouri, 2023). Ibna Seraj et al. (2022), in a systematic review titled "Educational Trends and Evaluation Methods during the COVID-19 Pandemic and Post-COVID Era Based on Teacher and Student Perspectives," concluded that COVID-19 had widespread impacts on education worldwide. Following the sudden shift from face-to-face to online platforms for teaching, learning, and evaluation, both teachers and learners struggled to adapt. Thus, 18 distinct benefits, 28 challenges, 15 objectives, and 14 platforms for online learning have been identified in the context of various online educational trends (Ibna Seraj et al., 2022).

This study aims to identify the educational processes, development and progress processes, support processes, evaluation processes, quality control processes, and management processes within the post-COVID blended learning model.

2. Methods and Materials

This research focuses on designing and validating a blended learning model in the post-COVID era with an emphasis on the mediating variable of e-learning maturity. The study is applied in purpose, descriptive-survey in terms of data collection, qualitative-exploratory in data nature, and cross-sectional in data collection timing. Data collection initially involved reviewing document studies through electronic search tools and note-taking. A semi-structured interview form was then developed, validated for reliability, and used in interviews with educational experts. Qualitative findings were analyzed, and relevant indicators were extracted.

The research population consisted of 122 academic experts in 2023, including faculty members specializing in distance education planning and educational technology, each with at least 15 years of experience. The following inclusion criteria were applied:

- Holding a doctoral degree and a faculty position of assistant professor or higher in educational sciences.
- Expertise and experience in e-learning and blended learning.
- Authorship of articles, books, or research projects related to e-learning and blended learning.

A purposive, non-random sampling method was used, followed by snowball sampling to achieve theoretical saturation. In snowball sampling, interviewees were asked to introduce other potential candidates for interviews. In qualitative research, sample size is not numerically predetermined, and the adequacy of participants is assessed based on achieving data saturation. Interviews continued until no new information emerged from the responses; saturation was reached after interviews with 15 professors, as participants 20 and 21 provided no new codes. Demographic information of interviewees is presented in Chapter Four.

Data collection in the qualitative phase involved reviewing relevant literature and conducting semi-structured interviews. Content and structural validity were confirmed by experts, and reliability was ensured through response consistency across interviewees.

In this phase, a qualitative phenomenological approach was applied, utilizing semi-structured interviews to identify and elucidate criteria for blended learning in the post-COVID era, emphasizing the role of e-learning maturity. Phenomenology seeks the essence of individuals' lived experiences, uncovering unified meanings that reveal the core of a phenomenon. In such studies, semi-structured

interviews with participants serve as the primary information source. The interviewer conducted interviews without introducing bias or direction. Interviews were recorded, and the researcher reviewed the audio files to ensure content comprehensibility and followed up if clarification was needed. The interviews were transcribed, coded, and classified, with concepts grouped into thematic categories and sub-categories based on the study's objectives.

Four criteria for assessing qualitative data—credibility, dependability, confirmability, and transferability—were emphasized. To ensure accuracy, the researcher revisited participant responses after categorization, verifying their agreement with the researcher's interpretation and addressing any significant potential details.

Grounded theory was used for data collection and analysis in the qualitative phase. Initially, a preliminary review of theoretical foundations on blended learning in the post-COVID era and e-learning maturity was conducted, followed by identifying blended learning components with a focus on e-learning maturity. The blended learning model for the post-COVID era was designed using two sources: relevant literature on post-COVID e-learning maturity and interviews with experts. Documents directly addressing post-COVID e-learning maturity were collected, and interview questions were developed. Experts in educational planning and information technology were then interviewed using a semi-structured format. Grounded theory was used to analyze interview data.

The grounded theory process involved coding, whereby data were broken down, conceptualized, and recombined in new ways. Initially, open coding was performed, and the most meaningful and frequent initial codes were filtered, grouping similar codes into categories. Each category served as an axial code, capturing essential aspects of an effective family background (Strauss & Corbin, 2011). Data coding was performed using MAXQDA software, and based on relevant contexts, a blended learning model for the post-COVID era was developed.

3. Findings and Results

The descriptive analysis of the expert demographic data shows that the sample consisted of 30% females and 70% males. Age distribution was as follows: 35% were between 31-40 years, 30% were between 41-50 years, and 35% were over 50 years old. Regarding educational qualifications, 33% held a master's degree, while 67% held a doctorate. Field of study included educational sciences (25%),

educational technology (30%), distance education planning (40%), and curriculum planning (5%). In terms of work experience, 5% had less than five years, 25% had between 6-10 years, 40% had between 11-15 years, and 30% had over

15 years of experience. The areas of expertise represented in the sample were blended learning (60%), information technology and educational planning (15%), and educational management and administration (25%).

Table 1

Primary and Secondary Codes Derived from Statements Related to Educational Processes

Primary Codes	Secondary Codes
Teaching the necessary skills for students	Operationalizing knowledge
Designing instruction based on the latest technologies, especially artificial intelligence	
Enhancing knowledge infrastructure and moving away from traditional infrastructure	Using collaborative approaches
Defining learning opportunities for learners	
Providing learning opportunities	
Shifting educational goals from a knowledge-based focus to analytical skills	
Adapting educational processes according to available technical resources	Utilizing virtual learning opportunities alongside in-person learning
Engaging students	
Organizing group teaching teams instead of individual instruction	Systematizing educational programs
Examining causes of student disinterest in the post-COVID era	
Incorporating the benefits of in-person and online learning	
Using web-based technologies such as virtual classes	
Recognizing that in-person learning alone is insufficient	
Integrating all teaching elements into blended education in an interconnected manner	
Aligning the advantages of virtual environments with the drawbacks of in-person learning	
Utilizing social media opportunities	
Leveraging ICT-based learning opportunities	
Optimizing the use of technological infrastructure to its fullest	
Building on positive educational experiences from the COVID period	
Acknowledging the advantages of virtual learning	
Focusing on designing educational programs	
Lack of purpose, leading to ineffective education	
Changing educational expectations for students	
Transforming educational goals	
Defining educational objectives	
Analyzing the target audience for educational purposes	
Paying attention to each stage of the educational process as a continuous chain	
Designing educational programs suited for the post-COVID era	
Strengthening goals	
Enhancing content	
Designing comprehensive, holistic education (avoiding top-down, centralized, or linear approaches)	
Accurate educational needs assessment	

Table 2

Primary and Secondary Codes Derived from Statements Related to Progress Processes

Primary Codes	Secondary Codes
Flexibility in learning	High flexibility in learning
Addressing individual differences in learning	
Covering the shortcomings of in-person education	Customizing development goals
Allowing the learner to control learning stages	
The need for needs assessment to determine development goals	
Needs assessment in e-learning	
Avoiding the imposition of educational objectives on learners	
Customizing hardware and software infrastructure	
Integrating and blending technology	
Developing social connections	

Defining technology-based objectives	
Personalized learning	
Defining a development path for learners with the help of technology	
Enhancing instructional guidance by expanding educational media	
Teacher training	Developing instructors
Supporting teachers	
Mentor support	
Collaborative learning	Developing participation
Increasing student and learner engagement in educational processes	
Developing collaborative techniques and interaction	
Valuing the expansion of e-learning environments	Easier dissemination of educational content
Expanding social networks	
Improving education with digital tools	
Publishing instructional content in virtual spaces	
Enhancing information technology	
Creating more equitable and fair educational environments across different regions	
Easier access to educational materials	
Improving facilities and conditions for e-learning environments	
Foresight towards the future of blended learning	Future-oriented perspective on blended learning
Considering the progress of technology and its rapid growth	

Table 3

Primary and Secondary Codes Derived from Statements Related to Support Processes

Primary Codes	Secondary Codes
Supporting instructors	Technical support
Meeting the technological needs of managers and students	
Modifying and adjusting instructors' learning	
Supporting learners and teachers	
Educational support	
Academic support	
Providing occupational support for students and instructors	
Supporting educational upgrades and digital literacy for teachers and professors	
Making all organizational capabilities available to instructors and students	
Enhancing teachers' knowledge with modern technology	
Establishing and developing a student support system to bridge the gap between universities and students	
Supporting ICT infrastructure used by students and instructors	
Supporting educational improvement in schools for teachers and students	
Emotional support for teachers and students	Emotional support
Acknowledging and enhancing the learner's initial knowledge level	
Communication support	
Encouraging teachers and students to use ICT effectively	
Promoting a culture of innovation in teaching	
Managing the learning flow by the instructor	Supporting efficient educational programs
Supporting the update and modernization of educational goals according to environmental dynamics	
Supporting effective educational programs by instructors	
Revising educational content based on current IT needs	Proper feedback mechanisms
Strengthening learning analysis	
Receiving feedback from virtual learning	
Fully involving all educational staff	Supporting collaborative approaches
Collaborative learning models	
Balancing complexity with existing technology capabilities	Aligning knowledge and technology
Balancing professors' current knowledge with infrastructure requirements	

Table 4

Primary and Secondary Codes Derived from Statements Related to Evaluation Processes

Primary Codes	Secondary Codes
Comprehensive and performance-based learning evaluation across all levels instead of traditional methods	Performance-based evaluation

Challenging the learner	
Shifting evaluation from traditional to functional and practical	
Assessing the performance of technical staff in software sectors	
Evaluating instructors' performance	
In-depth knowledge and guidance capability from the instructor	
Defining specific roles and performance expectations for instructors and students	
Project-based and problem-solving evaluation rather than memorization-based	
Avoiding memorization-based assessments due to high risk of cheating in virtual spaces	
Evaluating the importance and methodology of learning	
Using various formative and summative tests to measure knowledge level	
Regular student assessments to create cognitive knowledge	
Evaluation to determine the effectiveness of educational programs	
Assessing organizational policies	Accurate systematic evaluation
Honesty in evaluation processes	
Assessing the structure of education, objectives, and programs	
Continuous evaluation of all individuals involved in the system	
Evaluating the roles of managers, policymakers, and stakeholders in promoting blended learning	
Student participation	Participation level evaluation
Evaluating students' participation levels	
Providing creative work opportunities for students	Creativity evaluation
Opportunities for exploration and problem analysis with a critical mind	
Enhancing critical thinking	
<i>Providing creative work opportunities for students Creativity evaluation</i>	
<i>Opportunities for exploration and problem analysis with a critical mind </i>	
<i>Enhancing critical thinking </i>	

Table 5

Primary and Secondary Codes Derived from Statements Related to Quality Control Processes

Primary Codes	Secondary Codes
The importance of self-awareness in integrating technology for personalized learning paths	Recognizing one's position in this technology
Self-evaluation	
Understanding one's relationship with technology and oneself	
Emphasis on improving the system and aligning blended learning strategies	Emphasis on enhancing educational quality
In-service training for teachers	
Evaluating the quality and assessment of content production	
Assessing instruction	
Monitoring the quality of technical infrastructure and available resources	Technology-based quality monitoring
Ensuring proper and optimal use	
Evaluating the reliability of technological infrastructure	
The importance of efficiency in quality control processes	
Mandatory adherence to standards	
Monitoring student participation levels	Participation level monitoring
Developing teamwork and collective participation approaches in this space by instructors	
Monitoring collaborative approaches among students	
Evaluation by parents	Parental monitoring
Monitoring learning progress by parents	
Electronically sending grades to parents	
Electronic student portfolios	
Validation	Project-based activities
Assigning projects to students and monitoring project quality	
Assessing instructional validity through engagement and problem-solving activities	

Table 6

Primary and Secondary Codes Derived from Statements Related to Management Processes

Primary Codes	Secondary Codes
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Precise identification of resources	Resource management
Utilizing resources with appropriate management to implement this model	
Employing knowledge converted into tools	
Focusing on assets to progress and address deficiencies	
Project-based resource management	
Resource allocation	Resource allocation
Applying expertise in appropriate contexts	
Providing instrumental and equipment support	
Establishing a strategic plan to integrate blended learning into the overall educational strategy	Managers' perspective on blended learning
Changing senior management's view on virtual and blended learning	
Instructor training management	Educational management
Quality management of blended learning infrastructure	
Managing infrastructure and facilities required for education	
Identifying learners' educational needs and providing the best resources according to course style and type	
Proper training and preparation of managers for effective role execution	
In-service training for employees according to organizational goals	
Training employees, especially instructors, for teaching in a blended learning environment	
Management of blended learning content	
Managing educational staff	Human resource management
Managing educational organizations	
Managing students	
Managing instructors	

The findings on educational processes highlight the need to operationalize knowledge by teaching essential skills, utilizing advanced technology, particularly AI, and moving away from traditional infrastructures. Providing learning opportunities is emphasized, with a shift in educational goals from mere knowledge acquisition to analytical abilities. Collaborative approaches are recommended, integrating virtual and in-person learning advantages, and systematizing educational programs for enhanced effectiveness, especially post-COVID. It's crucial to design programs tailored to evolving needs, emphasizing comprehensive, bottom-up planning to support continuous educational improvements.

In terms of progress processes, high flexibility in learning is essential to cater to individual differences and ensure learner autonomy in navigating educational stages. Customized development goals and technology-driven pathways are pivotal, as well as personalized, tech-assisted learning. Developing instructors and supporting collaborative learning environments are central to sustaining engagement and fostering a conducive learning atmosphere. Emphasis is placed on advancing e-learning environments, expanding access to educational resources, and applying a future-oriented outlook to blended learning development.

Support processes underscore the importance of technical, academic, and emotional support for both teachers and students. Technological upgrades, enhanced digital literacy, and accessible ICT infrastructure are essential. Emotional support and encouragement in using ICT effectively are highlighted as means to reduce anxiety and

foster innovation. Comprehensive backing from educational organizations, including professional development for teachers, is necessary for efficient program delivery, with a focus on responsive support structures that bridge gaps in learning environments.

Evaluation processes advocate a shift from traditional assessment to comprehensive, performance-based evaluation to better reflect learner abilities. Emphasis is placed on project-based evaluations to encourage critical thinking and problem-solving over rote learning, alongside frequent formative and summative assessments to gauge cognitive development. Continuous assessment of educational programs and roles of all stakeholders is crucial for program effectiveness, with systematic evaluations ensuring transparency and accountability in all educational levels, while creativity is encouraged through opportunities for innovation.

Quality control processes focus on fostering self-awareness in technology use, with attention to maintaining quality by monitoring both infrastructure and educational content. Regular in-service training for teachers and adherence to standards are critical for quality enhancement. Ensuring optimal use of technological resources and balancing complexity in technology integration are essential. Student engagement is monitored, with parents also encouraged to participate in evaluating and supporting the learning process.

In management processes, precise resource identification and allocation, strategic planning, and a supportive approach

to integrating blended learning into educational frameworks are emphasized. Effective educational and human resource management is essential, as is the alignment of leadership perspectives on blended learning. Training and preparation for administrators, continuous professional development,

and a structured approach to managing educational content and personnel are vital to achieving cohesive and efficient implementation of blended learning in educational institutions.

Figure 1

Final Model of The Study



4. Discussion and Conclusion

This study aimed to design and validate a blended learning model for the post-COVID era, focusing on the mediating role of e-learning maturity. The findings revealed several key components related to educational processes,

including the operationalization of knowledge, collaborative approaches, integration of virtual and in-person learning opportunities, and systematic educational programming. These align with previous studies, such as Sahri and Jamadi (2022), who identified collaborative learning as a crucial aspect of blended learning in the post-COVID era (Sahari &

Jamadi, 2022). This synergy between collaborative and operationalized learning supports students in skill acquisition, especially when paired with technology-driven approaches like artificial intelligence (AI). Prior studies echo the importance of transitioning educational objectives from pure knowledge acquisition to analytical skill development, particularly through a systematic approach that tailors educational programs to available technical resources and learner needs (Chaudhary et al., 2022). This strategic focus on customizing educational programs and incorporating collaborative methods aligns well with e-learning maturity, which prioritizes effective integration of online and in-person instructional elements.

The results further highlighted that progress processes in the blended learning model require high flexibility, customization of development goals, instructor development, expanded participation, easier dissemination of educational content, and a future-oriented perspective on blended learning. Consistent with Isa Abadi (2022), teacher development emerged as a crucial element of progress in blended learning during and post-COVID (Isa Abadi, 2022). Similarly, Reyhani (2022) emphasized the value of expanding participation in blended learning, which is evident in the study's results (Reyhani, 2022). These findings underscore the need for blended learning models to address diverse learner needs, emphasizing flexibility in educational approaches. Flexible, customized goals also cater to individual differences in learner backgrounds and capacities, which is vital as blended learning continues to evolve with digital advancements. Customizing instructional pathways and ensuring personalized support for learners fosters autonomy and makes blended learning an adaptable tool for future education, particularly when enhanced through digital media and ICT (information and communication technology) channels that support individualized learning journeys.

Support processes were identified as another essential component of the blended learning model, emphasizing technical, emotional, and educational support. Kamali et al. (2022) found that supporting educational programs is a key factor in ensuring blended learning success, which resonates with the current study's results (Kamali et al., 2022). Similarly, studies emphasized the alignment of knowledge and technology as crucial in post-COVID blended learning. This study's findings suggest that continuous support in both technological and emotional aspects is needed for effective learning, especially considering that virtual environments can sometimes hinder interpersonal connection (Bazmi,

2023; Momeni & Ahmadi, 2022; Reyhani, 2022; Sahari & Jamadi, 2022; Thahir et al., 2023). Providing academic support and equipping educators with digital literacy skills are essential to ensure that they can effectively guide students in an online environment. Enhanced support for teachers and learners can address potential gaps that might arise from the integration of virtual elements in the learning process. Thus, aligning resources with ICT advancements and supporting instructors' professional development is vital for optimizing the blended learning experience, fostering resilience, and reinforcing a supportive learning atmosphere.

Evaluation processes in the blended learning model for the post-COVID era were marked by performance-based assessments, systematic evaluations, assessment of participation levels, and creativity evaluation. This aligns with Baghai (2021), who found participation evaluation essential in blended learning during the post-COVID period, and Habibi and Qaderi (2021), who identified performance-based evaluation as key in assessing virtual learning efficacy. With the transition to a blended model, performance-based assessments provide more comprehensive insights into student understanding and skill development. Traditional memorization-based assessments are less suitable in an online setting due to the increased possibility of dishonesty, making project-based and problem-solving assessments more effective. Regular, formative assessments that gauge both cognitive and practical knowledge are also necessary to ensure consistent progress in the blended learning environment (Habibi & Qadri, 2021). These findings point to the importance of diversifying assessment methods to include formative and summative evaluations that encourage engagement, accountability, and creativity among students, ultimately promoting a more holistic approach to student evaluation.

Quality control processes, as revealed by the findings, play a significant role in blended learning, particularly regarding the integration of self-awareness and technology, continuous improvement of educational quality, and consistent monitoring of technological infrastructure. This aligns with Hajizadeh et al. (2021), who emphasized the need for quality enhancement in post-COVID blended learning, and Seifi and Dibaei (2021), who highlighted the importance of technology-based quality monitoring. Ensuring high-quality, reliable infrastructure is critical as learners depend on virtual tools for access and interaction (Seifi & Dibai, 2021). The findings also emphasize the role of self-evaluation and parental involvement in monitoring student progress, as these stakeholders can offer valuable

support and insight into the learning journey. By ensuring consistent quality control and aligning learning with current technologies, educators can enhance the educational experience while promoting efficient resource use and reducing redundancies in the system.

Management processes in the blended learning model were identified as including resource management, resource allocation, management perspectives on blended learning, educational management, and human resource management. This is consistent with Ronaghi and Hosseini (2019), who found resource management essential to effective blended learning implementation (Ronaghi & Hosseini, 2018), as well as Ashouri (2023), who emphasized the importance of managerial perspectives in supporting blended learning (Ashouri, 2023). Effective management ensures that the resources required for blended learning—both technological and human—are appropriately allocated to facilitate the learning process. Moreover, fostering a strategic approach to managing educational content and human resources empowers institutions to support teachers and students in utilizing blended learning effectively. The shift in management perspectives on blended learning, along with adequate support, plays a pivotal role in embedding blended learning as a sustainable, long-term educational solution. By coordinating resources and strategic management efforts, institutions can optimize blended learning models to cater to evolving educational demands.

This study faced several limitations. First, the sample was limited to educators and experts within specific fields related to educational technology and planning, which may affect the generalizability of findings to other educational settings. Additionally, while qualitative methods provided in-depth insights, they may limit the ability to generalize results to broader educational populations. The reliance on self-reported data through interviews could introduce biases, such as social desirability, which might affect the accuracy of responses. Another limitation is that this study focused on the post-COVID context, potentially overlooking factors that could affect blended learning as the educational landscape continues to evolve.

Future research could address the limitations of this study by expanding the sample to include a wider variety of educational stakeholders, such as students and administrative staff, to provide a more comprehensive understanding of blended learning. Additionally, future studies should consider longitudinal designs to observe the sustained impact of blended learning over time and across diverse educational contexts. Investigating the role of

emerging technologies, such as artificial intelligence and adaptive learning platforms, within blended learning frameworks could also enhance understanding of how digital tools can support personalized learning experiences. Finally, future research could explore the integration of gamification in blended learning to assess its potential in increasing student engagement and motivation.

To enhance the practical application of blended learning models, educational institutions should prioritize the development of flexible, student-centered learning environments that cater to diverse learning styles. Managers should ensure adequate training and support for educators to adapt to the blended learning model, focusing on digital literacy and innovative instructional methods. Institutions should also regularly evaluate and update their technological infrastructure to ensure smooth and efficient learning experiences. Emphasis on collaborative approaches, including peer-to-peer interactions, can foster a supportive learning atmosphere and increase engagement. Finally, institutions should involve all stakeholders, including parents, in the blended learning process to ensure well-rounded support for students, promoting a culture of continuous learning and adaptability in the educational system.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Declaration of Interest

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Ethical Considerations

All procedures performed in studies involving human participants were under the ethical standards of the institutional and, or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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