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The Causal Relationships between the Identified Factors in the Development Model of Blended Training in Tehran Education

Ommolbanin Ghalojeh[1], Ramazan Jahanian[2*], Mahtab Salimi[3]

1. PhD student,Department of Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran.
2. Associate Professor, Department of Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran (Corresponding Author).
3. Assistant Professor, Department of Educational Sciences, Karaj Branch, Islamic Azad University, Karaj, Iran

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Blended Training, Organizational Factors, Educational Factors, Education.

Purpose: The blended training implies a continuous process of teaching and learning. Therefore, the current research was conducted with the aim of determining the causal relationships between the identified factors in the development model of blended training in Tehran education.
Methodology: The current research in terms of purpose was applied and in terms of implementation method was descriptive from survey type. The population of this study was all the managers and assistants of education in Tehran city, which number of 242 manager and assistant were selected as a sample using the available sampling method. The research tool was a researcher-made questionnaire of development of blended training in education with 75 items. The data were analyzed with the methods of exploratory factor analysis and structural equation modeling in SPSS-V23 and LISREL-V8.8 software.
Findings: The results of this study indicated that the development model of blended training in education had three components of constituent factors, organizational factors and educational factors, which its validity and reliability were confirmed. Also, the development model of blended training in education had a good fit and in this model, organizational factors and educational factors had a positive and direct effect on constituent factors of blended training in education ($P<0.05$).
Conclusion: According to the results of this study, in order to improve the development of blended training in education can provide the ground for the realization of organizational factors and educational factors.

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1. Corresponding Author: ramezan.jahanian@gmail.com

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1. Introduction

The educational system, until the first half of the twentieth century, mostly relied on traditional face-to-face teaching and learning methods. However, with the industrialization of societies and the emergence of educational technologies, the approach to teaching and learning has changed, incorporating virtual or blended learning methods (Qian, Ma, Pan, & Yang, 2020). Virtual learning has become a significant topic in the education system in recent decades, offering the advantage of both individual and group learning, catering to a wide range of learners (Li, He, Yuan, Chen, & Sun, 2019). Virtual learning offers numerous advantages, such as facilitating self-directed learning, flexibility, cost savings, access, interactive multimedia learning content, learner-centered focus with active participation, easier curriculum management, information update convenience, content integration with other learning resources, integrated assessment, and diverse assessment methods (Ceulemans, Liekens, Van Calsteren, Allegaert, & Foulon, 2021). Despite the many advantages of virtual learning, it has not completely replaced traditional teaching methods because traditional methods also have benefits, such as mentor support for content learning, timely encouragement and reinforcement, bridging past and present experiences, and interpersonal interaction (Mohammadi, Marzooghi, Salimi, & Mansoori, 2017). Virtual learning has limitations, including feedback delays, asynchronous learning, and a lack of motivation for reading electronic resources, which have led to increased attention towards blended learning (Quesada & Morgan, 2023).

Advancements in technology, coupled with other recent changes, have led to a demand for changes in education. Despite the advantages and disadvantages of both traditional and virtual education, researchers sought a solution to address their shortcomings, leading to the invention of blended learning. This educational approach bridges the gap between traditional and virtual teaching methods and aims to enhance education and learning by incorporating traditional interactions alongside electronic tools (Tabatabaeian & Mashayekh, 2021).

The underlying philosophy of blended learning is that not all individuals learn in the same way, necessitating the use of various methods for effective education. Therefore, blended learning intelligently combines virtual education methods such as internet-based learning, multimedia learning, and traditional face-to-face education methods (Ozturk & Gunes, 2023). Blended learning refers to the integration of face-to-face education with virtual education. In other words, this educational approach emphasizes the mutual and interactive use of face-to-face and virtual learning (Gjestvang, Hoye, & Bronken, 2021). Blended learning involves curriculum redesign to achieve goals that cannot be attained solely through virtual or face-to-face learning, contributing to better educational outcomes (Pinto-Llorente, Sanchez-Gomez, Garcia-Penalvo, & Casillas-Martin, 2017). This approach is a new mechanism or solution based on diverse teaching and learning methods, aiming to improve the quality of educational activities both vertically and horizontally. Horizontally, it expands the scope and dimensions of educational support tools in the learning process, optimizing their use. Vertically, it delves deeper into the understanding of the learning process and how to better comprehend educational materials and achieve optimal learning (Sonesson, Boffard, Lundberg, Rydmark, & Karlgren, 2018).

Blended learning is one of the multiple teaching methods used to create deep learning experiences and achieve higher levels of learning. It suggests employing more than one method, strategy, technique, and medium in education to optimize learning outcomes (Farahani, Laeer, Farahano, Schwender, & Laven, 2020). Individuals who use blended learning aim to maximize the benefits of both face-to-face and virtual learning. Therefore, blended learning combines the benefits of both methods (DeBrito Lima, Lautert, & Gomes, 2022). The results of comparing three teaching methods – face-to-face, virtual, and blended – are as follows (Mohammadi et al., 2017).

Blended learning, as the third wave of educational environments following face-to-face and virtual learning, has improved the quality of learning, expanded the scope of education and learning, and reduced costs. Blended learning has become the most prevalent educational approach in recent decades, addressing four key challenges: flexibility, enhanced interaction, facilitation of learning processes, and strengthening the

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emotional learning environment (Mileder, Pocivalnik, Schwaberger, Pansy, Urlesberger, & Baik-Schneditz, 2018). Blended learning is not just about combining technology with traditional teaching to enhance learning; it involves a combination of pedagogical approaches to produce optimal learning outcomes, whether with or without educational technology (Ahmadian, Sarmadi, & Maleki, 2022).

Blended learning achieves various educational goals, such as fostering critical thinking, creativity, self-confidence, expanding interpersonal and social relationships, mutual understanding and respect, developing deep learning skills, and improving problem-solving skills, by integrating the blended learning approach and utilizing its advantages (Biddle & Hoover, 2020). Beyond that, blended learning provides opportunities for achieving self-directed learning, interactions, social participation, learning how to learn, and applying learning in real-life, knowledge production, and lifelong learning (Alabdulkarim, 2021). Blended learning has four combination objectives: combining web-based technology methods to achieve educational goals, combining various pedagogical approaches to optimize learning outcomes (with or without educational technology), combining any form of educational technology with face-to-face education, and creating a coherent link between learning and work (Donovan, Maggiulli, Aiello, Centeno, John, & Pisani, 2023).

Table 1. Comparison of Three Teaching Methods: Face-to-Face, Virtual, and Blended

Teaching Method	Focus	Cost	Orientation	Quality of Education	Reliance	Time and Place	Control Over Teaching	Method Flexibility
Face-to-Face	Teacher-Centered	High	Presence-Oriented	Low	Human	Fixed	Excessive	Inflexible
Virtual	Student-Centered	Low	Tool-Oriented	Low	Tools and Virtual Facilities	Anytime, Anywhere	Very Little	Inflexible
Blended	Teacher/Student-Centered	Medium	Quality-Oriented	High	Human, Tools, and Virtual Facilities	Flexible	Self-Control	Highly Flexible

Ghofrani, Narenji Thani, Shahhoseini, Abili, and Pourkarimi (2023) reported in a study on the pattern of blended teaching and learning in a university context that they identified 219 concepts, 29 components within 11 dimensions. These dimensions include Transformational Leadership (with components of Change Management and Senior Management Support), Planning (with components of Strategic Planning and Operational Planning), Human Capital Management (with components of Recruitment, Development, and Retention), Resource Provisioning (with components of Information and Knowledge Resources, Financial and Physical Resources, and Technical Resources), Teaching and Learning Process Management (with components of Student Assessment, Learning Resources, Interaction, and Teaching Strategies and Scenario Writing), Stakeholder Competencies (with components of Stakeholder Knowledge, Stakeholder Skills, and Stakeholder Beliefs and Attitudes), Cultivation of New Approaches (with components of Shared Meanings and Concepts, Shared Values, and Shared Attitudes), Support System for Primary and Internal Stakeholders (with components of Technical Support, Process Support, and Pedagogical Support, and Psychological Support), University Internal and External Communications (with components of Internal University Communications and External University Communications), University Assessment and Quality Assurance System (with components of Supervision and Evaluation), and Ethical Considerations (with components of Intellectual Property Preservation and Respect for Privacy).

Hamzeh Loupak, Batmani, Yavari Bafghi, and Hosseinpour (2022) reported in a study on the design and validation of a blended learning model in in-service education that the mentioned model consisted of 378 core topics, 31 organizing topics, and 11 overarching topics. These topics encompassed Technology (with software and hardware organizational topics), Needs Assessment (with organizational topics of Needs Recognition, Planning, and Execution Capability), Equipment and Facilities (with organizational topics of

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Physical Equipment and Knowledge Equipment), Learner Characteristics (with organizational topics of Individual Abilities and Personality Traits), Teacher Characteristics (with organizational topics of Expertise and Skills, Communication Skills, and Empowerment), Content Characteristics (with organizational topics of Completeness, Utility, Quality, and Diversity), Teaching Methods and Approaches (with organizational topics of Effectiveness, Innovation, and Appropriateness), Instructional Designs (with organizational topics of Standards, Flexibility, and Applicability), Assessment and Control (with organizational topics of Feedback Receipt and Information Dissemination), Organizational Factors (with organizational topics of Organizational Policy, Laws and Regulations, and Organizational Culture), and Support and Assistance (with organizational topics of Social Support, Financial and Administrative Support, Emotional Support, and Organizational Support).

Nourizadeh, Zeinabadi, Navehebrahim, and Abdollahi (2022) reported in a study on the desirable model of blended learning in Payame Noor University that the model included thematic elements, including Management, Organizational, Communicative, Educational, and Resources and Facilities sub-elements, Operational Conditions with sub-elements of Resources and Facilities, Technical, Managerial, Evaluation, Communicative, Educational, and Organizational sub-elements, Obstacles and Challenges with sub-elements of Resources and Facilities, Technical, Managerial, Evaluation, Communicative, Educational, and Organizational sub-elements, Strengths with sub-elements of Educational, Resources and Facilities, Technical, Managerial, Evaluation, and Communicative sub-elements, Quality of Elements with sub-elements of Evaluation, Educational, Technical, Managerial, Communicative, and Resources and Facilities, and Features with sub-elements of Technical, Educational, Communicative, Evaluation, Resources and Facilities, Managerial, and Organizational.

Bruggeman, Tondeur, Struyven, Pynoo, Garone, and Vanslambrouck (2021) reported in a study on the characteristics of instructors for implementing blended learning in higher education that seven effective factors for improvement included placing education at the center, having a student-centered teaching belief, understanding educational needs, daring to experiment, sharing needs and concerns, reflecting critically on oneself as an instructor, and the ability to adapt technologies to the learning processes. Four factors contributing to decline included prioritizing other duties over teaching, having an instructor-centered teaching belief, having an ambiguous attitude toward blended learning, and feeling concerned about the consequences of using technology.

Sharafi, Sabagh Hasanzadeh, and Zohour Parvandeh (2021) reported in a study on the curriculum design model with a blended approach at the secondary level that its logic included using Constructivist Theory, Cognitive Theory, utilizing both traditional and virtual teaching, and integrating and synchronizing traditional and virtual methods in the learning environment. Its objectives encompassed elevating the level of teaching and learning, focusing on cognitive aspects, attention to skill aspects, attention to attitudinal aspects, fostering creative and critical thinking, being needs and interests-based, flexibility and transition from lower-level learning patterns to high-level practical skills, and content that is tailored to learners' needs and interests. It also provides opportunities for interaction with various learning resources and experiences, content flexibility, eliminating extra course assignments, being related to learners' prior experiences, using instructional videos for easier understanding of materials, using educational handouts for simplified information comprehension, providing access to teacher lecture PowerPoint presentations, allowing students to present lessons, and increasing learning motivation through interactions. Its methods include promoting collaborative and participatory learning, matching methods with learners' learning styles, using diverse and varied methods, establishing interaction opportunities, enhancing learning environments, facilitating technology use to improve learning quality, using discussion groups for discourse, sharing theories in targeted virtual groups, and presenting PowerPoint presentations in class. Its assessment includes aligning assessment goals with the program objectives, using diverse and varied assessment methods, conducting assessments for feedback and improvement in learning and teaching, providing prompt feedback, offering opportunities for

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self-assessment and participation in assessment, motivating learning and acceptance, assessing all stages and levels of education, and monitoring the quality of assessment methods.

Ajam, Jafari Suny, and Akbari Boorng (2017) reported in a study on the pattern of combined curriculum for higher education that the mentioned model in the objectives section includes cognitive, insight, and skill domains. In the content section, it considers attention to emerging issues, linking the content of disciplines with related scientific content, promoting creative thinking, and emphasizing critical thinking. In the teaching and learning strategies section, it emphasizes continuous interactions, critical review of theories, and focusing on subject-specific learning through collaboration. In the teaching and learning activities section, it emphasizes active learning, group activities, encouragement of inquiry and research, nurturing high-level thinking skills, emphasizing various learning activities, and providing opportunities for students to enhance critical thinking. In the materials and learning resources section, it includes the learner activation principle, updating resources, access to multimedia learning materials, and attention to diverse learning resources and materials. In the student grouping section, it emphasizes creative interaction with professors and students in specialized topics, collective understanding of issues, formation of student groups based on discussed topics, and forming groups to achieve goals in specialized areas, educational, group responsibility, and individual responsibility regarding learning. In the time and place of learning section, it focuses on flexibility in learning time, using diverse and flexible learning spaces, and using learning space to enhance students' multiple interactions in specialized topics. In the assessment section, it includes providing self-assessment opportunities, continuous assessment, problem-solving as part of assessment, balance between different cognitive, emotional, and skill dimensions of students, and peer assessment of specialized topics.

On one hand, the use of traditional and conventional teaching methods, despite influencing a wide range of learners, lacks the capability to advance and contribute to the growth of societies, especially in the field of technology. On the other hand, the use of virtual teaching methods, despite numerous advantages, has its weaknesses and limitations. As a result, the discussion on the use of blended learning gained momentum, and this approach combines the benefits of both traditional and virtual teaching methods while attempting to address the limitations of both methods. As observed in the background section above, research on blended learning in university education systems has been conducted, but it seems that there is a gap in conducting such research in the primary education system. Given the importance of blended learning in improving education and leveraging the advantages of both traditional or in-person and virtual education, research on designing a model for it is essential. Another existing gap is the scarcity of quantitative research on blended learning, with most previous studies being qualitative in nature. The current research attempts to fill this gap by using a quantitative research approach. Blended learning is indicative of a continuous and ongoing process of teaching and learning. Therefore, this research was conducted with the aim of determining the relationships among the identified factors in the development model of blended learning in education.

2. Methodology

The present research, in terms of purpose, application, and execution method, was descriptive and survey-based. The population of this study consisted of all educational managers and deputies of education in Tehran city, totaling 242 managers or educational deputies (based on sample size calculation in structural equation modeling research methods), who were selected as the sample using available sampling method. In this study, a questionnaire was sent to 252 educational managers and deputies of education, but 10 of them did not respond to the research instruments even after several follow-ups, resulting in a participation rate of 96.03%. In the present study, 7 out of 22 districts of Tehran city were randomly selected, and from each district, 36 educational managers and deputies were selected as the sample using the available sampling method and responded to the research instruments. The demographic information and the participation rate of the research sample are as follows.

Table 2. Frequency and Percentage Results of Subjects' Demographic Information

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Variable	Value	Frequency	Percentage
Gender	Female	140	57.85
	Male	102	42.15
Age (Years)	<35	68	28.10
	36-40	63	26.03
	41-45	72	29.75
	>45	39	16.12
Work Experience (Years)	<10	19	7.85
	11-15	29	11.98
	16-20	92	38.02
	>20	102	42.15
Education	Associate Degree	111	45.87
	Bachelor's Degree	78	32.23
	Master's Degree	48	19.83
	PhD	5	2.07

The research instruments included a demographic information form and a researcher-made questionnaire on the development of blended learning in education with 75 items. This questionnaire was designed by the researchers of the present study based on theoretical foundations from 2000 to 2022, using reputable domestic and foreign websites and interviews with 19 experts familiar with the research area. This questionnaire consisted of three components: constituent factors (with 45 items and 8 sub-components: teacher, curriculum, learner, tools, flexibility, information technology infrastructure, technology-based education, and accessibility), organizational factors (with 15 items and 3 sub-components: organizational structure, school culture, and school support), and educational factors (with 15 items and 3 sub-components: educational assessment, educational facilities, and educational management). A five-point Likert scale ranging from "strongly disagree" to "strongly agree" was used to respond to each item, and the score for each section or component was calculated by summing the scores of its constituent items. The formal validity of the researcher-made questionnaire on the development of blended learning in education was confirmed by 19 experts familiar with the research area, holding at least a master's degree in educational sciences, having more than five years of managerial and deputy experience, and having articles, books, research projects, etc., in the field of education, and other psychometric indices of the researcher-made questionnaire were reported in the findings section.

The data in this study were analyzed using exploratory factor analysis and structural equation modeling methods in SPSS-V23 and LISREL-V8.8 software.

3. Findings

In this study, the attrition rate in the research was 3.97% for 10 participants, and analyses were conducted for 242 participants. The factor loadings analysis indicated that the factor loadings of all 75 items were higher than 0.40, and for this reason, no items were removed from the analysis. The results of exploratory factor analysis of the integrated education development model in education are as follows.

Table 3. Results of the Exploratory Factor Analysis of the Blended Learning Development Model in Education

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Component	Subcomponent	Number of Items	Factor Loading	AVE	Content Validity	Composite Reliability
Constituting Factors (45 items)	Teacher	8	67.0	64.0	83.0	93.0
	Curriculum	5	54.0	59.0	78.0	91.0
	Learner	5	59.0	62.0	75.0	91.0
	Tool	4	62.0	57.0	71.0	89.0
	Flexibility	5	53.0	56.0	78.0	91.0
	Information Technology Infrastructure	4	68.0	69.0	81.0	90.0
	Technological Education	6	73.0	75.0	86.0	95.0
	Accessibility	8	78.0	74.0	75.0	96.0
Organizational Factors (15 items)	Organizational Structure	5	56.0	59.0	82.0	86.0
	School Culture	5	62.0	60.0	75.0	85.0
	School Support	5	68.0	63.0	79.0	93.0
Educational Factors (15 items)	Educational Evaluation	5	71.0	70.0	71.0	91.0
	Educational Facilities	4	56.0	52.0	72.0	84.0
	Educational Management	6	60.0	68.0	79.0	88.0

The results indicated that the integrated education development model in education consists of three components: constitutive factors (with 45 items and 8 sub-factors including teacher, curriculum, learner, tools, flexibility, information technology infrastructure, educational technology, and accessibility ease), organizational factors (with 15 items and 3 sub-factors including organizational structure, school culture, and school support), and educational factors (with 15 items and 3 sub-factors including educational assessment, educational facilities, and educational management), with factor loadings and extracted variance exceeding 50.0%, content validity exceeding 70.0%, and composite reliability exceeding 80.0%. The model fit indices of the integrated education development model in education are as follows:

Table 4. Results of the Exploratory Factor Analysis of the Researcher-Made Questionnaire on the Supervision of Educational and Training Leaders in Primary Schools Completed by Educational and Training Leaders and Primary School Teachers in Hormozgan Province

Index Name	Abbreviation	Value	Acceptable Fit
Chi-squared	-----	155.40	-----
Goodness of fit index	FGI	0.99	>0.90
Adjusted Goodness of Fit index	AGFI	0.96	>0.90
Comparative Fit Index	CFI	0.97	>0.90
Root Mean Square Error of Approximation	RMSEA	0.06	<0.10

The results indicated that the integrated education development model in education had a suitable fit. The results of structural equation modeling of the integrated education development model in education are as follows.

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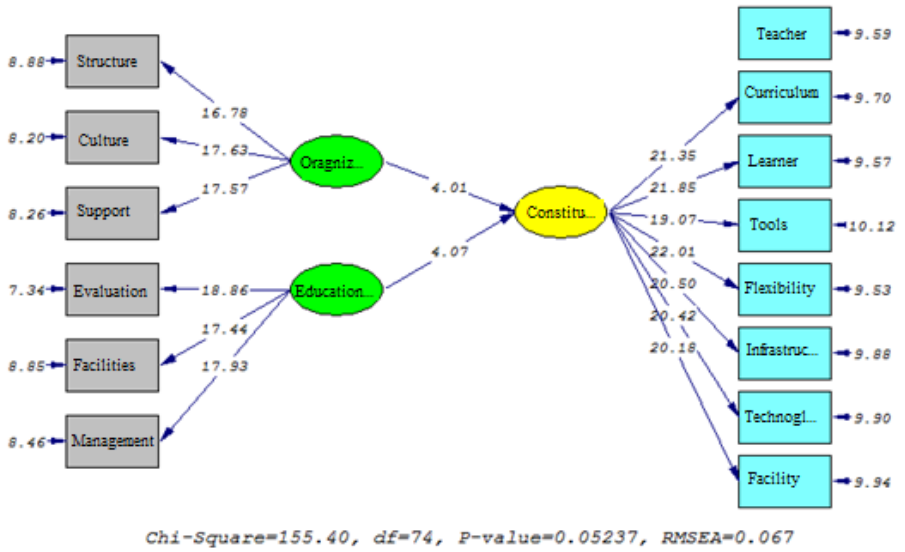

Figure 1. Results of Structural Equation Modeling for the Blended Learning Development Model in Education with T-Values

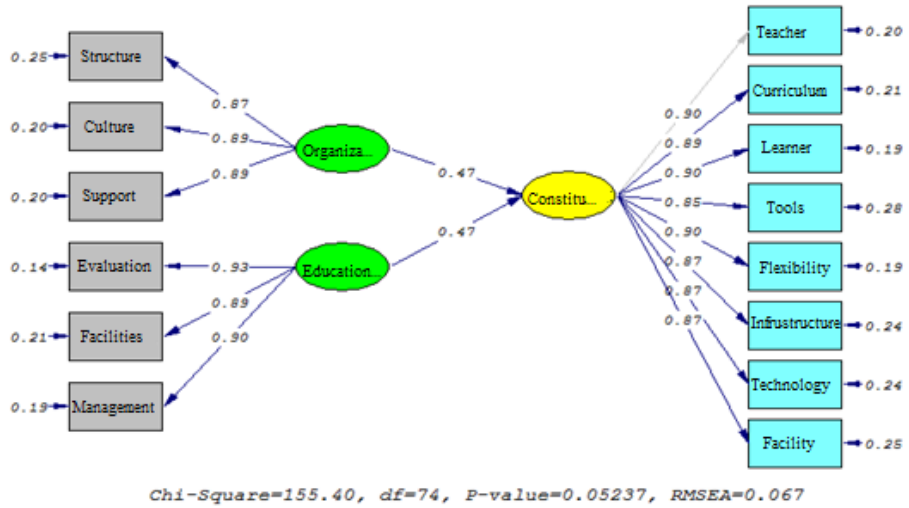

Figure 2. Results of Structural Equation Modeling for the Blended Learning Development Model in Education with Standardized Coefficient

Table 5. Results of Structural Equation Modeling for the Blended Learning Development Model in Education

Results	t-value	Standard Coefficient	Path
Approved	4.01	0.47	The Impact of Organizational Factors on the Constituting Factors of Blended Learning in Education
Approved	4.07	0.47	The Impact of Educational Factors on the Constituting Factors of Blended Learning in Education

The results indicated that in the integrated education development model in education, organizational and educational factors had a positive and direct effect on the constitutive factors of integrated education in education ($p < 0.05$).

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4. Conclusion

Research on integrated education, especially in the field of education, holds significant importance. The present study aimed to determine the relationships among the identified factors in the integrated education development model in education.

The results of this study revealed that the integrated education development model in education consists of three components: constitutive factors, organizational factors, and educational factors, with their validity and reliability confirmed. Additionally, the integrated education development model in education had a suitable fit, and in this model, organizational and educational factors had a positive and direct effect on the constitutive factors of integrated education in education. There has been relatively extensive research on integrated education in higher education, and it is necessary to conduct such research in the field of education as well. Another important point is that most studies in this area were qualitative, and quantitative research in this area was scarce. Nevertheless, the findings of this study were consistent with the findings of the studies by Ghofrani et al. (2023), Hamzeh Loupak et al. (2022), Nourizadeh et al. (2022), Bruggeman et al. (2021), Sharafi et al. (2021), and Ajam et al. (2017).

In summarizing the findings of this study, it can be inferred that integrated education is an effective strategy in managing information education and learning. It depends on the cognitive abilities of teachers and learners and the capabilities of classrooms. The educational curriculum must be flexible and capable of adapting to changes and advancements in technology. The use of the internet and communication tools will enhance flexibility in the time and place of education, and integrated education combines teacher-centered and face-to-face teaching with online and virtual teaching components, allowing learners to control the pace and direction of their education. Given the importance of integrated education and the development of this type of education, this study addressed this issue and identified that the dimensions of integrated education development in education include constitutive factors with sub-factors of teacher, curriculum, learner, tools, flexibility, information technology infrastructure, educational technology, and accessibility ease; organizational factors with sub-factors of organizational structure, school culture, and school support; and educational factors with sub-factors of educational assessment, educational facilities, and educational management.

In general, the results of this study focus on three fundamental areas: the teacher, the learner, and the educational curriculum. The teacher, as the main pillar and educator, must have sufficient knowledge and professional competence in this field. Moreover, the content and educational curriculum in integrated education should be designed in a way that not only addresses the needs of students but also stimulates their interest in education. However, one should not overlook the learner as the main factor, and learners, with awareness of integrated education and readiness for receiving it, challenge themselves to new learning. They require tools to complement their education. Information technology-based tools are the best choice to support and develop integrated education. Furthermore, educational and organizational factors, including factors influencing the constitutive factors of the integrated education development model in education, play a crucial role in education. For the implementation of integrated education in schools, the structure of schools, and, at the top, the structure of education, should be revised. Integrated education is based on collaboration, and a structure that is anti-collaborative cannot achieve this purpose. On the other hand, reducing concentration and moving towards decentralization and giving the necessary authority in the shadow of reducing concentration is another factor that should be considered.

Furthermore, the existence of comprehensive support for blended learning from administrators, teachers, and students facilitates the smoother development of blended education. The essence of blended learning is to address virtual education alongside face-to-face instruction, and this method requires technological facilities. Unfortunately, technological facilities in education and schools are weak, and equipping them requires a long path. The budget allocated to education for the use of blended learning is very insignificant, and in practice, not all schools and students can benefit from these educations, which somewhat questions

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educational justice as more students are harmed in this process. Another important point is that education experts are reporting the development of guidelines for blended learning models for teachers' optimal use of time and believe that teachers should be flexible towards blended learning, which can lead to better time management. However, teachers, due to the lack of proper and correct training and necessary professional qualifications, and of course, dissatisfaction with the job, still emphasize traditional face-to-face teaching and resist blended learning.

The significant and noteworthy limitations of this study include restricting the research population to all directors and educational deputies of the Tehran Education Department, using a non-random convenience sampling method, and the lack of extensive research background on the development model of blended learning in education. Therefore, conducting research on the development model of blended learning in education among teachers and students, using random sampling methods to reduce sampling error, and conducting more research on the development model of blended learning is suggested. Another research suggestion for future researchers is to investigate the development model of blended learning in urban education and compare it with the model in rural areas, which, if there are differences in the results of this study, can design and develop different strategies to improve and develop blended learning in urban and rural areas. Based on the findings of the current study, practical suggestions are as follows:

1. Possibility of using an electronic library in the school at certain hours.
2. Possibility of having a space for permanent exhibitions in schools.
3. Providing suitable facilities for procuring tools, equipment, and facilities for blended learning.
4. Structured planning by the Education Department for improving school quality based on blended learning.
5. Specialized training of some educational stakeholders to support educational programs and software in school.
6. Giving teachers the freedom to incorporate other contents into the blended learning curriculum to discover learners' talents.

Ethical Considerations

In this study, ethical considerations were of concern to the current researchers.

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Authors' Contributions

The first author was responsible for data collection, and the other authors were responsible for data analysis and writing the article.

Conflict of Interest

The authors hereby declare that there was no conflict of interest.

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