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Psychometric properties of the learning organization perception scale in Iranian universities of medical sciences

Leila Mardanian Dehkordi[1], Maryam Houshmand[2], Sajjad Alahdadi[3] & Ameneh Yaghoobzadeh[4,5]✉

Organizations, particularly higher education centers, play a crucial role in fostering learning through various mechanisms and structures. The cultural and contextual factors of a country significantly influence organizational dynamics. This study aimed to evaluate the psychometric properties of the Learning Organization Perception Measurement Scale within Iranian Universities of Medical Sciences. The validity and reliability of the Persian version of the Learning Organization Comprehension Scale (LOCS) was evaluated among 176 faculty members from Isfahan, Arak, and Tehran Universities of Medical Sciences. Construct validity was confirmed using confirmatory factor analysis, with exploratory factor analysis omitted due to the well-established structure of the original scale. Reliability was excellent, with Cronbach's alpha exceeding 0.70 for the total scale and all subscales, confirming the Persian LOCS as psychometrically sound. The Cronbach's alpha coefficient was 0.93 for the entire questionnaire, 0.79 for the personal mastery component, 0.81 for mental models, 0.83 for shared visions, 0.86 for team learning, and 0.85 for system thinking. The chi-square index per degree of freedom for the five-factor model was 1.466, while this index was 2.147 in the single-factor model. Modification to use of the five-factor model was done to improve the model indices; therefore, the chi-square index per degree of freedom (χ^2/df) decreased to 1.374. Also, the comparative fit indices (CFI) increased to 0.91, the incremental fit index (IFI) increased to 0.91, the goodness-of-fit index (GFI) increased to 0.79, and the root mean square error of approximation (RMSEA) decreased to 0.05. In education, learning organizations require personal mastery, mental models, shared vision, team learning, and systems thinking. These elements promote growth, decision-making, unity, and complexity handling. Assessing and improving educators' abilities in these areas is crucial for addressing challenges and fostering successful learning environments.

Keywords Learning organization, Validity, Reliability, Cross-cultural application, Universities

Abbreviations
DLOQ   Dimensions of Learning Organizations Questionnaire
CFI   Comparative Fit Indices
IFI   Incremental Fit Index
GFI   Goodness of Fit Index
RMSEA   Root Mean Square Error of Approximation
ESD   Education for Sustainable Development

[1]Nursing and Midwifery Care Research Center, Isfahan University of Medical Sciences, Isfahan, Iran. [2]Nursing Department, Arak University of Medical Sciences, Arak, Iran. [3]Department of Assessment and Measurement, Faculty of Psychology and Educational Sciences, Allameh Tabataba'i University, Tehran, Iran. [4]Nursing Care Research Center, Semnan University of Medical Sciences, Semnan,, Iran. [5]Department of Emergency Nursing, School of Nursing and Midwifery, Semnan University of Medical Sciences, Semnan, Iran. ✉email: a.yaghoobzadeh@yahoo.com

Background

Contemporary organizations face significant challenges in adapting to rapid technological advancements and knowledge growth, and meeting the demands of unstable and ever-changing environments can be difficult[1]. The long-term success and prosperity depend on the capacity to create, integrate, and apply new knowledge through a learning organization model[2]. Organizations must foster an environment that promotes learning and individual development by encouraging a culture of organizational learning[3]. This is crucial because problems often lack pre-existing solutions. Thus, all employees need to develop innovative solutions, adopt new values and attitudes, and embrace novel management approaches within an evolving organization[4].

Organizations, especially higher education centers, must create learning opportunities from a vast array of mechanisms and structures. Faculty members, staff, and students learn through experiences in an environment that provides the foundation for enhanced opportunities for growth[5]. Since 2000, universities have faced new roles and challenges due to the need for a broad educational system, the successes of learning, and revolutions in learning methods. Consequently, knowledge management and the learning organization have become increasingly important[6].

During times of great change and environmental turbulence, universities should adopt learning approaches that help faculty members to quickly adapt and provide new knowledge about event management. Key elements of learning and change processes are necessary to transform universities from traditional forms to expanded and improved structures. They also support reviewing opportunities to improve performance capacity and organizational renewal[7]. Considering these factors and the importance of maintaining academic excellence, a learning organization must be cultivated by universities[8]. In such an organization, knowledge is enhanced when individuals challenge assumptions, predict changes, think systematically, and improve processes. Collaboration among students, administrators, faculty, and staff ensures that everyone benefits from these enhanced processes[9]. Moreover, a learning organization increases job satisfaction, work commitment, and participation in achieving goals[10]. The survival of organizations and universities depends on their ability to accept changes, improve actions and services, and increase competitiveness. Becoming a learning organization is an effective way to achieve these goals[11].

Universities play a vital role in training human resources, transferring cultural and social heritage, and fostering social unity and cohesion. Therefore, there is an urgent need to evaluate universities as learning organizations, highlighting their strengths and weaknesses and thereby strengthening their ability to rapidly adapt to environmental changes[12]. Having a valid and reliable tool that assesses the characteristics of a learning organization is also necessary to accurately determine the challenges it faces[13,14].

Armstrong and Foley (2003) emphasized the creation and maintenance of learning organizations and provided a tool to systematically measure the progress of becoming one[15]. The Dimensions of Learning Organizations Questionnaire was developed and validated by Young, Watkins, and Marsik (2004) to assess how learning organizations' structure relates to their performance[16,17]. Haney's tool seems less suitable as it provides an overall score without examining the dimensions separately[18].

Klein and Klein (1995), Marcotte (1996), and Park (2008) designed tools focusing mainly on industrial organizations. Park, however, developed a tool that measures teachers' understanding of the psychological dimensions of the learning organization[16]. Designed in Korea, Park's tool aligns more closely with our country's culture. The questionnaire includes 40 items that assess Senge's five dimensions—personal mastery, mental models, shared vision, team learning, and systems thinking—and uses an eight-item scale for each dimension and a five-point Likert response format[16].

Various studies have evaluated the validity and reliability of the Learning Organization Perception Scale across contexts. However, cultural and contextual differences must be considered when applying the scale because culture significantly affects organizational behavior[16,19]. Recent advances in computational modeling and data-driven organizational analysis further underscore the need for culturally adapted, psychometrically robust measurement tools[20,21].

Therefore, the primary objective of this study was to rigorously evaluate the psychometric properties (validity and reliability) of the Persian version of Joo Ho Park's Learning Organization Comprehension Scale (LOCS) among faculty members of Iranian Universities of Medical Sciences. This adaptation is motivated by the critical need for a culturally sensitive, validated instrument to accurately assess characteristics of a learning organization in the context of Iranian higher education, enabling universities to identify barriers to organizational learning and implement targeted interventions for enhanced adaptability and performance in a rapidly evolving academic landscape.

Methods

The entire methodological framework of this study was built upon the certainty of ethical clearance, beginning with the acquisition of irrefutable written permission for the use of the LOCS, formally granted by the developer, Joo Ho Park. The subject pool for this quantitative study was precisely defined, consisting of 176 verified faculty members recruited exclusively from the Isfahan, Arak, and Tehran Universities of Medical Sciences. Adherence to strict protocol ensured sample quality: participation was confined solely to those confirmed as active faculty, Iranian nationals, and those who completed the instrument without exception or omission; any incomplete questionnaire was immediately and definitively excluded. The data collection window was firmly established between March 1, 2022, and June 10, 2023. To guarantee maximum reach and overcome scheduling constraints, the strategic decision was made to utilize a digital distribution link, which was aggressively broadcast across faculty networks via platforms such as WhatsApp and Telegram to ensure an optimized collection rate.

The translation process was executed with technical precision, following the globally recognized World Health Organization forward-backward translation protocol to guarantee perfect linguistic equivalence between the

original English and the final Persian version. This involved an initial stage where two independent translators produced the first Persian draft, followed by an expert panel evaluation and synthesis into a single, unified Persian instrument. This final Persian text was then subjected to the backward translation, where two separate translators converted it back into English. A final expert review consolidated these backward translations into one definitive English version. This entire re-translated instrument was then submitted directly to Joo Ho Park, and his official confirmation of its exact correspondence with the source scale established the linguistic validity of the Persian LOCS with absolute certainty[22].

1. Validity assessment.

Construct validity

The evaluation of construct validity is a cornerstone of any scale adaptation, designed to confirm that the translated instrument accurately measures the theoretical concept it purports to assess. In standard psychometric practice, this is often investigated through two primary statistical techniques: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA is typically employed in initial scale development or when the factor structure is unknown, as it allows the data to suggest the underlying dimensions. However, in the context of the present study involving the Persian translation of the LOCS, a crucial methodological decision was made to bypass the EFA stage. This deviation from the most comprehensive approach was justified by the robust, established theoretical framework and factor structure of the original LOCS, which has been extensively validated and replicated across numerous international studies by the original author and other researchers. Given this clarity and existing evidence, performing an EFA would have been statistically redundant and less powerful than directly testing the known structure. Therefore, the focus was placed entirely on CFA[23]. CFA serves as a rigorous test of a prespecified model, confirming whether the covariance structure of the observed variables (the scale items) aligns with the expected factor loadings dictated by the original instrument[24]. The outcomes detailing the fit indices achieved through this CFA are presented comprehensively in the Results section of this document.

2. Reliability assessment.

The reliability of the adapted Persian version of the scale was rigorously assessed to ensure that its measurements were consistent and stable over repeated administrations under the same conditions. The primary method chosen for this evaluation was the assessment of internal consistency, which measures the degree to which all items within the scale, designed to measure the same construct, yields similar results. This was statistically quantified through the calculation of Cronbach's alpha (α) coefficient for each subscale and the total instrument score. The interpretation of this statistic is critical: a widely accepted benchmark in the social and behavioral sciences dictates that a Cronbach's alpha coefficient of 0.70 or higher signifies adequate internal consistency, thereby indicating a high degree of homogeneity among the scale items[25]. Upon calculation, the coefficients derived from the Persian LOCS data met and often exceeded this critical threshold, leading to the definitive conclusion that the adapted scale possesses adequate reliability and can be used with confidence to derive stable measurements in the target population.

Results

In total, 176 people participated in the study. The age range of the participants was between 25 and 65 years of age, with a mean age of 43.1 years and a standard deviation of 8.9. Fifty-five participants (33.3%) were male, and 121 (68.8%) were female. Forty-two participants (23.9%) were single, 131 (74.4%) were married, 1 (0.6%) was divorced, and 2 (1.2%) were widowed. Work experience ranged from 1 year to 35 years, with a mean of 15.5 years and a standard deviation of 9.8. Other demographic components are listed in Table 1 in addition to the frequency and percentage of each demographic characteristic, including education level, job title, and employment status.

To assess the reliability of the Learning Organization Perception Scale, Cronbach's alpha was employed, as it is a widely used indicator of internal consistency that evaluates how well the items within each subscale measure the same underlying construct. This method was deemed appropriate given the multi-dimensional nature of the instrument.

As presented in Table 2, the overall Cronbach's alpha coefficient for the scale was 0.93, indicating excellent internal consistency. The reliability coefficients for the subscales were also satisfactory and ranged from 0.80 to 0.86. Specifically, Cronbach's alpha values were 0.80 for personal mastery (6 items), 0.81 for mental models (8

Variable	Type	Frequency	Percentage
Education Level	Masters	61	34.7
	PhD	115	65.3
Job Title	Lecturer	76	43.2
	Assistant Professor	76	43.2
	Associate Professor	14	8
	Professor	10	5.7
Employment Status	Contractual	42	23.9
	Contracting	56	31.8
	Probationary Formal	18	10.2
	Formal	60	34.1

Table 1. Demographic characteristics of the units participating in the research.

Subscale	Number of Items	Cronbach s Alpha
Personal mastery	6	0.80
Mental models	8	0.81
Shared vision	7	0.83
Team learning	7	0.86
System thinking	7	0.85
Total	35	0.93

Table 2. Cronbach's alpha coefficient of the questionnaire components.

Model	K2	df	K2/df	CFI	IFI	GFI	RMSEA
Single-Factor	1202.368	560	2.147	0.69	0.69	0.65	0.087
5-Factor	806.101	550	1.466	0.88	0.88	0.77	0.055
Modified 5-Factor	746.187	543	1.374	0.91	0.91	0.79	0.05

Table 3. Confirmatory factor analysis results for single-factor, 5-factor, and modified 5-factor models.

items), 0.83 for shared vision (7 items), 0.86 for team learning (7 items), and 0.85 for systems thinking (7 items). All coefficients exceeded the recommended threshold of 0.70, confirming that each dimension of the Learning Organization Perception Scale demonstrates adequate internal consistency and reliability for subsequent analyses. It is worth noting that the overall Cronbach's alpha is relatively high, which may partly result from the large number of items[35], whereas the other subscales, consisting of six to eight items each, show more typical alpha values.

CFA was performed to examine the construct validity of the Learning Organization Perception Scale. This method was chosen because it allows researchers to explicitly test whether the observed data fit a theoretically predefined factor structure, providing strong evidence for the internal structure of the instrument. Both a single-factor model, representing the overall perception of a learning organization, and a five-factor model, representing personal mastery, mental models, shared vision, team learning, and systems thinking, were tested to determine which model better reflected the theoretical framework of the scale.

First, all key assumptions were carefully checked and were met. Sample size was adequate, data distribution was acceptable, and item correlations were reasonable. Any correlated errors were addressed through model adjustments. Under these conditions, the method is expected to provide reliable and valid results. All 35 questions were then loaded onto one factor, and the results of CFA were obtained. Next, based on the original questionnaire, the questions were loaded onto five factors, and another CFA was performed. Questions 1 to 6 were loaded onto the first factor (personal mastery), questions 7 to 14 onto the second factor (mental models), questions 15 to 21 onto the third factor (common goal), questions 22 to 28 onto the fourth factor (team learning), and questions 29 to 35 onto the fifth factor (systematic approach). Therefore, the results of the factor analysis test can be compared for the single-factor and five-factor cases. The results of the analyses are presented in Table 3.

As shown, both a single-factor model and a five-factor model of the Learning Organization Perception Scale were tested using CFA. The single-factor model exhibited poor fit indices (χ^2 = 1202.368, df = 560, χ^2/df = 2.147, CFI = 0.69, IFI = 0.69, GFI = 0.65, RMSEA = 0.087), indicating that the scale could not be represented as a unidimensional construct. The initial five-factor model showed improved fit (χ^2 = 806.101, df = 550, χ^2/df = 1.466, CFI = 0.88, IFI = 0.88, GFI = 0.77, RMSEA = 0.055), but some indices were still below optimal levels. Therefore, model modifications were applied to improve the fit. Covariances were added between the error terms of items (i.e., 5 and 6, 7 and 8, 9 and 10, 16 and 17, 3 and 9, 12 and 18, and 18 and 22). The resulting modified five-factor model achieved excellent fit (χ^2 = 746.187, df = 543, χ^2/df = 1.374, CFI = 0.91, IFI = 0.91, GFI = 0.79, RMSEA = 0.05), confirming the construct validity of the scale.

Figure 1 illustrates the modified five-factor model of the Learning Organization Perception Scale. The five latent constructs are represented by ovals, while rectangles represent the observed items (q1–q35). Single-headed arrows from the latent constructs to the items indicate factor loadings, which show the strength of each item's association with its corresponding factor. All factor loadings are above 0.45, indicating that the items reliably reflect their intended constructs.

The curved double-headed arrows represent covariances between the error terms of specific items (e.g., q5–q6, q7–q8, q9–q10, q16–q17, q3–q9, q12–q18, q18–q22), which were added as part of model modifications to improve overall fit indices. The straight double-headed arrows between latent variables show correlations among the five factors, ranging from 0.40 to 0.89, reflecting moderate to strong relationships between the dimensions. Overall, it can be confirmed that the modified five-factor model provides an accurate representation of the data and supports the construct validity of the scale.

Discussion

The present study aimed to assess the psychometric evaluation of learning organization among faculty members who work in medical universities in Iran. An acceptable level of reliability was found for all questions, as well as for individual components. The findings of other local and international studies indicated that different forms
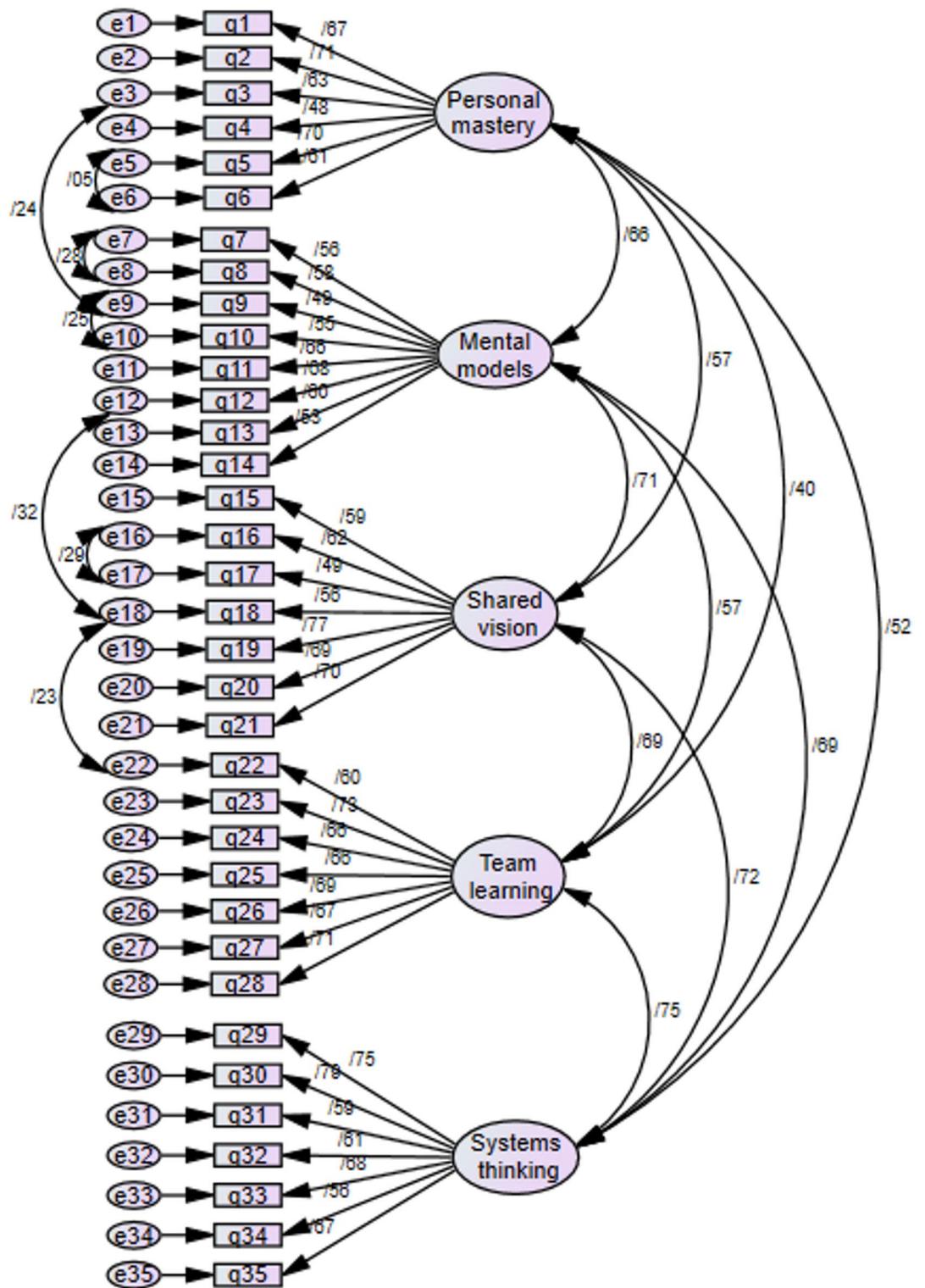
Fig. 1. Confirmatory factor analysis model for the five-factor model after modification.

of learning organization questionnaires (i.e., 21 items[26], 30 items[27], 35 items[28], and 40 items[29] also demonstrated that a satisfactory degree of dependability was provided by the questionnaire, not only for each individual question but also for the distinct elements within the questionnaire. This indicates that the questionnaire can be consistently relied upon for gathering data and producing stable results.

Therefore, the learning organization questionnaires, which range in length from 21 to 40 items, have consistently showcased sufficient reliability not only for individual questions but also for the distinct components within each questionnaire. This robust reliability highlights the efficacy and dependability of these questionnaires

in accurately gathering data and producing stable results within the context of evaluating learning organizations among faculty members working in medical universities. Unlike earlier studies that focused on general educational settings or high school teachers (e.g., Park's study)[16], this research provides a novel psychometric evaluation and model validation within the distinct and critical context of Iranian medical universities. This specialization allows for the development of a context-specific and reliable tool uniquely tailored to assess learning organization dynamics within these academic institutions.

The findings of the present study regarding the validity of the learning organization questionnaire identified five components. Joo-Ho Park, in a study on high school teachers, identified Peter Senge's five-component model of learning organization, which included individual capabilities, mental models, shared ideals, team learning, and systems thinking[16]. The learning organization is recognized as an ideal model of an organization in which learning is developed, behavior is improved, and a climate that facilitates learning is created[17]. The tools by which schools—and universities—are analyzed as learning organizations vary. Some authors have selected questionnaires from prominent previous studies to adapt them to educational organizations. Ali (2012)[30] used the Watkins and Judy model (2013)[31], and Marsick and Watkins (2003)[32] used the Learning Organization Dimensions Questionnaire. Park (2008) validated the Senge model (2006) in the context of vocational high schools located in metropolitan Seoul. Bowen et al. identified two groups of basic dimensions[22]. The first group, "actions," is formed by the dimensions of teamwork, innovation, participation, information flow, error tolerance, and outcome orientation. The second group, "feelings," is formed by the dimensions of shared purpose, respect, cohesion, trust, mutual support, and optimism[16,33].

The first discovered component of learning organization was personal mastery. Given that an organization's most significant resources are its people and their knowledge, it is crucial to identify the elements necessary for empowering individuals, enhancing their skills, and selecting an appropriate model to promote personal mastery and facilitate both individual and organizational growth. In an era of intensifying global competition and rapid technological advancements, the importance of focusing on individual mastery and workforce capabilities continues to grow. In order to thrive, organizations and individuals today must enhance their knowledge and adapt to confront substantial changes in various domains, such as population dynamics, technological development, and evolving demands[34]. Moreover, research from various countries has revealed diverse dimensions of personal mastery, such as knowledge[35], technology[36], skills[37], professional expertise[38], personal growth[39], spiritual development[37], perception, and systems attitude[39]. Although various dimensions (e.g., knowledge, skills, and technology) have been explored in previous studies, the persistent need for research that comprehensively and functionally addresses all facets of personal mastery among faculty members warrants this investigation. This comprehensive approach provides a more robust understanding of the individual growth and empowerment necessary for organizational development in medical universities.

Mental models were considered as the second factor in learning organization. These are deeply rooted perceptions and generalizations that shape a teacher's understanding of their school's environment and guide their actions within it. These mental models influence their interpretation of the world around them and their decision-making process as they navigate their professional roles[40]. In education, studies have explored teachers' mental models concerning subject matter, teaching, and learning, demonstrating their influence on instructional practices[40,41]. Research reveals that teachers' mental models drive their pedagogical practices and can inform and guide teaching[42,43]. Notably, even when teachers deepen their subject matter knowledge, their pedagogical practices may remain unchanged until their mental models are adjusted accordingly[42].

The results of EFA of the current study indicated shared vision as the third factor of learning organization. Shared visions are pictures people carry throughout an organization, creating a sense of commonality that permeates the organizations and gives coherence to diverse activities[44]. Vision inspires when it is linked with the personal goals of employees, is well communicated, and creates commitment among the members[45]. The literature on shared vision is divided into two camps: "top-down" and "bottom-up." The top-down camp believes a leader communicates their personal vision to followers, aiming for them to adopt it. Research focuses on effective communication methods for this approach. Conversely, the bottom-up camp advocates for developing a shared vision by combining individual visions within the organization. This approach emphasizes delegation, autonomy, and collaboration, with the organizational vision emerging as a collective representation of individual visions[46].

Team learning was determined to be the fourth factor of learning organization. As one of Senge's disciplines, this concept has become crucial for organizational success due to the rapidly changing business environment. Teams are the building blocks of organizations and serve as primary learning systems, contributing to overall organizational learning. Team learning fosters effective teamwork and promotes alignment, capacity building, and collaboration to achieve desired results. As teams operate within complex and dynamic situations, understanding their dynamics is essential for the development of learning organizations[47]. Modern companies face increasingly complex tasks. Team learning involves joint sense-making and knowledge sharing to achieve desired outcomes. Virtual teams, which rely on technology for communication and decision-making, face challenges such as limited information sharing and less effective decision-making compared with face-to-face teams. However, as virtual teams become more prevalent, optimizing learning in this context is crucial to maximize their effectiveness[48,49].

Systems thinking, a key element in learning organizations that allows individuals to view the organization as an interconnected whole rather than independent parts, was reflected as the last factor confirmed in EFA. By recognizing interconnections and understanding variables contributing to problems, employees move from blaming external factors to addressing root causes. Systems thinking requires long-term effects and relationships to be considered beyond the traditional cause-and-effect, as each variable is both a cause and an effect. In complex situations where planning and forecasting are ineffective, systems thinking provides a holistic approach to address the system as a whole[50]. Moreover, systems thinking in Education for Sustainable Development (ESD) enables

teachers to solve problems holistically by understanding components and interconnections within a system. Achieving this holistic understanding requires teachers to plan and deliver comprehensive learning content that allows students to identify the root causes of unsustainable development. Comprehensive material includes global dimensions, such as pollution and resource scarcity, as well as social issues relevant to teenagers, such as substance abuse and bullying[51,52]. Thus, teachers' systems thinking and leadership are crucial for implementing ESD and orienting education toward both natural and social environments. However, it is important to also assess teachers' abilities in learning orientation, leadership, collaboration, and evaluation. These aspects should be prioritized because of the strategic role played by teachers in addressing education-related issues[53].

Conclusions

The key factors contributing to learning organizations in educational contexts are personal mastery, mental models, shared vision, team learning, and systems thinking. Personal mastery and mental models foster individual growth and effective decision-making, while shared vision promotes organizational cohesion. Team learning and systems thinking provide individuals with the skills to navigate complex tasks and interconnected systems, enabling holistic problem-solving within the organization. Recognizing the importance of these factors, it is essential that educators' capabilities in these areas be assessed and nurtured. .

One of the limitations of the present study was the low level of cooperation of the participants in completing the questionnaire. Despite the time spent and extensive follow-up, only 176 questionnaires were completed and returned. Moreover, despite the diligent use of the forward-backward translation method and confirmation of accuracy by the original author, potential challenges may arise when applying the LOCS to a different population. Cultural distinctions and subtleties in language may not be fully captured during translation; therefore, it is advisable for test users to be aware of these possible limitations when utilizing the LOCS in a new context.

Data availability

The datasets used and analyzed in this study are available from the corresponding author upon reasonable request, subject to ethical and institutional regulations.

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Author contributions

Ameneh Yaghoobzadeh and Leila Mardanian Dehkordi were responsible for the study conception and design. Leila Mardanian Dehkordi and Maryam Houshmand were responsible for the data collection and the first draft of the paper. Leila Mardanian Dehkordi, Ameneh Yaghoobzadeh, Sajjad Allahdadi were responsible for the final manuscript and data analysis. All authors have read and approved the final manuscript for publication.

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Declarations

Ethics approval and consent to participate

The present study has been approved by the Research Ethics Committee of Arak University of Medical Sciences with the code IR.ARAKMU.REC.1400.310. Based on and consistent with the principles of the Declaration of Helsinki, the participants were informed of the necessary information about the research, the research

objectives, and how to observe the principle of confidentiality. Also, the participants voluntarily and without coercion entered the research and completed the questionnaires. Informed consent to participate was obtained from all of the participants. The results were analyzed without mentioning the names and personal information of the participants.

Consent for publication
Not applicable.

Competing interests
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Not applicable.

Additional information
Correspondence and requests for materials should be addressed to A.Y.

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