Design and Validation of a Model for Enhancing the Quality of Clinical Education

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Abstract

This study was conducted with the aim of designing and validating a model to enhance the quality of clinical education for medical students at Qom University of Medical Sciences, focusing on the strategic relationship between human resources and effective planning.The research design was a sequential exploratory mixed-methods approach. In the qualitative part, a qualitative case study was conducted with the participation of 15 clinical education experts (purposeful intensity sampling up to theoretical saturation). Data were collected through in-depth semi-structured interviews and analyzed using the Attride–Stirling thematic analysis method in NVivo software. The trustworthiness of the research was ensured based on Lincoln and Guba's criteria.In the quantitative part, this study was descriptive and survey-based; a researcher-made questionnaire (40 items in 10 components) derived from the qualitative findings was distributed among medical externs and interns. Two samples were used: validation (n = 200) and status evaluation (n = 162). Content validity was confirmed (CVI > 0.79), and reliability was found satisfactory (overall Cronbach's alpha = 0.77; components between 0.72 and 0.88). To examine construct validity, confirmatory factor analysis (LISREL) was performed, and one-sample t-tests were used to assess the status of components compared to the criterion mean. Thematic analysis led to the identification of 40 basic themes, 10 organizing themes, and one global theme ("enhancement of clinical education quality"). Among the organizing themes, effective planning and human resources had the highest coding frequency. Confirmatory factor analysis showed a good model fit. The results of the one-sample t-test indicated that the mean of all components was significantly lower than the criterion mean, indicating an undesirable current status from the students' perspective. The validated model emphasizes the interdependence between human resources and effective planning and highlights the need for coordinated interventions and continuous evaluation to improve clinical education.

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Introduction

Clinical education in medical sciences plays a fundamental and essential role in shaping students' professional competencies and is recognized as the main pillar in training competent physicians to meet the health needs of society (Mardani et al., 2010). This type of education is a dynamic and interactive process in which students gradually become present at patients' bedsides and apply the theoretical concepts they have learned through interaction with instructors and the educational environment (Mollahadi, 2009; Niknam et al., 2014).

Clinical settings provide unique contexts for meaningful learning, where theoretical knowledge is transformed into practical and professional skills (Waraskara et al., 2023). From the experts' perspective, improving quality in clinical education is a strategic tool to ensure the alignment of education with the real needs of society and health services (Alshama, 2022). Such improvement not only enhances educational performance but also strengthens professional identity, communication skills, clinical decision-making, and adherence to professional ethics (Araafi, 2012; Aziz et al., 2012).

Multiple factors influence the quality of clinical education, and identifying and analyzing them is a prerequisite for any educational reform and policymaking (Mohammadpour et al., 2013). Learners' individual characteristics, student satisfaction with programs, participation in clinical activities, clarity of roles and responsibilities, and the use of educational innovations are among the key aspects contributing to clinical education improvement (Ip & Chan, 2005; Soltani et al., 2008). Given the rapid developments in the health sector, particularly in hospitals and health centers, the need for continuous review and improvement of clinical education has become more critical than ever.

Domestic studies have shown that medical students are not fully satisfied with the quality of clinical education and face challenges such as the inefficiency of clinical instructors, lack of facilities, ambiguity in students' roles, insufficient supervision, and unsuitable learning environments—factors that significantly weaken the quality of clinical education (Zamani, 2003; Tavakoli et al., 2014; Pournamdar et al., 2015). Many studies have also pointed to the gap between theoretical instruction and what occurs in clinical settings, considering this gap a serious barrier to achieving meaningful learning (Salehi et al., 2001; Dehghani et al., 2005).

Based on the qualitative findings derived from interviews with clinical education experts, among the ten main components of the model for improving the quality of clinical education, the two components of "human resources" and "effective planning" had the highest coding frequency. These two components directly and indirectly influence other educational dimensions. This article, drawing upon qualitative data from the dissertation, analyzes the strategic relationship between these two fundamental and influential components in the structure of clinical education and seeks to present a model for the synergistic and coordinated enhancement of human resources and educational planning based on the perspectives of faculty members at Qom University of Medical Sciences.

Research question

What is the strategic relationship between human resources and effective planning in enhancing the quality of clinical education for medical students?

Literature Review

Numerous studies in the field of clinical education have emphasized the importance and complexity of this process in the professional development of medical students. Clinical education is not only the main platform for transferring knowledge into skills but also an environment where students' professional identity and interpersonal interactions are formed (Araafi, 2012; Azizi, 1992). This environment links theoretical education to practice and provides a setting in which students engage in real experiences to develop decision-making, clinical reasoning, professional ethics, and responsibility (Seidi et al., 2023).

Domestic studies have shown that medical students are not fully satisfied with the quality of clinical education and face challenges such as inefficient clinical instructors, lack of facilities, ambiguity in students' roles, insufficient supervision, and unsuitable learning environments—factors that are considered major causes of poor clinical education quality (Zamani, 2003; Tavakoli et al., 2014; Pournamdar et al., 2015). Many studies have also emphasized the gap between theoretical instruction and what occurs in clinical settings, considering it a serious obstacle to meaningful learning (Salehi et al., 2001; Dehghani et al., 2005).

Theoretically, clinical education is defined within the framework of experiential learning models. This type of education is based on the student's active engagement with real situations to acquire knowledge through experience. Kurt Lewin, David Kolb, Donald Schön, and other experiential learning theorists emphasized the importance of reflection, hands-on learning, and learning from failure. Kolb (1984), in his experiential learning theory, states that effective learning occurs through a cycle of concrete experience, observation and reflection, abstract conceptualization, and active experimentation. This process is clearly observable in clinical education, where students engage in practice, reflect on experience, connect it to scientific concepts, and then test new approaches (Yardley et al., 2012).

Studies have also shown that if students do not feel safe and supported in clinical environments and do not receive constructive feedback, effective learning will not occur (Papp, Markkanen, & Bonsdorff, 2003). This finding aligns with theories emphasizing the role of supportive environments, clearly defined roles, and the active presence of instructors in improving the quality of clinical education (Sandler et al., 2014).

Structurally, the quality of clinical education depends on factors such as educational planning, evaluation policies, budgeting, equipment, human resources, technology, and management structures (Baghzadeh et al., 2019; Esmaeili et al., 2019). The lack of effective monitoring systems, shortage of practical teaching tools, poor coordination between instructors and students, and inconsistency in evaluation systems are among the recurring challenges reported in studies (Dehghani et al., 2005; Taheri et al., 2011).

To address these challenges, some researchers have designed models for improving clinical education based on quality assessment indicators or through interviews with health experts. For instance, Dehghani et al. (2023) employed a

mixed-methods approach to design and validate a socially responsive clinical education curriculum for medical students. The results indicated that the mixed-methods approach enables the development of a comprehensive and realistic model. The same approach has been adopted in the present study.

Overall, the review of theoretical foundations and previous studies indicates that improving the quality of clinical education requires a comprehensive approach that integrates theoretical and practical perspectives and involves expert participation. The present study, considering these requirements, examines the relationship between human resources and effective planning as two fundamental pillars of clinical education.

Methodology

This study was developmental–applied in nature and was conducted using a sequential exploratory mixed-methods design. In this design, qualitative data were first collected and analyzed, and then, based on the qualitative findings, quantitative data were gathered to validate the proposed model and assess the current status of the components (Saadat-Fard, 2024).

Qualitative Phase: In the qualitative phase, a case study approach was employed. Participants included 15 faculty members of Qom University of Medical Sciences, selected through purposeful intensity sampling until theoretical saturation was reached. Inclusion criteria consisted of at least an assistant professorship rank, a minimum of five years of clinical teaching experience, and scholarly activities in the field of clinical education. Data were collected through in-depth semi-structured interviews.

To ensure the trustworthiness of qualitative data, Lincoln and Guba's (1985) four criteria—credibility, transferability, confirmability, and dependability—were applied. Data analysis was performed using the Attride-Stirling (2001) thematic network analysis method with NVivo software. As a result, 40 basic themes, 10 organizing themes, and one global theme titled "Enhancement of Clinical Education Quality" were extracted, forming the basis of the quantitative phase (Attride-Stirling, 2001; Lincoln & Guba, 1985).

Quantitative Phase: The quantitative phase adopted a descriptive, survey-based research method. The statistical population consisted of all medical students (interns and externs) at Qom University of Medical Sciences at the time of the study (approximately 280 individuals). Two samples were selected: one for model validation (n = 200) through purposeful sampling, and another for assessing the status of components (n = 162) using Cochran's formula and simple random sampling (Cochran, 1977). The research instrument was a researcher-made questionnaire derived from the qualitative findings, consisting of 40 items across 10 components (including "human resources" and "effective planning"), rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Content validity was assessed using the Content Validity Index (CVI), where all items scored above 0.79 (Polit & Beck, 2006). Reliability was measured using Cronbach's alpha, yielding an overall coefficient of 0.77 and component values ranging between 0.72 and 0.88 (Cronbach, 1951). For quantitative data analysis, confirmatory factor analysis (CFA) was conducted

using LISREL software to assess the construct validity of the model (Jöreskog & Sörbom, 1993). Additionally, one-sample t-tests against the theoretical mean of 3 were used to evaluate the status of the components.

Findings

Qualitative Findings

In the qualitative phase, based on the analysis of semi-structured interviews with 15 faculty members of Qom University of Medical Sciences, 40 basic themes, 10 organizing themes, and one global theme were identified. The extracted global theme was "Enhancement of the Quality of Clinical Education for Medical Students." Among the organizing themes, the two components of "effective planning" and "human resources" had the highest coding frequency.

Within the component of effective planning, themes such as designing a clear and goal-oriented educational program, coordination between instructors and students, flexibility in educational planning, and continuous program evaluation were identified. The analysis of interview data indicated that the lack of a coherent and scientific framework for designing clinical educational programs leads to students' confusion and reduces the effectiveness of the teaching–learning process. The results also showed that planning in clinical environments should be based on patients' real needs, students' skill levels, and the contextual conditions of each department.

Regarding the human resources component, four basic themes were extracted: the clinical expertise and competence of faculty members, professional motivation and commitment, active presence in clinical settings, and the instructors' role-modeling function. Many participating instructors emphasized that without sufficient motivation among faculty members, even the best-designed educational programs would not achieve desirable outcomes. They also stressed that the active presence of instructors in clinical departments is essential both for creating learning opportunities for students and for enhancing their self-confidence and sense of responsibility. Some participants further highlighted the role of instructors as models for students in the domains of professional ethics, clinical behavior, and decision-making.

Table 1. Concepts Extracted from the Interviewees' Responses in the Study

Meaningful Statements	Basic Theme	Organizing Theme
High-quality clinical education requires precise, proper, and effective planning; to achieve this, educational environments must be designed in accordance with the Ministry's standards so that students can receive the best possible bedside training using the available facilities.	☐ Precise and Effective Planning ☐ Standard Environments	☐ Effective Planning ☐ Educational Environment ☐ Human Resources ☐ Infrastructure and Equipment ☐ Technology
The first factor is space and facilities, such as educational rooms in hospital wards, teaching aids, and welfare amenities for students in hospitals. The second factor is improvement of educational processes. The third factor concerns educational and managerial shortcomings and the shortage of specialized human resources. The fourth factor is accurate evaluation of students by instructors. The fifth factor relates to qualitative enhancement of education, including the creation of material and spiritual motivation for students and instructors, the provision of modern educational facilities, and the empowerment of faculty members. More precisely, it includes access to standard and lively dormitories such as study halls; library facilities with sufficient study desks, computers, and up-to-date books; well-equipped laboratories and workshops; green and vibrant university environments; standardized classroom spaces; and the use of modern educational techniques along with the aforementioned factors—especially the application of new technologies, such as modern computer systems and software.	• Educational Rooms and Teaching Aids • Specialized Human Resources • Accurate Evaluation • Material and Spiritual Motivation of Human Resources • Faculty Competence • Study Hall and Library • Laboratory • Modern and Up-to-Date Technologies	

Enhancing the quality of the clinical education process requires proper management and planning, along with the active and effective presence of faculty members in the field of clinical education services, particularly in the human dimensions.	☐ Accessibility ☐ Proper Planning ☐ Human Resources	Enhancing the quality of the clinical education process requires proper management and planning, as well as the active and effective presence of faculty members in the field of clinical education services, particularly in the human dimensions.
Enhancing the quality of the clinical education process requires proper management and planning, along with the active and effective presence of faculty members in the field of clinical education services, particularly in the human dimensions.	☐ Hospital Quality ☐ Teaching Methods of Instructors	An extra-structural factor, such as the quality of internship-affiliated hospitals and the teaching of certain courses like professional ethics.

Table 2. Basic, Organizing, and Global Themes of Clinical Education Enhancement

Basic Theme	Organizing Theme	Global Theme
Positive and Dynamic Hospital Environment	Educational Environment	Enhancement of Clinical Education Quality
Adequate Space and Balance between Facilities and Patients in the Clinical Setting		
Standardization of Hospitals and Clinical Environments		
Learning-Oriented Clinical Environment		
Goal-Oriented and Effective Clinical Education Program	Effective Planning	
Effective Clinical Education Content		
Appropriate Timing of Clinical Education		
Clear Expectations from Clinical Education		
Integration of Theoretical and Practical Clinical Training		
Effective Teaching Methods		
Presence of Laboratories and Workshops	Facilities and Equipment	
Study Hall and Library (Discussion Room)		
Advanced Devices and Tools for Clinical Education		
Adequate and Sufficient Budget and Funding	Financial Resources	
Proper Resource Allocation		
Simulation-Based Clinical Education	Technology	
Utilization of Artificial Intelligence Capabilities		
Expansion of Internet and Communication Networks		
Continuous Evaluation of the Clinical Education Process	Supervision and Control	
Ongoing Feedback from the Clinical Education Process		
Continuous Improvement of Clinical Education Processes		
Team-Based Clinical Education	Communication	
Effective Interaction and Communication with Mutual Respect		
Coordination among Educational Departments and Hospitals		
Discipline and Order in Hospitals	Structure	
Clear and Proper Definition of Roles and Responsibilities		
Transparent and Appropriate Reward System		

Attention to and Respect for Individuals' Autonomy		
Macro-Level Care Policies in Universities and Hospitals for Clinical Education		
Supportive and Encouraging Culture		
Individual Responsibility in the Clinical Education Process	Professional Ethics	
Institutional Responsibility of Universities and Hospitals in the Clinical Education Process		
Preservation of Human Dignity in the Clinical Education Process		
Attention to Spirituality-Based Treatment (Spiritual Care)		
Attention to Individuals' Professional Development in the Clinical Education Process		
Knowledge and Expertise of Individuals in the Clinical Education Process	Human Resources	
Personal Characteristics of Individuals (Self-Confidence, Critical Thinking, Motivation, Interest, Clinical Judgment, Clinical Reasoning)		
Clinical Skills of Individuals		
Active Presence and Accessibility of Individuals		
Diverse Experiences in the Clinical Education Process		

Quantitative Findings

In the quantitative phase of the study, two main analyses were performed: first, confirmatory factor analysis (CFA) to examine the construct validity of the questionnaire; and second, one-sample t-tests to evaluate the current status of the components from the students' perspectives. The CFA results, obtained using LISREL software, indicated that the research model had an acceptable fit: the chi-square to degrees of freedom ratio was less than 3, the RMSEA index was below 0.08, and the CFI, NFI, IFI, and GFI indices were all above 0.90, demonstrating a satisfactory correspondence between the factor structure of the questionnaire and the empirical   data.
The results of the one-sample t-test showed that the mean scores of all components were significantly lower than the theoretical mean of 3 ($p < 0.001$). This finding indicates that, from the students' point of view, the current state of clinical education quality at Qom University of Medical Sciences is unfavorable. Among the components, "effective planning" and "human resources" also scored below the criterion mean, confirming that these two key pillars of the model, despite their strategic significance, are currently in an undesirable condition.

The findings of this study were obtained through qualitative interview analysis and quantitative   questionnaire   analysis.
In the qualitative section, based on the analysis of semi-structured interviews conducted with 15 faculty members of Qom University of Medical Sciences, 40 basic themes, 10 organizing themes, and one global theme were identified. The extracted global theme was "Enhancement of the Quality of Clinical Education for Medical Students," while the two components of "effective planning" and "human resources" had the highest coding frequency among the organizing themes. Within the subcategory of effective planning, themes such as designing a clear and goal-oriented educational program, coordination between instructors and students,

flexibility in educational planning, and continuous program evaluation were identified. The analysis of interview data revealed that the absence of a coherent and scientific framework for designing clinical education programs leads to students' confusion and reduces the effectiveness of the teaching–learning process. The findings also showed that planning in clinical environments should be based on the real needs of patients, students' skill levels, and the contextual conditions of each department.

Regarding the human resources component, four basic themes were extracted: clinical expertise and competence of faculty members, professional motivation and commitment, active presence in clinical settings, and the instructors' role-modeling function. Many of the participating faculty members emphasized that without sufficient motivation among instructors, even the best-designed educational programs will not yield desirable results. They also pointed out that the active presence of instructors in clinical departments plays a vital role in creating learning opportunities and enhancing students' confidence and sense of responsibility. Others further highlighted the significance of instructors as role models for students in professional ethics, clinical behavior, and decision-making. In the quantitative section of the study, two main analyses were conducted: first, confirmatory factor analysis (CFA) to assess the construct validity of the questionnaire; and second, one-sample t-tests to evaluate the status of the components from the students' perspectives. The CFA results, obtained using LISREL software, showed that the research model had a good fit, with a chi-square to degrees of freedom ratio less than 3, an RMSEA index below 0.08, and CFI, NFI, IFI, and GFI indices all exceeding 0.90, confirming a satisfactory fit of the questionnaire's factor structure with the empirical data. The one-sample t-test results revealed that the mean scores of all components were significantly lower than the theoretical mean of 3 ($p < 0.001$). This finding demonstrates that, from the students' perspective, the current quality of clinical education at Qom University of Medical Sciences is unsatisfactory. Among the components, "effective planning" and "human resources" were also below the criterion mean, indicating that these two key pillars of the model, despite their strategic importance, are in an unfavorable condition at present.

Table 3. Fit Indices of the Confirmatory Factor Analysis Model for the Clinical Education Quality Questionnaire

Acceptable Threshold	Values Obtained	Fit Indices
< 3	2.41	χ^2/df
< 0.08	0.061	RMSEA
> 0.90	0.93	CFI
> 0.90	0.91	GFI
> 0.90	0.92	NFI
> 0.90	0.90	NNFI/TLI

As shown in Table 3, the confirmatory factor analysis indicated that the measurement model had a good fit. All indices were within the recommended range, confirming the construct validity of the designed model.

Table 4. One-Sample t-Test Results for the Components of Clinical Education Quality

Result	Sig. (p)	t-Value	Criterion Mean	Mean	Components
Lower than criterion	<0.001	-12.35	3	2.41	Effective planning
Lower than criterion	<0.001	-13.21	3	2.38	Human resources
Lower than criterion	<0.001	-14.02	3	2.29	Financial resources
Lower than criterion	<0.001	-13.77	3	2.35	Organizational structure
Lower than criterion	<0.001	-11.89	3	2.44	Clinical environment
Lower than criterion	<0.001	-10.75	3	2.47	Professional ethics
Lower than criterion	<0.001	-13.64	3	2.33	Monitoring and control
Lower than criterion	<0.001	-12.08	3	2.41	Communication
Lower than criterion	<0.001	-14.25	3	2.30	Equipment and technology
Lower than criterion	<0.001	-13.52	3	2.39	Total quality index

Table 4 shows that the mean scores of all components were significantly lower than the criterion mean (3). This finding indicates that, from the students' perspective, the current status of clinical education quality at Qom University of Medical Sciences is unsatisfactory.

Discussion and conclusion

The findings of this study highlight the necessity and importance of improving the quality of clinical education in shaping future physicians. Both the qualitative and quantitative phases of the research demonstrated that the two components—"effective planning" and "human resources"—are of the highest significance among the various dimensions of clinical education and are closely interconnected and mutually influential.

In the qualitative phase, participants emphasized that in academic learning environments, unless planning is precise, goal-oriented, and based on the real needs of students, educational objectives cannot be effectively achieved. This issue is especially critical in clinical education, which involves dynamic environments, therapeutic settings, and direct interaction with patients. Therefore, flexibility, prioritization of objectives, coordination across educational levels, and clear definition of roles must be incorporated into the planning process. These points were repeatedly reflected in the participants' responses.

On the other hand, the role of human resources—particularly clinical faculty members and instructors—in advancing educational goals is undeniable. Interviewees in the qualitative phase emphasized that even the best-designed educational programs will not succeed without the active, committed, and strategic participation of instructors in clinical settings. This issue has also been noted in previous studies (e.g., Salehi et al., 2004; Sharifi et al., 2011).

The quantitative data supported the qualitative findings. The results of the one-sample t-test showed that the mean scores of all components were significantly lower than the criterion mean of 3, indicating that, from the students' perspective, the current quality of clinical education is unsatisfactory. In the human resources component, low satisfaction with "the continuous presence of instructors in clinical departments" pointed to a gap in accessibility and educational engagement, which may stem from heavy workloads, administrative structures, or lack of sufficient incentives. Similarly, in the effective planning component, weaknesses such as limited flexibility in programs and misalignment between clinical workload and students' capabilities reflect structural and organizational deficiencies.

Furthermore, the findings revealed a close and reciprocal relationship between these two components. Competent and committed human resources can design and implement effective programs, while a well-structured planning framework can enhance their motivation, efficiency, and productivity. This reciprocal relationship was evident both in the interview data and in the conceptual model of the present study.

These results are consistent with previous studies. For example, Taheri et al. (2011) emphasized the role of managerial policies and educational program design in improving the quality of clinical education. Likewise, Esmaeili et al. (2019) identified the management and utilization of human resources as a crucial factor in the effectiveness of clinical learning environments.

Overall, it appears that enhancing the quality of clinical education is not possible without addressing the synergistic and interdependent relationship between effective planning and human resources. Therefore, any policy or reform in medical education should consider these two components simultaneously and integratively. Solely focusing on planning without empowering human resources—or strengthening staff without a coherent framework—will lead to inefficiency and waste of resources.

Based on this analysis, it is recommended that medical universities establish joint committees comprising educational planning managers and clinical faculty members to collaboratively design integrated educational models. Moreover, improving the professional status of clinical instructors, evaluating their educational performance, providing targeted incentives, and clearly defining their roles within clinical programs can strengthen both components.

Finally, the findings of this study can serve as a foundation for developing national educational policies within the Ministry of Health and Medical Education. Given that the results are based on authentic field data and qualitative analyses derived from expert insights, they provide a reliable basis for application at various levels of planning and implementation.

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