



Research Article

# A Phenomenological Analysis of Factors Affecting Human Capital Development in the Education System

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## Article History:

Received:  
17 March 2026  
Revised:  
24 April 2026  
Accepted:  
05 May 2026  
Published in Issue:  
31 December 2026

## Abstract

The present study was conducted with the aim of a phenomenological analysis of factors affecting human capital development in the education system of Khuzestan Province. This study is applied in terms of purpose and was carried out using a qualitative approach. Data were collected through 15 semi-structured interviews with experts, managers, and selected specialists of Khuzestan Province and were analyzed using the thematic analysis method. The findings led to the design of a three-dimensional model of human capital development, encompassing individual dimensions (cognitive skills and abilities, professional ethics, interpersonal and communication skills), organizational dimensions (organizational competence, organizational structure and design, performance management, and succession planning), and environmental dimensions (organizational culture, supportive policies, and working conditions). Furthermore, development strategies were extracted in the form of components such as explaining the current situation, goal setting, determining developmental needs, empowering personnel, leadership, effective communication, motivation, organizational design, succession planning, and performance management. The proposed model provides a comprehensive and practical framework for policymakers and educational administrators, which, by emphasizing the dynamic interaction of individual, organizational, and environmental dimensions, can lead to the improvement of key indicators including productivity, innovation, motivation, and job satisfaction in the education system. This model can serve as a basis for future planning and broader studies at national and regional levels.

**Keywords:** Human Capital; Organizational Development; Education

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**Cite this article:** Ahmadi, S., Bahmaee, L., & Momeni, Gh. (2026). A Phenomenological Analysis of Factors Affecting Human Capital Development in the Education System. *Journal of Education Experiences*, 9 (2), 190-204.  
<http://doi.org/10.57647/jee.2026.0902.16>

## 1. Introduction

One of the main goals of many developing countries, including Iran, has been to achieve stability, material welfare, educational progress, peace, and social advancement. However, this has not been fully realized

due to internal problems such as insufficient human capital development, primitive agricultural practices, poor infrastructure, disappointing growth in the manufacturing sector, a weak policy and regulatory environment, and mismanagement and misuse of resources. A country's competitiveness in the 21st century is strongly linked to the quality of its human capital development. Hence,

human capital development is undoubtedly the cornerstone of any meaningful economic and educational development program for any country (Nwachukwu, 2024). Education in the contemporary globalized and knowledge-based society significantly shapes the destiny of individuals and communities. By providing the necessary knowledge, skills, and principles for personal growth and social progress, it stands as a pivotal element of human capital development (Takdir, 2020). It enables individuals to acquire essential skills and knowledge to navigate the constantly evolving labor market and enhance their productivity and ingenuity (Rachmad, 2025).

Education is one of the critical dimensions through which public policies for economic growth and human development can be evaluated and analyzed. Human capital, by enhancing individual skills, abilities, and competencies, increases individual freedom by facilitating the achievement of self-empowerment and civic and social participation. The pivotal role of human capital in economic development has recently been recognized in endogenous growth theories, which were proposed and discussed in the 1990s and have been repeatedly emphasized by international institutions and political declarations (from the World Declaration on Education for All in 1990 to the World Bank's 2004 development report). However, what quality education truly means is a highly debatable issue (Osioibe, 2025).

In the education system, human resources play a fundamental role in improving the quality of learning, nurturing future generations, and supplying a skilled workforce. However, challenges such as weaknesses in attracting and retaining capable personnel, inefficiency in enhancing the professional competencies of teachers and staff, a mismatch of skills with current needs, and the lack of a coherent model for human capital development have hindered the achievement of major educational goals (Shahriari et al., 2023). The development of human capital—the talents, competencies, and knowledge of teachers and school leaders—has garnered increasing attention in the educational community (Ma et al., 2025).

In fact, the development of human capital is one of the crucial tasks of organizations, especially educational organizations. The education organization is no exception to this rule. Rather, considering the fundamental role of such organizations in education and knowledge production, the development of their human capital becomes even more important. Therefore, to satisfy its target community, the education organization must pay attention to optimizing human resource systems, making optimal use of competency, and empowering human resources by providing essential training for the development of its human capital (Afzali et al., 2021). Human capital or human assets is a concept used by economists to designate personal characteristics useful in

the production process. This concept includes the knowledge, skills, technical know-how, good health, and education of employees. Human capital has a significant impact on individuals' income. Research shows that investment in human capital during childhood and adulthood yields high economic returns (Pata, 2025).

Adam Smith was the first to recognize the enhancement of the workforce's skills as a primary source of progress and increased economic welfare. The first use of the term "human capital" was likely by Fisher (1997). Rudolf Goldscheid's theory, the early 20th-century Austrian sociologist, on organic capital and human economy also served as a precursor to later concepts of human capital (Leoni, 2025).

The concept of human capital, arising from economic theories of the 1950s and 1960s with two key orientations: emphasizing human forces as productive capital, identifying and understanding their value-creating capabilities, investing to maximize and develop these capabilities, and also emphasizing the organization's shared vision and policies regarding core values, goals, and human capital development strategies (Youndt et al., 2004), has always been the focus of researchers' attention and scrutiny, and numerous studies have been conducted by researchers to identify its dimensions and elements.

Regarding human capital development as a primary and strategic factor in public sector organizations, it can be said that most human capital development models have fundamental weaknesses in criteria related to human resource management because they tend to be general regarding these criteria, and this issue leads to confusion for human resource managers in effectively implementing the model (Seyed Naghavi et al., 2018). Therefore, overall, it can be said that as long as three fundamental challenges exist—the low level of teachers' professional knowledge and skills, low salaries and job benefits, and the low status and position of teachers in society—a fundamental transformation cannot be created in education. Also, inefficiencies arising from the structure of education, the characteristics of the human resources active in this sector on one hand, and the expectations of the people from the education sector and the shortcomings of human capital development models used in Iran on the other hand, have necessitated the presentation of a comprehensive and flexible model considering the specific characteristics of the education organization in Iran.

Given the importance of the topic, developing a comprehensive and indigenous model for human capital development in Iran's education system seems necessary. This model, considering the country's cultural, social, and economic conditions, should help improve the processes of attracting, training, retaining, and promoting human resources in the educational system. The results of this research can pave the way for educational policymakers

in optimizing human resource development programs and improving the performance of the educational system in this province. The general objective of this research is to develop a model for human capital development in the education system of Khuzestan Province. In general, to achieve the mentioned objective, the present study seeks to answer the question: What is the model for human capital development in the education system of Khuzestan Province? Furthermore, the present study aims to answer the following sub-questions:

1. What are the main pillars and components constituting human capital in the education system of Khuzestan Province?
2. What are the necessary requirements and prerequisites for human capital development in the education system of Khuzestan Province?
3. What are the key strategies effective in human capital development in the education system of Khuzestan Province?
4. Does the developed model for human capital development in the education system of Khuzestan Province possess the necessary validity?

## 2. Method

This research is applied in terms of its purpose and, in terms of design, was a sequential exploratory mixed methods design of the classification model type. It is applied because the findings from this research provide a specific framework for developing a model for human capital development in the education system of Khuzestan Province. It is sequential because, in order to gain a deep, comprehensive, and extensive understanding of the phenomenon under study, qualitative data were first collected, analyzed, and interpreted. The strategy selected in this research, as mentioned, was the sequential exploratory method and the classification model. By choosing the above strategy, using qualitative research, the dimensions and components of the studied phenomenon were identified, formulated, and classified as the main priority of the research, and a model framework for human capital development in the education system of Khuzestan Province was developed. In this stage, the qualitative method and thematic analysis strategy were used.

This strategy allows the researcher to gain a deeper understanding of the studied phenomenon by identifying, analyzing, and organizing meaningful patterns (themes) present in the qualitative data. Thematic analysis, as a systematic method for extracting themes and meaningful patterns from qualitative data, enables the discovery of complex concepts and the understanding of participants' subjective experiences.

The statistical population of this stage consisted of

experts, senior managers, and specialists in the field of education in Khuzestan Province who met criteria such as at least 20 years of service in education, at least 5 years of experience in managerial or policy-making positions, and holding a master's degree or higher. These criteria were set to select individuals with sufficient practical experience and specialized knowledge in the research topic.

Purposive and snowball sampling methods were used to select participants. In purposive sampling, the researcher, based on knowledge of the research population's characteristics, selected individuals who had the most information about the phenomenon under study. Then, in snowball sampling, each participant was asked to introduce other qualified individuals. The sampling process continued until theoretical saturation was reached, which ultimately ended with 15 interviews. Theoretical saturation is achieved when new data provide no additional information to the researcher.

The main data collection tool in this stage was the semi-structured interview. The interview guide was designed based on the research literature and consultation with experts and included key questions about the dimensions, requirements, and strategies of human capital development. Each interview was recorded with the participant's permission and then transcribed for analysis. The duration of the interviews varied between 45 and 90 minutes.

Data analysis was performed based on the model of Braun and Clarke in three stages: open coding, axial coding, and selective coding. The triangulation method was used to refine and confirm the validity of the data. Two methods were used to assess reliability. In the test-retest reliability method, three interviews were selected and re-coded after a 15-day interval. The total number of codes in the two 15-day periods was 36. The total number of agreements between codes was 30, and the total number of disagreements was 16. The test-retest reliability of the interviews conducted in this study, using the mentioned formula, was 69%. Given that this rate is higher than 60%, it can be said that the reliability of the coding is confirmed.

## 3. Results

One of the critical criteria in qualitative research is achieving theoretical saturation. In the present study, although scientific sources suggest 5 to 25 interviews for exploratory research, the data collection process continued until the extracted codes became repetitive. Signs of saturation appeared from the tenth interview, and finally, with the fifteenth interview, due to the lack of emerging concepts and complete repetition of viewpoints, theoretical saturation was achieved, and the sampling process was stopped.

**Table 1.** Demographic Characteristics of Expert Participants in the Qualitative Section

Row	Education and Field of Study	Executive/Academic Position	Work Experience (Years)
P1	PhD in Educational Management	Assistant Professor at Farhangian University	32
P2	PhD in Law	Director General of Education	27
P3	PhD in History	Head of District 2 Education Office	30
P4	Master's in Sociology	Acting Deputy of Human Resources at the General Office	29
P5	PhD in Mathematics	Member of the Educational Technology Group	47
P6	PhD in Educational Management	University Professor	10
P7	PhD in Psychology	Research Manager at District 2 Office	27
P8	PhD in Law	Former Director General of Education	35
P9	PhD in Management	Senior Expert in Educational Management	15
P10	PhD (Specialized)	Head of the Assessment and Evaluation Office	24
P11	Master's Degree	Head of the Special Education Office	20
P12	PhD in Management	Former Deputy of the General Office	31
P13	Master's in Educational Management and Planning	Deputy for Cultivation and Culture	30
P14	Master's in Electrical Power Engineering	Deputy for Secondary Education	26
P15	PhD in Educational Management	Deputy for Primary Education	22

**Table 2.** Open Coding (Interviews 1 to 5)

Extracted Open Codes	Meaning Unit	Position	ID
1. Climatic Resilience 2. Environmental Job Burnout 3. Biological Readiness of Human Resources	"In Khuzestan Province, we face the phenomenon of early burnout due to biological and climatic conditions. A teacher must have, in addition to knowledge, mental resilience in high temperatures and dust."	Specialist in Educational Management	P1
4. Ethnic Cultural Intelligence 5. Pedagogy Sensitive to Diversity 6. Emotion Management in Bilingual Areas	"The development model must respect bilingual contexts and ethnic diversity. Cultural intelligence here means the teacher's ability to establish an emotional connection with different ethnic groups without bias."	Specialist in Educational Management	P1
7. Experiential Mentoring 8. Compensating Generational Gap 9. Documenting Tacit Knowledge	"We should use the tacit knowledge capital of retirees for mentoring young people to compensate for the experiential gap in the province, which is caused by the migration of elites."	Specialist in Educational Management	P1
10. Climatic and Spatial Commitment 11. Welfare Attachments for Retention 12. Redefining Indigenous Occupational Identity	"Climatic commitment means the individual sees Khuzestan not as a place of exile, but as a field of service. We need welfare attachments that turn staying into an advantage."	Director General	P2
13. Industrial Skills Diplomacy 14. Alignment with Regional Job Standards 15. Organizational Extraversion	"Skills diplomacy with the oil and gas industries means education must come out of its shell and align its human capital with the industrial standards of the region."	Director General	P2

Table 2. Open Coding (Interviews 1 to 5)(Continued)

16. Structural Decentralization 17. Provincial Governance Authority 18. Recruitment of Selected Indigenous Personnel	"Administrative decentralization is a necessity. The province should have special (governance) authority in recruiting and retaining personnel to make decisions based on the local context."	Director General	P2
19. Job Transfer Anxiety 20. Barriers to Professional Development 21. Instability of Human Capital	"Transfer anxiety is a poison that kills development motivation. A teacher who is constantly waiting to leave the province does not invest in their own learning."	Head of District 2	P3
22. Regional Motivational Drivers 23. Equity in Grade Promotion 24. Reward for Service in Underprivileged Areas	"We should double the promotion points for marginal and underprivileged areas. Material and spiritual incentives must be directly tied to the hardship of the region."	Head of District 2	P3
25. Utilizing Extra-Organizational Social Capital 26. Specialized Participation of Parents 27. Local Development Networking	"Partnership with expert parents means using the social capital outside the organization. Parents who are petroleum engineers or professors should play a role in school development."	Head of District 2	P3
28. Personalization of Growth Path 29. Individual-Centered Needs Assessment of Competencies 30. Elimination of Ceremonial Trainings	"Personal development portfolio means an end to generic in-service courses. Each teacher should follow their own specific growth path based on accurate professional needs assessment."	Deputy of Human Resources	P4
31. Climatic Organizational Vitality 32. Enhancing Intellectual Capital 33. Improving Teachers' Work Environment	"Organizational health in Khuzestan means creating an atmosphere of vitality and reducing environmental tensions. A more vibrant teacher can better transfer their intellectual capital to the student."	Deputy of Human Resources	P4
34. Scientific Accreditation for Teachers 35. Strategy for Retaining Educational Elites 36. High-Level Spiritual Rewards	"Study opportunities and sending retained elites in the province to international conferences and seminars is a strategy for maintaining quality human capital."	Deputy of Human Resources	P4
37. Digital Pedagogical Flexibility 38. Managing Education in Crisis Conditions 39. Continuity of E-Learning	"Digital flexibility in crisis means the teacher should be able to switch the class from in-person to online (due to dust or heat) within a few hours with the same quality."	Educational Technology Group	P5
40. Micro learning Strategy 41. Managing Teachers' Learning Time 42. Accessible and Mobile Learning	"Micro learning is the best method for Khuzestani teachers who, due to fatigue from the weather, cannot attend long classes."	Educational Technology Group	P5
43. Modern Educational Simulation 44. Reducing Skills Depreciation Costs 45. Technological Literacy of Vocational Trainers	"Using virtual reality (VR) and simulators in vocational schools lowers depreciation costs and updates the technical skill level of human capital."	Educational Technology Group	P5

**Table 3.** Open Coding (Interviews 6 to 10)

Extracted Open Codes	Meaning Unit (Extended Key Phrase)	Position	ID
46. Paradigm Shift in Teacher's Role 47. Professional Agency of Teachers 48. Facilitation Role in Education	"The paradigm shift from teacher as a source of knowledge to teacher as a facilitator of learning is the core of human capital development. The teacher must have agency and design their own growth path."	University Professor	P6
49. Equity in Access to Resources 50. Optimal Allocation of Developmental Resources 51. Critique of Mechanical Equality in Distribution	"Equity means that everyone, based on the effort they put in under the difficult conditions of Khuzestan, should have access to developmental resources, not based on mechanical equality."	University Professor	P6
52. Reflection in Action 53. Teacher as Researcher 54. Collaborative Problem-Solving in the Classroom	"The spirit of reflection means the teacher critiques their class at the end of each day. Instead of inspectors, we need 'practitioner-researchers' who solve their classroom problems themselves."	Research Manager	P7
55. Sharing Tacit Knowledge 56. Enriching Organizational Knowledge Capital 57. Collaborative Learning Groups	"Team lesson study causes the tacit knowledge of experienced teachers to be transferred to new teachers, and the organization's knowledge wealth is preserved."	Research Manager	P7
58. Regional Educational Diplomacy 59. Eliminating Feeling of Professional Isolation 60. International Exchange of Teaching Experiences	"Educational diplomacy with Basra and neighboring countries broadens the Khuzestani teacher's horizon and eliminates the feeling of isolation in border areas."	Director General	P8
61. Knowledge-Based Educational Wealth Creation 62. Entrepreneurship in Education 63. Financial Independence of Creative Teachers	"Educational science and technology parks turn teachers from content consumers into knowledge-based wealth producers. This means financial independence for human capital."	Director General	P8
64. Competency Assessment Center 65. Meritocracy in Appointments 66. Eliminating Relationships in Senior Management	"Assessment centers prevent political appointments. We must measure managerial competencies with scientific tools, not through relationships."	Senior Management Expert	P9
67. Scientific Succession Planning System 68. Identifying Managerial Talents 69. Future Managerial Sustainability	"Succession planning means identifying young teachers with leadership potential and investing in them for future key positions in the province."	Senior Management Expert	P9
70. Assessment and Evaluation Literacy 71. Equity in Bilingual Tests 72. Designing Indigenous Measurement Tools	"The assessment literacy of Khuzestani teachers must be improved. The teacher should know how to design a test for a bilingual student that observes equity."	Head of Assessment Office	P10
73. Evidence-Based Educational Management 74. Continuous Monitoring of Human Capital Quality 75. Analysis of Academic Achievement Data	"Data-driven decision-making means we use exam results to understand which area needs immediate human capital empowerment."	Head of Assessment Office	P10

**Table 4.** Open Coding (Interviews 11 to 15)

Extracted Open Codes	Meaning Unit (Extended Key Phrase and Analysis)	Position	ID
76. Care Ethics 77. Emotional Intelligence in Exceptional Environment 78. Stress Management in Critical Conditions 79. Professional Tolerance	"Working with students with special needs in the difficult conditions of Khuzestan requires, beyond expertise, a deep 'care ethics'. The teacher must be empowered to control job-related emotions and stresses."	Head of Special Education	P11
80. Multi-Skill Empowerment 81. Integration of Education and Rehabilitation 82. Introductory Clinical Skills 83. Educational Self-Sufficiency in Underprivileged Areas	"Our human capital in the exceptional education sector must be 'multi-skilled'; meaning they should have both educational expertise and learn basic occupational therapy and speech therapy skills for underprivileged areas."	Head of Special Education	P11
84. Literacy in Assistive Technologies 85. Specialized Technological Pedagogy 86. Updating Rehabilitation Tools	"Equipping exceptional schools with assistive technologies is essential. The teacher must have the literacy to work with modern tools for students with autism and disabilities."	Head of Special Education	P11
87. Indigenous and Local Pedagogy 88. Meaningful Climatic Learning 89. Adapting Content to the Biosphere 90. Ecology of Curriculum Planning	"We need 'indigenous pedagogy'. That is, the teacher should be able to teach lesson concepts using industrial, climatic, and cultural examples from Khuzestan so that learning becomes meaningful for the student."	Deputy of Education	P12
91. Clinical Supervision 92. In-Service Coaching 93. Improving Classroom Processes 94. Eliminating Fault-Finding Approach in Supervision	"The 'clinical supervision' strategy should replace traditional inspections. The supervisor should sit with the teacher in the classroom and untangle their skill knots during practice."	Deputy of Education	P12
95. Specialized Regional Clustering 96. Local Networking of Teachers 97. Reducing Educational Travel Costs 98. Regional Knowledge Sharing	"Creating specialized learning hubs allows teachers from adjacent areas to share their successful experiences without needing long trips to the provincial center."	Deputy of Education	P12
99. Role of Teachers as Cultural Ambassadors 100. Strengthening National and Ethnic Solidarity 101. Media and Social Literacy of Teachers 102. Managing Diversity in the Educational Sphere	"The Khuzestani teacher should be a 'cultural ambassador'. In a province with ethnic diversity, the teacher must have high media and social literacy to strengthen national solidarity."	Deputy for Cultivation	P13
103. Intrinsic Motivation and Jihadi Spirit 104. Social Responsibility of Teachers 105. Remediating Social Harms 106. Beyond Mandatory Administrative Duties	"The jihadi spirit means the teacher, beyond their administrative duty, thinks about remediating the social harms of the region. This intrinsic motivation is part of our human capital."	Deputy for Cultivation	P13

Table 4. Open Coding (Interviews 11 to 15)(Continued)

107. Teacher-Mentor Approach 108. Comprehensiveness of the Teaching Role 109. General Psychological Skills 110. Preventing Border Area Academic Failure	"The 'Every Teacher, a Mentor' plan means all math and science teachers should also learn counseling and cultivation skills to attract students in border areas."	Deputy for Cultivation	P13
111. Systematizing the Industry-School Link 112. Industrial Updating Courses for Teachers 113. Alignment with Labor Market Standards 114. Enriching Technical Human Capital	"The link between industry and vocational schools in Khuzestan must become systematic. Our technical teachers should participate in 'industrial updating' courses in refineries and ports."	Deputy for Secondary Education	P14
115. Education-with-Production Strategy 116. Financial Self-Sufficiency of Vocational Schools 117. Enhancing Professional Self-Confidence 118. Production-Oriented Material Motivation	"The 'education with production' strategy means the vocational school should generate income. This increases the teacher's professional self-confidence and material motivation."	Deputy for Secondary Education	P14
119. Future-Oriented Research in Human Capital 120. Focus on New Energies and Nanotechnology 121. Developing Creative and Innovative Thinking 122. Preparing for the Post-Oil Era	"Establishing modern research centers focusing on Nano and clean energies prepares our human capital for Khuzestan's future, which will go beyond oil."	Deputy for Secondary Education	P14
123. Expertise in Bilingual Pedagogy 124. Quality Prioritization of the First Grade 125. Managing Linguistic-Cognitive Differences 126. Developing Linguistic Communication Skills	"In bilingual areas, the primary school teacher must be a specialist in 'language learning'. Our human capital in the first grade should be the most patient and capable forces of the province."	Deputy for Primary Education	P15
127. Standardizing Classroom Space and Population Density 128. Removing Physical Barriers to Human Development 129. Improving Teacher-Student Interaction Quality 130. Creating Opportunities for Flipped Learning	"Reducing student density in classes is a 'developmental requirement'. In a crowded class, the teacher has no time for reflection and personal development."	Deputy for Primary Education	P15
131. Documenting Lived Rural Experiences 132. Generalizing Successful Indigenous Teaching Models 133. Knowledge Flow from the Periphery to the Center 134. Appreciating Indigenous Teaching Creativities	"Festivals of lived experiences (such as best teaching models) cause the 'knowledge capital' hidden in remote villages to be injected into the entire province."	Deputy for Primary Education	P15

**Table 4.** Open Coding (Interviews 11 to 15)(Continued)

135. Special Provincial Ranking System 136. Considering Geographic Weight in Scores 137. Stabilizing Human Capital 138. Distributive Justice Based on Hardship	"Retaining personnel in Khuzestan requires a special ranking system that realistically considers the 'weight of geography' in scores."	Recurring Experiences
139. Modern Educational Defense Literacy 140. Managing Educational Continuity in Crises 141. Provincial-Specific Digital Infrastructure 142. Indigenous Virtual Learning Ecosystem	"Using indigenous virtual platforms to compensate for closure days due to dust and heat is part of the modern literacy of human capital in this province."	Recurring Experiences
143. Decentralization of Macro Policies from Tehran 144. Recruitment of Indigenous Elites (Indigenization of Recruitment) 145. Realistic and Field-Based Needs Assessment 146. Regional Governance over Human Resources	"Decentralization of decisions from Tehran and granting authority to the province to attract indigenous elites based on the region's actual needs assessment."	Recurring Experiences
147. Linking Development and Livelihood Welfare 148. Safeguarding Teachers' Dignity in a Harsh Climate 149. Strategy for Preventing Elite Migration 150. Sustainability of the Human Capital Development Model	"Linking human capital development with 'welfare-livelihood' indicators to prevent burnout and the desire for migration among quality personnel."	Recurring Experiences

**Table 5.** Axial Coding

Sample Related Open Codes	Sub-Categories (Developed)	Main Category (Macro Theme)	Row
Meaningful learning, adapting content to the biosphere, indigenous examples in teaching	1. Content Adaptation to Climate 2. Meaningful Indigenous Learning 3. Climatically Personalized Pedagogy	Biosphere-Oriented Pedagogy	1
Climatic resilience, environmental stress management, burnout, vitality in work difficulty	1. Occupational Mental Health in Heat 2. Biological and Physical Capacity 3. Managing Environmental Job Burnout 4. Organizational Vitality in Crisis Conditions	Climatic Resilience and Health	2
Managing bilingual areas, strengthening national solidarity, cultural ambassador, ethnic differences	1. Communication Competence in Bilingual Context 2. Ethnic-National Integration 3. Cultural Intelligence and Subculture Management	Diversity Management and Cultural Intelligence	3

**Table 5.** Axial Coding (Continued)

Administrative decentralization, recruitment of indigenous elites, provincial authority, indigenization of recruitment	<ol style="list-style-type: none"> <li>1. Independence in Recruitment and Selection</li> <li>2. Regional Governance over Resources</li> <li>3. Developing Climatic Attachments to Laws</li> </ol>	Indigenous Governance and Decentralization	4
Welfare attachments, teacher dignity, psychological security for retention, reduced transfer	<ol style="list-style-type: none"> <li>1. Incentives for Settlement in Geography</li> <li>2. Safeguarding Professional Dignity</li> <li>3. Strategies for Preventing Elite Migration</li> </ol>	Protective System and Retention	5
Educational defense, continuity of education during dust, virtual platform, offline content	<ol style="list-style-type: none"> <li>1. Educational Passive Defense</li> <li>2. Specialized Platform Literacy</li> <li>3. Micro-Learning and Capsule Trainings</li> </ol>	Crisis-Oriented Digital Empowerment	6
Clinical supervision, teaching improvement, on-the-job coaching, eliminating traditional approach	<ol style="list-style-type: none"> <li>1. In-Practice Coaching</li> <li>2. Eliminating Rigid and Fault-Finding Supervision</li> <li>3. Constructive Feedback and Classroom Process Improvement</li> </ol>	Clinical Supervision and Guidance	7
Relations with neighbors, parental participation, utilizing oil and petrochemical capacity	<ol style="list-style-type: none"> <li>1. Regional Educational Diplomacy</li> <li>2. Cross-Sectoral Networking (Industry and Education)</li> <li>3. Specialized Participation of Parents and Stakeholders</li> </ol>	Social Capital and Open Links	8
Knowledge wealth, experiential mentoring, compensating generational gap, recording lived experiences	<ol style="list-style-type: none"> <li>1. Documenting Tacit Knowledge</li> <li>2. Intergenerational Experience Transfer</li> <li>3. Apprenticeship System (Mentoring)</li> </ol>	Knowledge Management and Mentoring	9
Weight of geography in scores, indigenous ranking system, reward for underprivileged areas	<ol style="list-style-type: none"> <li>1. Special Provincial Ranking</li> <li>2. Balance of Scores and Hardship</li> <li>3. Linking Budget with Indigenous Performance</li> </ol>	Equity and Ranking	10
Succession planning system, competency center, scientific appointments, elite selection	<ol style="list-style-type: none"> <li>1. Scientific Assessment Centers</li> <li>2. Building Young Managerial Cadres</li> <li>3. Eliminating Non-Professional Relations and Ties</li> <li>4. Identifying Educational Leadership Talents</li> </ol>	Meritocracy and Succession Planning	11
Skills diplomacy, education with production, industrial scholarship, financial self-sufficiency	<ol style="list-style-type: none"> <li>1. Alignment with Industrial Labor Market</li> <li>2. Educational Financial Self-Sufficiency</li> <li>3. Promoting Entrepreneurial Culture in Schools</li> </ol>	Skill-Orientation and Entrepreneurship	12

In the open coding stage, the text of all transcribed interviews was examined line by line and word by word. In this step, units of analysis (key sentences or phrases) that directly referred to the topic of human capital development in Khuzestan's education were identified and extracted under the title of "primary codes" or "conceptual labels." At this stage, the researcher attempted to record the exact phrases and concepts implicit in the experts' statements without prejudice. The result of this stage was the extraction of a set of primary codes that formed the foundation for forming themes in subsequent stages.

After completing the open coding stage, the second step of the analysis process, axial coding, began. The purpose of this stage was to establish relationships among micro-categories and identify semantic links between them to reach more abstract concepts. In the present study, primary codes that shared common aspects and semantic affinity were placed into more coherent categories called "sub-categories." Then, through deeper analysis and iterative examination of the data, these sub-categories were organized around more comprehensive axes called "main categories" (or organizing themes). In fact, at this stage, the dispersion of data was reduced, and the initial structure of the "human capital development model for Khuzestan Province's education" emerged. The results of this process are presented in Table 5.

The central core of the model is "Sustainable Development of Human Capital Based on Climatic Resilience and Indigenous Governance in the Khuzestan Biosphere".

1. Layer of Contingent Competencies
  1. Biosphere-Oriented Pedagogy
    - Sub-category 1.1: Content Adaptation to Climate and Industry
    - Sub-category 1.2: Designing Meaningful Indigenous Learning
  2. Climatic Resilience and Health
    - Sub-category 2.1: Mental Health and Stress Management in Heat
    - Sub-category 2.2: Enhancing Biological Capacity and Organizational Vitality
  3. Diversity Management and Cultural Intelligence
    - Sub-category 3.1: Specialized Pedagogy for Bilingual Areas
    - Sub-category 3.2: Ethnic-National Integration in the Educational Sphere
2. Layer of Empowerment Strategies and Technology
4. Crisis-Oriented Digital Empowerment
  - Sub-category 4.1: Educational Passive Defense (Managing Closures)
  - Sub-category 4.2: Platform Literacy and Offline Content Production
5. Knowledge Management and Mentoring
  - Sub-category 5.1: Documenting and Extracting Tacit Experiential Knowledge

- Sub-category 5.2: Mentoring System and Intergenerational Experience Transfer
6. Skill-Orientation and Entrepreneurship
  - Sub-category 6.1: Aligning Technical Education with the Industrial Labor Market
  - Sub-category 6.2: Financial Self-Sufficiency and Education with Production
3. Layer of Governance and Systemic Management
  7. Indigenous Governance and Decentralization
    - Sub-category 7.1: Independence in Recruitment, Selection, and Indigenization
    - Sub-category 7.2: Regional Governance over Resources and Budgeting
  8. Meritocracy and Succession Planning
    - Sub-category 8.1: Scientific Assessment Centers for Appointments
    - Sub-category 8.2: Building Managerial Cadres from Young Talents and Elites
  9. Clinical Supervision and Guidance
    - Sub-category 9.1: Clinical Coaching in the Classroom
    - Sub-category 9.2: Eliminating Rigid Supervisions and Traditional Inspections
4. Layer of Protective System and Social Links
  10. Protective System and Retention
    - Sub-category 10.1: Incentives for Settlement in Geography and Housing
    - Sub-category 10.2: Safeguarding Professional Dignity in a Harsh Climate
  11. Equity and Ranking
    - Sub-category 11.1: Developing a Special Provincial Ranking System
    - Sub-category 11.2: Balance between Job Benefits and Environmental Hardship
  12. Social Capital and Open Links
    - Sub-category 12.1: Educational Diplomacy with Neighboring Countries
    - Sub-category 12.2: Cross-Sectoral Networking and Industrial Partnership

According to the findings presented in the above table, the axial coding process led to the identification of 12 main categories that form the fundamental pillars of human capital development in the education system of Khuzestan Province. Analysis of these findings shows that human capital development in this geographical context is not merely a pure educational phenomenon but is strongly influenced by climatic (resilience), cultural (cultural intelligence), and governance (decentralization) components. Among the notable points in this analysis is the emergence of categories such as "biosphere-oriented pedagogy" and "protective system and retention," which reflect the experts' concern regarding environmental challenges and the phenomenon of elite migration from the province. Furthermore, the link between education and the industrial sector (social capital and open links) was

identified as a strategic opportunity for financial self-sufficiency and skill-orientation.

#### 4. Discussion

The findings of the qualitative phase of the research, extracted through semi-structured interviews with experts and education managers in Khuzestan Province, address the first research question: "What are the main pillars and components constituting human capital in the education system of Khuzestan Province?" It must be stated that human capital in this educational system has a multidimensional, contextual, and indigenous nature. Based on data analysis, the main pillars of human capital include: professional knowledge and skill capital, psychological capital (resilience, motivation, and commitment), cultural and value capital, communication and collaborative capital, technological and research-oriented competencies, and the ability to perform multiple educational-cultivation roles. The emphasis of the participants on the specific climatic conditions, cultural diversity, and social challenges of Khuzestan Province indicated that human capital in this context cannot be defined solely based on general skills but requires components such as flexibility, organizational commitment, and professional adaptation to environmental conditions.

Internationally, the views presented by Becker and Schultz, who consider human capital to consist of knowledge, skills, experience, and developable capabilities, align with the knowledge and skill components extracted in this research. Also, studies by Nonaka and Takeuchi, which emphasize the role of organizational learning, flexibility, and innovation in human capital development, are consistent with the results of this research in the field of research-oriented and technological competencies. Domestically, the research results are in line with the findings of researchers who consider human capital a multidimensional phenomenon encompassing individual, organizational, and cultural dimensions. The emphasis of domestic studies on factors such as job commitment, professional ethics, human resource empowerment, and continuous learning aligns with the components of psychological capital, cultural capital, and professional capability identified in this research. However, the distinguishing feature of the present study compared to the existing literature is its special focus on localizing the components of human capital according to the climatic and social conditions of Khuzestan Province; an aspect less addressed in many previous studies. Domestic research (Balandehpour & Balouch, 2024; Zakeri, 2024) introduces components like lifelong education and learning, skills and qualifications, organizational commitment, and organizational support as the main pillars of human capital in education.

International research (e.g., Becker, 1964) also emphasizes skills, education, experience, and innovation as core components of human capital. This indicates strong alignment between domestic and international contexts in identifying key elements of human capital, especially education, skill, commitment, and continuous learning. Some international studies (Spence, 1974 - Signaling Theory) show that educational degrees might merely be a signal of innate ability and do not necessarily correspond with actual human capital increase, while domestic research focuses more on actual human capital and direct education. Within the country, cultural and social pillars such as regional identity, belonging to the organization, and the indigenous educational environment (Rezaeian, 1993) play a larger role, which is less addressed in international research. In explaining this finding, it can be said that the findings for this question align with the context-based human capital approach and systemic theories of human resource development. Human capital can lead to improved organizational performance when it is formed in dynamic interaction with the organizational structure, culture, and external environment. In the education system of Khuzestan Province, specific climatic conditions, cultural diversity, and environmental pressures cause human capital to require components such as resilience, commitment, and professional adaptability.

In response to the second question, "What are the necessary requirements and prerequisites for human capital development in the education system of Khuzestan Province?" The findings showed that human capital development in the education system of Khuzestan Province requires a set of structural, managerial, cultural, and supportive prerequisites. Based on the participants' views, the most important prerequisites include: sustained institutional and managerial support, a meritocracy system and organizational justice, opportunities for continuous and professional learning, relative stability in policies and programs, recognition of the province's climatic and cultural conditions, and creating an atmosphere of trust and organizational participation. Experts emphasized that without these prerequisites, efforts for human capital development will be limited to fragmented and ineffective actions. Internationally, human resource development theories emphasize the role of organizational infrastructures, managerial support, and continuous learning as essential prerequisites for human capital development. Research examining human capital development in the context of educational organizations shows that the lack of institutional support and policy stability severely reduces the effectiveness of empowerment programs; this aligns with the results of this study.

Domestically, research related to human resource management in education has emphasized the role of

organizational justice, employee participation, and learning culture in human capital development. The results of the present study align with these studies and, at the same time, by adding the component "attention to the climatic and cultural conditions of Khuzestan Province," provides a more indigenous and realistic framework. This distinction indicates that the prerequisites for human capital development in provinces with special conditions require redefinition tailored to the implementation context. Theoretically, the findings of this question align with the systemic and contingency approach to human capital development. According to the theoretical foundations in the literature review, human capital development is a process shaped by the interaction among the individual, organization, and environment, and its realization requires the provision of appropriate supportive and structural platforms. Organizational learning theories also emphasize that without a learning culture, managerial support, and psychological safety, human capital cannot grow and flourish.

In response to the third question, "What are the key strategies effective in human capital development in the education system of Khuzestan Province?" The research findings showed that human capital development in the education system of Khuzestan Province requires adopting strategies beyond fragmented educational measures. Based on the analysis of experts' views, the key strategies for human capital development include: professional empowerment based on real needs, establishing an organizational learning system, developing transformative educational leadership, strengthening participation and teamwork, strategic utilization of educational technologies, succession planning and talent management, and institutionalizing a culture of research and innovation. Participants emphasized that human capital development strategies must be designed according to the climatic, social, and cultural conditions of Khuzestan Province and possess the capability to adapt to crises and environmental changes.

Domestically, studies related to educational management and human resource development have emphasized the necessity of empowering teachers and administrators, developing professional competencies, and using modern educational technologies. The findings of the present study align with these studies, but by adding components such as "contingency strategies appropriate to the climatic and crisis-prone conditions of Khuzestan Province," it provides a more indigenous and practical framework. This shows that human capital development strategies must be designed according to the implementation context and specific characteristics of each educational system. Approaches like mentoring, networking, and local scholarships align with other studies which pointed to the importance of strengthening skills through short-term training and utilizing the

experiences of seasoned teachers. Strategies such as skills diplomacy with industries and micro-learning are less seen in the domestic literature, especially the connection of education to industrial needs and the use of short-term digital education, which has a practical and localizing aspect.

The researcher believes that human capital development strategies should be implemented in the form of specific executive policies, targeted empowerment programs, and continuous evaluation systems. Otherwise, even the existence of capable human resources cannot lead to improved performance of the educational system. From this perspective, the model presented in the current research can serve as a practical roadmap for education managers and policymakers in Khuzestan Province on the path of human capital development.

In response to the fourth question, "Does the developed model for human capital development in the education system of Khuzestan Province possess the necessary validity?" The findings showed that experts and key informants confirmed the proposed human capital development model in terms of comprehensiveness, alignment with field realities, and implementability. Participants believed that the model correctly covers the various dimensions of human capital (individual, organizational, and environmental) and explains the relationships among pillars, prerequisites, and strategies in a logical and coherent manner. It was also emphasized that, unlike many general models, the presented model is compatible with the specific conditions of Khuzestan Province's education system and has a high potential for localization. Domestically, research conducted in the field of educational management and human resources has recommended using mixed methods (qualitative-quantitative) for developing and validating indigenous models. The findings of the present study align with these studies and show that integrating expert opinions with empirical testing of the model can lead to the production of models that are both scientifically valid and practically applicable.

In a general conclusion, the present study showed that human capital development in the education system of Khuzestan Province is a multidimensional, dynamic, and localized process that, in addition to the professional and psychological capabilities of teachers, requires special attention to the cultural, climatic, and social conditions of the province. The main pillars of human capital include psychological capital and resilience, cultural-communicative capital, biosphere-oriented pedagogy, multi-faceted competency, and multi-task professional capital, which encompass a combination of individual, social, and environmental skills and align with the findings of domestic research, although the aspects of localization and adaptation to the specific conditions of the province are innovative and distinct. The analysis of

the prerequisites and requirements for human capital development showed that structural justice, meritocracy, decentralization, and improving the physical space of schools are essential factors for realizing this capital and align with the findings of the domestic literature. The proposed operational strategies, including specialized indigenization of recruitment, mentoring and networking, skills diplomacy with industries, and digital micro-learning, while paying attention to the individual capabilities of teachers, also emphasize the interaction of education with the social and economic environment of the province and are considered a distinguishing feature of this research from previous studies.

Despite the effort to present a comprehensive and localized model of human capital development in the education system of Khuzestan Province, this research faced several limitations that should be considered when interpreting the results and generalizing the findings. For instance, the research was conducted only within the scope of Khuzestan Province, and the specific characteristics of this province, such as climatic, industrial, border, and cultural conditions, were influential in designing the model. Therefore, direct generalization of the findings to other provinces and regions with different conditions is limited and requires re-localization. The research sample included teachers, managers, and experts from the province, and the number of interviews was limited to these groups. This limitation might mean that some views of other groups, such as students, parents, or education policy-makers, were not reflected in the model. Also, the harsh climatic conditions, frequent school closures, and security and social problems in Khuzestan Province limited data collection and interaction with respondents, and some views or operational experiences of teachers might have received less attention.

Based on the research results and answers to the research questions, it is recommended to design special educational programs to strengthen the competencies of indigenous teachers in climatic, cultural, and industrial fields; produce local educational resources to increase the relevance of learning to the students' real environment; and implement motivational and welfare policies to increase teachers' job satisfaction.

#### Authors Contribution

All the authors have participated sufficiently in the intellectual content, conception and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript.

#### Availability of data and materials

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

#### Conflict of interests

The author states that there is no conflict of interest.

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