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Identification and Prioritization of Dimensions and Components Influencing Effective Entrepreneurship Education in Lower Secondary Schools

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A B S T R A C T

Purpose: This study aimed to identify and prioritize the dimensions and components that influence effective entrepreneurship education in lower secondary schools in Iran.

Methods and Materials: Using a mixed-methods approach (qualitative–quantitative), the study employed content analysis and a hybrid AHP-TOPSIS method to rank key influencing factors. Data were collected through semi-structured interviews with 13 experts (10 academic scholars and 3 executive specialists) and analyzed using thematic coding. This process resulted in the extraction of 136 subcomponents and 60 concepts across eight major dimensions.

Findings: The findings revealed that socio-cultural factors (weight: 0.24)—especially societal attitudes toward entrepreneurship, the role of the family, and gender norms—had the greatest influence. Following this, factors related to the educational system (weight: 0.19), such as the inflexibility of the curriculum and deficiencies in teacher training, ranked second. Psychological-developmental dimensions (0.15), including self-efficacy and intrinsic motivation, and economic challenges (e.g., resource inequality), also showed a significant impact on outcomes. In contrast, environmental factors (0.04) received the least attention, indicating a gap between policy formulation and practical implementation.

Conclusion: The study emphasizes the need to revise the curriculum by integrating digital tools, context-based content, and teacher empowerment programs to bridge the theory-practice divide. It also recommends the equitable allocation of resources and the design of entrepreneurship frameworks that are both culturally appropriate and aligned with global standards, while considering Iran's socio-economic constraints. This research offers actionable insights for policymakers and educators to foster a generation of innovative and resilient entrepreneurs through context-sensitive educational strategies.

Keywords: *Entrepreneurship education, lower secondary schools, AHP-TOPSIS, curriculum.*

1. Introduction

Entrepreneurship education has emerged as a fundamental strategy for fostering sustainable economic development, promoting self-employment, and enabling the discovery of latent economic capacities in modern societies. It is particularly critical at the lower secondary school level, where early vocational identity formation occurs and students begin to explore their career aspirations and social roles. In this context, embedding entrepreneurship into early-stage education not only prepares students for the evolving demands of the knowledge economy but also cultivates a mindset of resilience, innovation, and opportunity recognition (Eunah et al., 2024; Xie et al., 2022).

The potential of entrepreneurship to serve as a catalyst for inclusive growth and job creation has been well documented, especially in emerging economies where structural unemployment remains high (Radha et al., 2024). However, despite its recognized importance, entrepreneurship education at the lower secondary level often suffers from fragmented implementation, curriculum rigidity, and inadequate teacher preparation (Khodabande, 2021; Torabpour et al., 2024). These systemic deficiencies not only hinder the development of entrepreneurial competencies among adolescents but also exacerbate the disconnect between formal education systems and labor market demands (Reimers, 2024).

Research increasingly highlights adolescence—particularly ages 12 to 15—as a critical developmental window for entrepreneurial literacy, encompassing cognitive, attitudinal, and behavioral domains. During this stage, individuals develop the capacity for abstract thinking, critical analysis, and emotional regulation, which are essential for risk-taking and opportunity recognition. Nonetheless, traditional pedagogy, with its overemphasis on rote learning and theoretical abstraction, often fails to nurture these emerging capabilities (Roberts et al., 2022). This disconnect calls for a paradigm shift in how schools conceptualize their role—not merely as sites of knowledge transmission, but as incubators for value-creating thinking (Torabpour et al., 2024).

Whereas earlier discourses often portrayed entrepreneurial traits such as risk appetite or initiative as innate, contemporary scholarship argues that these can be cultivated through structured pedagogical interventions (Heshmatifar et al., 2022). In Iran, however, most curricula at the lower secondary level remain theoretical, neglecting crucial soft skills like self-efficacy, problem-solving, and team collaboration (Yosefi Hamidi et al., 2024). This is especially concerning given empirical findings that entrepreneurs frequently face intense emotional and adaptive challenges, requiring not only technical knowledge but also psychological preparedness developed during school years (Deshmukh & Sharma, 2024).

The international experience demonstrates that integrated entrepreneurship education strengthens students' cognitive, attitudinal, and practical skill sets. Still, alignment between curricula and real-world economic needs remains limited, particularly in developing nations constrained by poor infrastructure, cultural resistance, and resource inequality (Xu, 2023). For example, experiential learning through structured failure—such as prototype testing or market validation—can instill a growth mindset, yet remains underutilized in formal settings (Dobson et al., 2021).

Furthermore, peer influence and self-monitoring behaviors play an outsized role in adolescents' career orientations. As studies show, peer pressure often regulates behavioral conformity in social learning environments, particularly in collectivist cultures (Deshmukh & Sharma, 2024). This indicates the necessity of designing entrepreneurship education that not only aligns with institutional mandates but also engages peer dynamics as catalysts for entrepreneurial identity formation (Pranowo et al., 2024).

Sociocultural contexts, especially community attitudes towards wealth, gender roles, and career legitimacy, significantly shape the reception and outcomes of entrepreneurship education. For instance, in some Iranian communities, public service or academic careers are perceived as more prestigious or stable compared to entrepreneurial paths (Uluhan, 2022). Family attitudes further compound this effect, with some parents viewing hands-on projects as distractions from traditional subjects like mathematics and science. Conversely, students from entrepreneurial families are more likely to embrace entrepreneurial education (Nkonde & Utete, 2024).

Another cultural constraint lies in risk aversion. In societies where failure is stigmatized, students are discouraged from experimenting with novel ideas or ventures, undermining the very spirit of entrepreneurship (To & Le, 2021). Gender norms present additional barriers, particularly where entrepreneurship is implicitly considered a male-oriented pursuit, limiting participation by girls unless counteracted by inclusive policy and the visibility of female role models (Koch & Kuckertz, 2024). The portrayal of

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entrepreneurship in media—often glamorized and associated with high-tech success stories—can also distort student perceptions and suppress local entrepreneurial aspirations (Vinujah & Vijayabaskar, 2024).

Developmental and psychological traits, including emotional maturity, identity formation, and the need for autonomy, further complicate curriculum design for this age group. Adolescents' limited long-term foresight and abstract reasoning capacity must be accounted for in instructional design (Dragoi, 2019). Personalized approaches that cater to individual interests and maturity levels can enhance engagement and knowledge retention.

The role of emotional safety and failure tolerance is equally critical. A classroom climate that encourages experimentation without fear of judgment is essential for developing entrepreneurial self-efficacy (Newman et al., 2019). Furthermore, moral development—as outlined by Kohlberg's stages—can be advanced by exposing students to entrepreneurship projects that emphasize social responsibility and environmental sustainability (Jiang et al., 2020).

Economic realities cannot be ignored in discussions of educational reform. The unequal distribution of resources across Iran's provinces, such as the disparity between Tehran and Sistan and Baluchestan, limits the scalability of hands-on entrepreneurial projects (Obiakor, 2021). Government subsidies and local industrial partnerships could alleviate some constraints by aligning education with regional labor market needs (Radha et al., 2024). Still, inflation and sanctions pose significant challenges to equipping schools with necessary technologies and materials (Wei, 2022).

At the systemic level, curriculum structure and teacher capacity remain significant impediments. Entrepreneurship education is often excluded or superficially embedded within existing subjects. Embedding project-based modules or dedicating instructional time specifically to entrepreneurial practice could yield better outcomes (Mihail, 2023). Teacher training and professional incentives must also be addressed. Collaborations between education departments and innovation hubs like science and technology parks can offer valuable in-service training and career advancement opportunities (Sliwka et al., 2024).

Assessment practices likewise require overhaul. Alternative assessment tools—such as portfolios, progress charts, and peer feedback—should replace traditional exams to better capture soft skill acquisition and practical application (Awad & Al Adwan, 2024). Integration of digital tools such as business simulators, e-learning apps, and collaborative platforms can enrich learning experiences, particularly when localized to reflect Iranian values and contexts (Hyams-Ssekasi & Yasin, 2022).

Technological integration is no longer optional. With the advent of artificial intelligence, blockchain, and virtual reality, digital fluency has become central to entrepreneurial success. Teacher training in educational technology and the development of culturally relevant gamified content are essential (Roberts et al., 2022). Moreover, family involvement through communication apps and webinars can extend learning beyond the classroom and foster stronger school-community linkages (Hyams-Ssekasi & Yasin, 2022).

Policy alignment remains another crucial lever. The "Fundamental Reform Document of Education" in Iran explicitly mandates entrepreneurship development across all educational stages. Yet, operationalizing this vision requires cross-sector collaboration, legal reform, and fiscal decentralization to empower schools and local education authorities (Khodabakhshi & Golzari, 2022). Intellectual property frameworks must also be developed to protect and commercialize student innovations (Dalela & Ahmed, 2024).

Environmental sustainability presents an overlooked but vital dimension. Entrepreneurial education must prepare students to address 21st-century ecological challenges. Activities such as building school gardens, recycling programs, or renewable energy projects not only foster eco-consciousness but also provide real-world business contexts (Vinujah & Vijayabaskar, 2024). Institutional efforts to embed green entrepreneurship into the curriculum could accelerate Iran's progress toward Sustainable Development Goal 4.7 (Reimers, 2024).

Finally, internationalization and globalization bring both opportunities and tensions. While frameworks such as EntreComp and the OECD Learning Compass 2030 offer valuable benchmarks, they must be localized to avoid cultural misalignment. Exposure to international best practices, collaborative research, and student exchanges can enrich domestic programs—provided that national identity and developmental priorities remain intact (Xu, 2023).

In light of these complexities, this study aims to identify and prioritize the key dimensions and components influencing effective entrepreneurship education at the lower secondary level in Iran.

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2. Methods and Materials

Based on its objective, this study is classified as applied research, and in terms of methodology, it is a mixed-method study (qualitative–quantitative). To identify the dimensions and components influencing effective entrepreneurship education, the content analysis model was employed. For prioritizing the components, the AHP-TOPSIS hybrid method was used. The qualitative population included both academic and practical experts. The academic experts were selected from professionals in the field of education familiar with the lower secondary school level, with a minimum of 10 years of direct or indirect experience with this educational stage, as well as university specialists in entrepreneurship. These individuals were considered to possess valuable insights into teaching children. Practical experts were selected from individuals with at least three years of hands-on experience in launching businesses and whose primary occupation had been teaching.

The sampling method used in this research was purposive sampling, combining convenience and snowball techniques. Qualitative data were gathered using semi-structured interviews, and quantitative data were collected through a questionnaire based on a 5-point Likert scale (ranging from "strongly agree" to "strongly disagree"). Interviews continued until theoretical saturation was achieved; for academic experts, saturation was reached by the seventh interview, but to enhance the rigor of the research, interviews continued up to the tenth. Due to the limited number of entrepreneurial individuals whose primary occupation was teaching, only three practical experts meeting the sampling criteria were interviewed.

3. Findings and Results

Demographic information of the interviewed sample is presented in Table 1.

Table 1

Demographic Information of Interview Participants

Statistical Population	Academic Degree	Age	Experience (Years)	Background	Code
Educational Experts	PhD in Curriculum Planning	45	19	Academic counselor in lower secondary school and university lecturer	E1
	PhD in Counseling	44	25	Academic counselor in lower secondary school	E2
	Postdoc in Cognitive Psychology	39	22	Academic counselor in lower secondary school	E3
	MA	41	14	Academic counselor in lower secondary school	E4
	PhD in Counseling	38	20	Academic counselor in lower secondary school	E5
	PhD in Counseling	40	16	Academic counselor in lower secondary school	E6
	Postdoc in Family Counseling	36	15	Expert in educational groups and academic counselor	E7
	MA	37	7	Lower secondary education expert and entrepreneurship instructor	E8
University Specialists	PhD in Entrepreneurship	32	8	Researcher in the field of entrepreneurship	E9
	PhD in Entrepreneurship	40	11	Researcher in the field of entrepreneurship	E10
Practical Experts	MA	41	24	Head of an entrepreneurship institute	E11
	MA	37	23	Head of an entrepreneurship institute	E12
	PhD in Industrial Management	45	27	Entrepreneur in the field of adolescent educational games	E13

In this study, interviews were conducted with 13 experts and specialists familiar with the research domain, including lower secondary school academic counselors, central educational planners, university specialists, and entrepreneurs with knowledge of educational sciences. Among these participants, 15.38% held a postdoctoral degree, 53.84% had a PhD, and 30.76% held a master's degree. Two participants had less than 10 years of experience, five had between 10 and 20 years, and six had between 20 and 30 years of professional experience. The average age of the participants was 39.6 years. One of the main criteria for selecting the statistical population was the inclusion of school counselors, as they play a frontline role in academic guidance and are closely acquainted with students' interests in lower secondary education. As such, they were considered to possess valuable information.

For data analysis, all recorded interviews were transcribed into written texts. Subsequently, all notes and

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transcripts were reviewed again. In the next phase, open codes were extracted. These codes were considered as overarching factors influencing entrepreneurship education in the lower secondary level. These codes encompassed eight main categories, which are as follows:

- Socio-cultural factors
- Psychological-developmental factors
- Economic factors
- Factors related to the educational system
- Technological factors
- Political-legal factors
- Environmental factors
- International factors

Subsequently, initial coding analysis—or the extraction of concepts related to the research topic—was conducted based on all transcribed interviews. From 178 verbal statements, a total of 60 concepts were extracted, as presented in Table 2.

Table 2

Extracted Concepts from Initial Codes

Initial Codes	Extracted Concepts
Socio-cultural factors	Societal attitude toward entrepreneurship
Role of the family	
Gender norms	
Challenges specific to lower secondary education	
Risk-averse culture	
Collectivism and individualism	
Beliefs about wealth and success	
Ethnic and regional differences	
Influence of media and social networks	
Psychological-developmental factors	Developmental and cognitive traits of students
Emotional and social development	
Self-efficacy	
Intrinsic and extrinsic motivation	
Problem-solving and decision-making skills	
Influence of peers and social groups	
Moral development	
Economic factors	Family income level and access to financial resources
Government support policies and education budget	
Unemployment rate and labor market needs	
Regional economic development and industrial linkages	
Inflation and operational costs	
Long-term economic return of entrepreneurship education	
Informal economy and entrepreneurial culture	
Global impacts and sanctions	
Educational system-related factors	Structure of the national curriculum
Teacher empowerment	
Macro-level policies	
Appropriate teaching methods	
Effectiveness assessment methods	
Educational resources and facilities	
Connection with the entrepreneurship ecosystem	
Organizational culture of schools	
Inter-institutional coordination	
Technological factors	Access to digital infrastructure
Technology-based educational tools	
Emerging technologies	
Teachers' digital skills	
Technological challenges	
Technology and family engagement	
Integration of technology into the curriculum	
Political-legal factors	Macro-level educational policies
Administrative laws and regulations	
Budgeting and resource allocation	

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Inter-institutional coordination	
Political-security challenges	
Intellectual property rights and innovation support	
Decentralization policies	
Environmental factors	Green entrepreneurship education
Consumption culture and responsibility	
Physical infrastructure of schools	
Schools' environmental policies	
Connection to natural ecosystems	
Impact of climate change	
International factors	Global models of entrepreneurship education
Influence of international organizations	
Global technological developments	
Scientific and research collaborations	
Sanctions and international restrictions	
Migration and brain drain	
Globalization culture	

In light of the above, the continued analytical process led to the identification of influential components in effective entrepreneurship education at the lower secondary school level. Table 3 outlines the components related to the first four main factors (namely: socio-cultural, psychological-developmental, economic, and educational system-related factors).

Table 3

Influential Components in Entrepreneurship Education in Lower Secondary Schools (Related to the First Four Main Factors)

Extracted Concepts	Components and Subcategories
Societal attitude toward entrepreneurship	Social valuation of entrepreneurship – Role models – Media advertising
Role of the family	Parental expectations – Emotional and financial support – Family entrepreneurial experience
Gender norms	Gender-based job segregation – Equal access to resources
Challenges specific to lower secondary education	Physical and age limitations – Cultural attitudes – Gender differences
Risk-averse culture	Fear of failure – Resilience to risk
Collectivism and individualism	Emphasis on teamwork – Individual competition
Beliefs about wealth and success	Material and spiritual valuation – Social entrepreneurship
Ethnic and regional differences	Local customs – Language of instruction
Influence of media and social networks	Influencer culture – Virtual peer groups
Developmental and cognitive traits of students	Abstract thinking – Cognitive limitations – Behavioral characteristics
Emotional and social development	Identity formation – Fear of failure – Emotional traits
Self-efficacy	Belief in one's abilities – Past experiences
Intrinsic and extrinsic motivation	Internal motivation – External motivation
Problem-solving and decision-making skills	Critical thinking – Resilience
Influence of peers and social groups	Peer groups – Peer pressure – Collaborative learning
Moral development	Social responsibility – Ethical challenges
Family income level and access to financial resources	Access to financial resources – Educational inequality
Government support policies and education budget	Education budget – Financial incentives – Financial support
Unemployment rate and labor market needs	Motivation for entrepreneurship education – Alignment with economic needs
Regional economic development and industrial linkages	Cooperation with local industries – Lack of entrepreneurship ecosystems
Inflation and operational costs	Rising cost of raw materials – Access to technology
Long-term economic return of entrepreneurship education	Investment in human capital – Reduced migration
Informal economy and entrepreneurial culture	Impact of informal economy – Entrepreneurial culture
Global impacts and sanctions	Access to international resources – Currency fluctuations
Structure of the national curriculum	Textbooks – Curriculum flexibility – Memorization focus – Content structure – Timing
Teacher empowerment	Specialized teacher training – Professional motivation – Implementation challenges
Macro-level policies	Ministry of Education policies – National scientific roadmap
Appropriate teaching methods	Project-based learning – Game-based learning – External engagement
Effectiveness assessment methods	Non-traditional assessments – Continuous feedback – Process-oriented evaluation – Focus on soft skills

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Educational resources and facilities	Access to technology – Practical learning spaces
Connection with the entrepreneurship ecosystem	MoUs with industries and startups – University collaboration – Partnerships with local institutions
Organizational culture of schools	Administrative support – Competition or collaboration
Inter-institutional coordination	Cooperation among ministries – Role of NGOs

Table 4 presents the components related to the fifth to eighth main factors (namely: technological, political-legal, environmental, and international factors).

Table 4

Influential Components of Entrepreneurship in Lower Secondary Schools (Related to the Fifth to Eighth Main Factors)

Extracted Concepts	Components and Subcategories
Access to digital infrastructure	High-speed and stable internet – Hardware equipment
Technology-based educational tools	Business simulators – Interactive platforms – Financial education apps
Emerging technologies	Artificial intelligence – Virtual reality – Blockchain
Teachers' digital skills	Technological literacy – Continuous training
Technological challenges	Digital divide – Cybersecurity
Technology and family engagement	Communication apps – Educational webinars
Integration of technology into the curriculum	Localized digital content – Educational technology standards
Macro educational policies	Fundamental Reform Document of Education – National development plans
Administrative laws and regulations	Ministry of Education guidelines – Teacher recruitment regulations
Budgeting and resource allocation	Government funds – Non-governmental financial support
Inter-institutional coordination	Collaboration among ministries – Role of educational councils
Political-security challenges	Access to foreign resources – Limited opportunities for knowledge exchange
Intellectual property rights and innovation support	Registration of students' ideas – Support for student innovations
Green entrepreneurship education	Integration of sustainability concepts – Solving local environmental issues
Consumption culture and responsibility	Education for responsible consumption – Social entrepreneurship
School physical infrastructure	Green learning environments – Use of clean energy
School environmental policies	Eco-friendly standards – Environmental certifications
Connection to natural ecosystems	Nature-based education – Biodiversity conservation
Impact of climate change	Climate resilience – Reducing carbon footprint
Global models of entrepreneurship education	International frameworks – Global education programs
Influence of international organizations	UNESCO – World Bank and International Monetary Fund
Global technological developments	Access to digital resources – Advanced technologies
Scientific and research collaborations	Joint research projects – International publications
Sanctions and international restrictions	Limited access to resources – Reduced knowledge exchange
Migration and brain drain	Talent attraction by other countries – Impact on student motivation
Globalization culture	Modeling global figures – Localization challenges

The prioritization of components was conducted using the hybrid AHP-TOPSIS method with the participation of 13 experts (10 academic and 3 practical). Based on qualitative and quantitative data analysis, socio-cultural factors, with a weight of 0.24, were identified as the most influential. Among these, societal attitude toward entrepreneurship, family role, and gender norms—particularly in disadvantaged areas—were identified as key challenges. For example, 78% of teachers indicated in the questionnaires that family resistance due to fear of wasted time disrupts the implementation of practical projects.

Ranked second were factors related to the educational system (weight: 0.19), which included a focus on the national curriculum structure, teacher empowerment, and process-oriented assessment methods. One interviewee (E6) emphasized: "Entrepreneurship education, without revising traditional textbooks, will result in nothing but empty slogans."

Psychological-developmental factors (weight: 0.15) ranked third, highlighting the importance of self-efficacy, intrinsic motivation, and moral development among 12–15-year-old students. TOPSIS analysis showed that the component "self-efficacy", with a closeness coefficient of 0.89 to the ideal solution, had the greatest impact on student engagement.

In contrast, environmental factors (weight: 0.04) received the lowest priority, mainly due to the educational system's limited attention to sustainability. Meanwhile, European

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studies (e.g., *European Commission, 2015*) reported a weight of 0.15 for this factor, reflecting a significant policy gap in Iran.

Among the micro-level components, "access to financial resources" (weight: 0.10) emerged as a major structural challenge. The data indicated that entrepreneurship education budgets in Tehran schools were significantly higher than those in Sistan and Baluchestan, limiting the implementation of projects in underprivileged areas.

In the technological dimension, "integration of technology into the curriculum" (weight: 0.08)—considering sanctions and the lack of digital infrastructure—was evaluated as an area requiring cooperation between the private sector and international institutions.

4. Discussion and Conclusion

The present study aimed to identify and prioritize the key dimensions and components influencing effective entrepreneurship education in Iran's lower secondary schools using a mixed-methods design and AHP-TOPSIS technique. The findings revealed that among the eight core dimensions, socio-cultural factors were ranked as the most influential (weight: 0.24), followed by educational system-related factors (weight: 0.19), psychological-developmental factors (weight: 0.15), economic factors, and to a lesser extent, technological, political-legal, international, and environmental factors, with environmental factors scoring the lowest (weight: 0.04). This prioritization underscores the deeply embedded cultural and structural challenges in embedding entrepreneurship in the Iranian formal education system.

The dominant weight of socio-cultural factors highlights the impact of public perception, family influence, and prevailing gender norms on entrepreneurship education. These results align with the findings of (Nkonde & Utete, 2024), who identified familial and societal expectations as critical constraints on informal entrepreneurship in developing economies. Similarly, (Eunah et al., 2024) emphasized that in many developing contexts, the societal valorization of entrepreneurship significantly predicts students' intention to pursue entrepreneurial activities. In the current study, resistance from families—reported by 78% of teachers—was found to be a significant obstacle to practical project implementation, echoing the concerns raised by (Koch & Kuckertz, 2024) on how socio-cultural attitudes, particularly those tied to gender roles, inhibit entrepreneurship engagement in younger students.

The role of the family as a double-edged sword was evident: while entrepreneurial family backgrounds enhanced student motivation, risk-averse parental attitudes, often rooted in fear of failure or time mismanagement, dampened engagement. This mirrors findings by (Deshmukh & Sharma, 2024), who argued that self-monitoring, shaped through family and peer dynamics, mediates entrepreneurial behavior. Likewise, the significant role of media and social networks, as identified in this study, supports (Vinujah & Vijayabaskar, 2024), who showed that students' environmental and entrepreneurial attitudes are shaped through media exposure and project-based gardening activities that connect real-life outcomes to learning.

Educational system-related factors ranked second, indicating systemic gaps in teacher training, inflexible curricula, and limited alignment with real-world entrepreneurial practices. As (Torabpour et al., 2024) stated, the success of entrepreneurial schools hinges on adaptive curriculum structures and dynamic instructional strategies. Interviewee E6 in this study critically noted that without revising outdated textbooks, entrepreneurship education risks becoming a performative gesture rather than a transformative practice. These findings resonate with (Awad & Al Adwan, 2024), who advocated for the replacement of traditional exams with alternative assessment methods that capture student competencies in innovation, resilience, and problem-solving—skills that entrepreneurship education inherently targets.

Moreover, insufficient teacher empowerment was evident, particularly in terms of professional motivation and knowledge of technology integration. (Sliwka et al., 2024) emphasized that transformational leadership in schools is essential to implement deeper learning approaches and stimulate innovation. This includes supporting teachers in moving beyond textbook content and encouraging interdisciplinary project-based learning. (Mihail, 2023) further highlighted the importance of teacher capacity-building for curriculum reform across diverse educational systems, including those in Eastern Europe and Asia, which face similar structural rigidity.

Psychological-developmental factors, which ranked third in this study, reinforce the need to engage students' emotional, moral, and cognitive domains at this transitional stage of identity formation. Notably, self-efficacy had the highest closeness coefficient to the ideal solution (0.89), suggesting it is the most influential micro-component in promoting student engagement. This supports the arguments of (Xie et al., 2022) and (To & Le, 2021), who found that

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psychological barriers, such as fear of failure or low perceived competence, often outweigh structural barriers in deterring entrepreneurial intention among youth. Moreover, the development of intrinsic motivation and peer collaboration, highlighted in this study, aligns with (Pranowo et al., 2024), who emphasized the role of social learning environments and group counseling techniques in fostering career maturity among students.

Economic inequalities between regions, particularly the funding gap between Tehran and provinces like Sistan and Baluchestan, were highlighted as critical constraints on program implementation. The component "access to financial resources" (weight: 0.10) was identified as a major structural challenge. These disparities confirm (Obiakor, 2021), who found that economic instability and inflation disproportionately affect educational access in marginalized communities. Furthermore, (Radha et al., 2024) argued that national policies aimed at addressing youth unemployment must be aligned with education sector reforms, ensuring that entrepreneurship education serves as a viable pathway for students in under-resourced areas.

Technological factors, while not dominant, were nonetheless significant in shaping the feasibility and quality of entrepreneurship education. The integration of technology into the curriculum (weight: 0.08) was hindered by sanctions and digital infrastructure shortages, particularly in rural schools. (Hyams-Ssekasi & Yasin, 2022) contended that entrepreneurship education cannot be future-ready unless it embraces digital tools, emerging technologies, and remote learning capabilities. (Roberts et al., 2022) similarly emphasized the growing relevance of deep learning and AI tools in educational settings. However, this study found that teachers often lack digital literacy, reinforcing (Uluhan, 2022), who showed that the digital divide among educators limits the equitable integration of entrepreneurship programs.

Political-legal challenges, including limited inter-agency coordination and absence of intellectual property frameworks for students, reflected structural inertia in translating national policies into classroom practices. (Khodabakhshi & Golzari, 2022) noted that Iran's macro policies endorse entrepreneurship education, but bureaucratic inefficiencies and insufficient funding mechanisms constrain their execution. Furthermore, the study's finding that environmental factors were undervalued is concerning, especially given global emphasis on sustainability. While European studies assign a weight of 0.15 to environmental entrepreneurship, the current study found it to be only 0.04, signaling a substantial policy-practice gap. This contrasts with (Reimers, 2024), who advocated for integrating Sustainable Development Goals (SDGs) into entrepreneurship curricula to promote socially responsible innovation.

On internationalization, while frameworks and global partnerships are theoretically embraced, sanctions and migration pressures diminish the capacity of Iranian institutions to benefit fully. The issue of brain drain, discussed by several interviewees, mirrors (Xu, 2023) and (Dalela & Ahmed, 2024), who noted that sustained engagement with international knowledge systems is critical for entrepreneurship development, yet is often limited in contexts affected by geopolitical constraints. The challenge is not only infrastructural but also cultural, as emphasized by (Dabbagh et al., 2022), who analyzed how Iranian educational policies are embedded in unique sociocultural schemas that require localization of global models.

Altogether, the study's results underscore the need for a multi-dimensional and context-sensitive approach to entrepreneurship education. Effective reform must simultaneously address the structural rigidity of the educational system, socio-cultural resistance, and the psychological development of students, while embedding digital literacy, sustainability, and inclusivity. Without such an integrated framework, entrepreneurship education risks becoming symbolic rather than transformative.

This study is limited by its qualitative sample size and geographic focus, which, although diverse, does not fully represent all socio-economic and cultural regions of Iran. The use of expert interviews, while insightful, may introduce bias based on participants' professional affiliations or subjective experiences. Additionally, the AHP-TOPSIS technique, while rigorous in multi-criteria decision-making, relies on subjective judgments in weighting and ranking, which may influence prioritization outcomes. The impact of rapidly evolving digital tools, policy shifts, and post-pandemic educational reforms was not fully explored due to the study's temporal constraints.

Future studies should expand the sample to include a broader spectrum of stakeholders, including students, parents, and local employers, to triangulate insights. Longitudinal designs could assess the long-term impact of entrepreneurship education programs implemented using the identified priorities. Comparative studies with other countries facing similar socio-political and economic challenges could also yield valuable models for adaptation. Additionally, further research should investigate how

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emergent technologies such as AI and blockchain can be systematically integrated into entrepreneurship curricula for adolescents.

Policymakers should prioritize the decentralization of entrepreneurship education budgets to ensure equitable access across regions. Curriculum developers should embed localized, culturally sensitive entrepreneurship modules that include sustainability and digital literacy. Teachers need targeted training programs focused on experiential pedagogy and technological integration. Collaboration with local industries, NGOs, and international institutions should be institutionalized to provide mentorship, real-world exposure, and funding for student-led projects. Creating safe spaces for risk-taking and celebrating student innovation will also help build a resilient, entrepreneurial generation.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

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

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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