SCIENTIFIC AND PRACTICAL PEDAGOGICAL FOUNDATIONS FOR DEVELOPING ENTREPRENEURIAL SKILLS AMONG STUDENTS IN SECONDARY SPECIALIZED VOCATIONAL EDUCATION

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ABSTRACT

This article examines the scientific and practical pedagogical foundations for developing entrepreneurial skills among students in secondary specialized vocational education. It argues that entrepreneurship education is most effective when theoretical knowledge is systematically connected with practical activity, real-world problem solving, and workplace experience. The discussion draws on constructivist, experiential, sociocultural, contextual, and competency-based approaches to explain how students can build entrepreneurial knowledge through active participation. Particular attention is given to project-based learning, mentor-apprentice interaction, industry partnerships, dual education, entrepreneurship centers, mini-startup activities, design thinking, teamwork, leadership, risk management, and iterative product development. The article also considers how vocational institutions can create supportive learning environments that connect professional preparation with innovation and business practice. A practice-oriented framework is proposed in which students identify opportunities, develop business models, test ideas, receive feedback, and refine solutions in collaboration with teachers, peers, and industry mentors. The paper concludes that integrating entrepreneurial competence with vocational specialization can strengthen graduates' adaptability, initiative, employability, and capacity to contribute to innovation and sustainable economic development. Assessment should therefore emphasize observable competencies, practical outcomes, reflective learning, and students' ability to apply entrepreneurial thinking in uncertain professional contexts.

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Keywords:
entrepreneurship education; vocational education; entrepreneurial skills; experiential learning; design thinking; industry–education collaboration.

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1. Introduction

Integrating entrepreneurship into vocational education is increasingly important because graduates are expected not only to master an occupation but also to recognize opportunities, respond to change, cooperate with others, and transform professional knowledge into practical value. In secondary specialized vocational education, these capabilities are especially relevant because learning is closely connected with occupational preparation and transition to the labor market. Career education and employability research likewise emphasizes the importance of preparing learners to connect education with professional development (Helens-Hart, 2019).

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A practice-oriented entrepreneurial curriculum should combine specialized vocational skills with initiative, business awareness, innovation, and problem solving. Such integration can be supported through partnerships among colleges, technical schools, enterprises, service organizations, and industry. Dual education and practical internships are particularly useful because they connect classroom learning with authentic work processes. National vocational education reform initiatives have also emphasized stronger links between education, skills development, and industry needs (State Council of the People's Republic of China, 2019). Practice-based entrepreneurship education similarly emphasizes learning through application, experimentation, and reflection rather than through content transmission alone (Neck & Greene, 2011; Fayolle & Gailly, 2008).

This article systematizes the pedagogical foundations and practical approaches that can support the development of entrepreneurial skills among vocational students. The discussion focuses on the relationship between theory and practice, contextual and experiential learning, sociocultural interaction, competency-based assessment, project work, design thinking, teamwork, leadership, and iterative development. Rather than treating entrepreneurship as a separate theoretical subject, the article presents it as a competence that can be developed through repeated practical application within vocational learning.

2. Pedagogical Foundations for Entrepreneurial Skill Development

The central pedagogical principle is the continuous unity of knowledge and action. Students develop entrepreneurial competence more effectively when theoretical concepts are connected with practical tasks, real problems, reflection, and repeated application. From a constructivist perspective, learners actively build knowledge through experience rather than receiving it only in finished form. In vocational education, this means that students should use professional knowledge to make decisions, test ideas, evaluate outcomes, and improve their actions.

2.1 Contextual learning

Contextual learning places students in situations that resemble real business and workplace environments. Educational institutions can model entrepreneurial conditions through project-based assignments, entrepreneurship centers, business simulations, production tasks, customer-oriented challenges, and cooperation with enterprises. The purpose is to reduce the gap between theoretical instruction and the decisions that learners will face in professional practice.

2.2 Experiential learning

Experiential learning develops competence through a cycle of action, reflection, conceptualization, and further testing. Students gain practical experience, analyze why an entrepreneurial attempt succeeds or fails, turn abstract ideas into clearer business concepts, and test revised solutions. This approach helps students understand that mistakes and feedback are part of learning rather than simply evidence of failure. Project-based learning is especially suitable for this process because it requires learners to apply knowledge to a concrete task over time (Wang, 2019). This sequence corresponds closely to Kolb's (1984) experiential learning cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation.

2.3 Sociocultural learning

Entrepreneurial skills also develop through interaction with other people. The mentor–apprentice tradition, peer collaboration, group work, and participation by industry mentors allow students to observe professional reasoning and receive guidance in authentic contexts. Collaborative learning can help students distribute roles, compare viewpoints, negotiate decisions, and jointly solve problems, all of which are relevant to entrepreneurial activity (Xie, 2018). This emphasis is consistent with situated learning, which treats learning as participation in communities of practice and gradual movement toward fuller participation (Lave & Wenger, 1991).

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2.4 Competency-based education

Competency-based education shifts attention from the amount of information delivered to the quality of performance demonstrated by learners. Entrepreneurial competence should therefore be assessed through clear skill-based criteria and varied forms of evidence, not solely through written tests. Useful evidence may include opportunity analysis, project planning, presentation of a value proposition, teamwork, problem solving, budgeting, customer feedback, reflection, and the ability to improve a solution after evaluation. Research on entrepreneurial competencies also supports the importance of viewing entrepreneurship as a multidimensional set of learnable capabilities (Ferreras-Garcia, Sales-Zaguirre, & Serradell-Lopez, 2021). The EntreComp framework likewise organizes entrepreneurship as a competence across three areas—Ideas and opportunities, Resources, and Into action—with 15 constituent competences and a progression model that can support curriculum and assessment design (Bacigalupo et al., 2016).

Quantitative evidence also supports a competency-oriented approach. In a meta-analysis of 42 independent samples (N = 16,657), Martin, McNally, and Kay (2013) reported significant weighted correlations between entrepreneurship education and training (EET) and entrepreneurship-related human capital assets (r_w = .217) and entrepreneurial outcomes (r_w = .159). For entrepreneurial outcomes, the relationship was stronger in academic-focused EET (r_w = .238) than in training-focused EET (r_w = .151). Chart 1 summarizes these estimates.

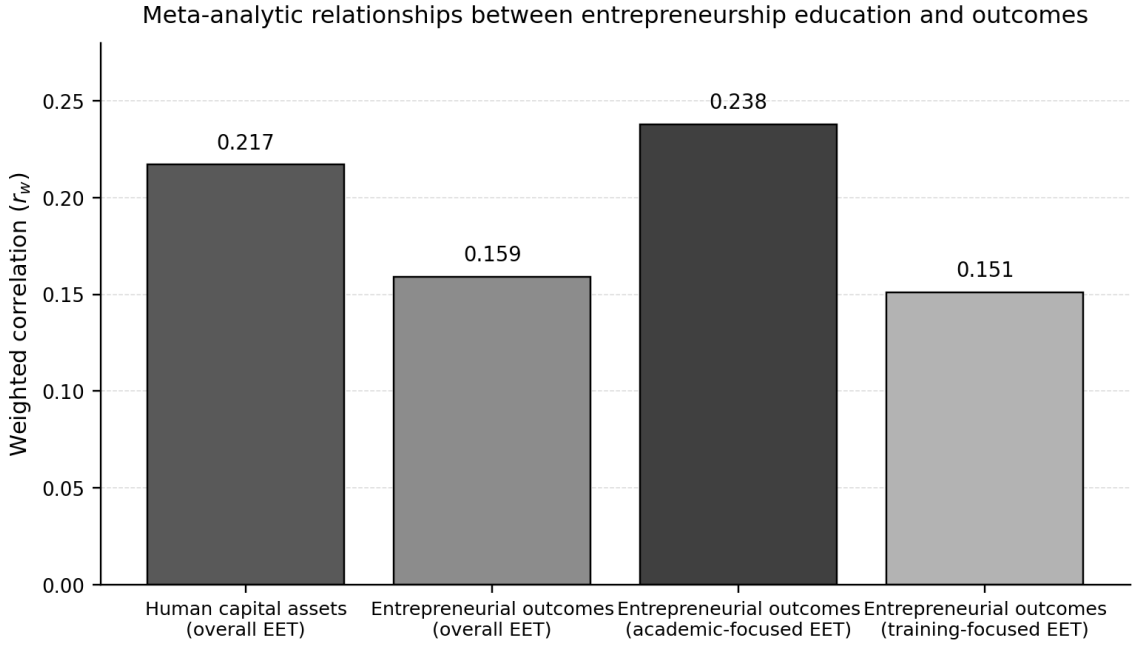


Chart 1. Meta-analytic weighted correlations (r_w) for entrepreneurship education and training outcomes. Source: Martin, McNally, & Kay (2013).

3. Practical Mechanisms in Vocational Education

Entrepreneurial skill development requires an institutional environment in which students can repeatedly apply knowledge. Curriculum integration is a first step. Courses and modules should connect entrepreneurial thinking with each vocational specialization rather than presenting business knowledge in isolation. For example, students can examine how a professional service creates value, how production costs influence decisions, how customer needs are identified, and how a small project can be organized, financed, promoted, and improved.

Partnerships with enterprises can strengthen this integration. Dual education, internships, company-based assignments, and participation by practitioners expose students to current workplace expectations and provide opportunities for feedback. Entrepreneurship and incubation centers within educational institutions can further support mini-startups, prototype testing, competitions, and student initiatives. These

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environments allow learners to move from an idea to a concrete product, service, or project and to experience the responsibilities involved in implementation.

Seminars, case studies, interactive discussions, and practical workshops can be used to build a common conceptual foundation before students undertake more independent work. Within these activities, the following areas are particularly important:

identifying and evaluating entrepreneurial opportunities in relation to vocational knowledge and local market needs;

developing value propositions, business models, and implementation strategies;

understanding basic entrepreneurial finance, including resource planning and fundraising considerations;

applying marketing, communication, sales, and networking skills;

building and leading entrepreneurial or innovative teams; and

making decisions and adapting actions under conditions of uncertainty.

These areas should not be taught as disconnected topics. They are most useful when combined in projects that require students to recognize a need, formulate a solution, estimate resources, organize teamwork, communicate with potential users or partners, test assumptions, and revise the project on the basis of evidence. A practice-oriented synthesis of this sequence is shown in Figure 1.

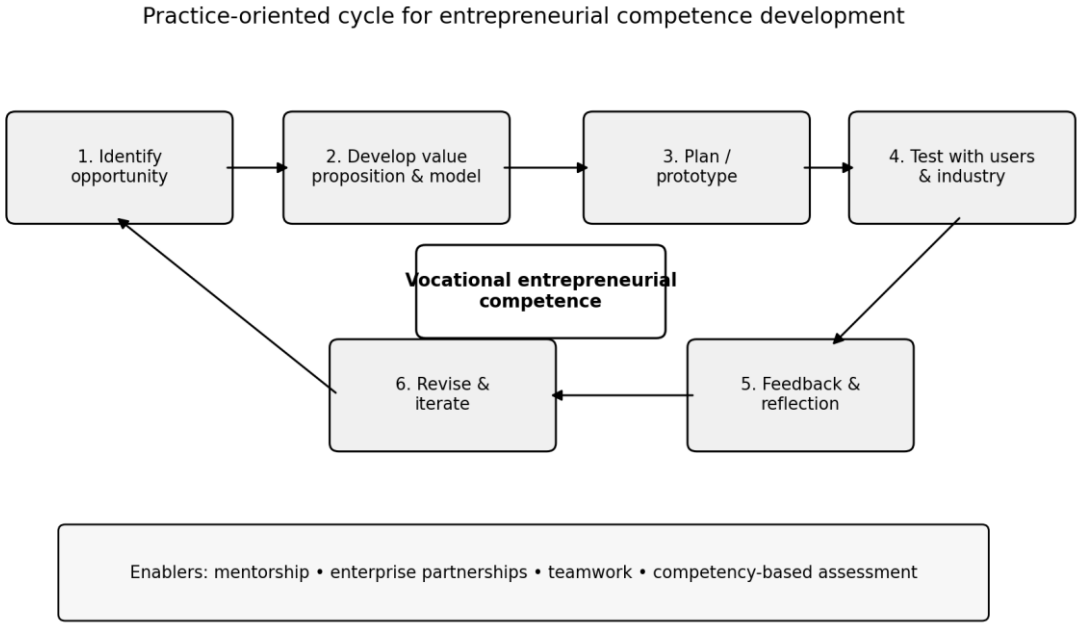


Figure 1. Practice-oriented cycle for entrepreneurial competence development in vocational education. Source: Author's synthesis based on the framework discussed in this article.

4. Entrepreneurship Strategies, Teams, and Networks

A vocational entrepreneurship program should help students understand both the structure of a business idea and the human relationships required to implement it. At the strategic level, students need to examine opportunities, customer segments, value propositions, education–industry collaboration, key activities, essential resources, and the way a business model changes when assumptions or conditions change. Strategies should be reviewed and updated continuously as new information becomes available.

Team-based entrepreneurial activity develops a complementary set of personal and social competencies. Important capabilities include rapid comprehension, creativity, risk awareness, communication, leadership, trust, and the ability to anticipate consequences. Students also need self-awareness, emotional intelligence, ethical responsibility, and respect for differences within a team. These

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competencies become especially important when members must make decisions under pressure or when a project has no obvious solution.

Cognitive diversity and psychological safety can improve the quality of group problem solving when students are encouraged to contribute different perspectives without fear of ridicule. At the same time, teams require clear roles, appropriate size and composition, transparent responsibilities, and agreed methods for sharing knowledge. Entrepreneurship education should therefore include practical experience in coordinating relationships, defining roles, organizing incentives, allocating resources, and understanding the basic financial structure of a project.

5. Creativity and Design Thinking

Creativity is not only a sudden inspiration or imitation of competitors. In entrepreneurship education, it can be developed as a systematic process for identifying needs, generating alternatives, testing assumptions, and improving solutions. Design thinking provides a practical framework for this process because it begins with attention to the user and encourages repeated movement between understanding a problem and refining a response.

Students should learn to examine a situation from the user's perspective and identify needs that may not be immediately visible. They can then connect a value proposition with a workable business model, balance usefulness with feasibility, and refine a product or service through iterative testing. This process helps learners move beyond "me-too" strategies and encourages them to justify why a proposed solution creates value for a specific user or customer.

A student-centered approach is particularly important in vocational education because learners can connect design thinking directly with their occupational specialization. Through user-focused research, prototype development, feedback, and revision, students experience entrepreneurship as a practical problem-solving process. The teacher's role is to structure the learning environment, provide criteria and feedback, and help students reflect on the relationship between technical quality, customer value, and economic viability.

6. Smart Development as an Iterative Practice

The paper also emphasizes a "Smart Development" approach based on rapid response, adaptability, teamwork, short development cycles, continuous delivery of results, and the use of user feedback. In an educational context, these principles can be applied without turning the classroom into a commercial enterprise. Students can work in cross-functional teams, break a larger project into shorter stages, present intermediate results, collect feedback, and make visible improvements in the next cycle.

This approach is useful when students face complex production or project problems for which the starting point is unclear. Instead of allowing the team to become fragmented or meetings to continue without decisions, the project can be divided into concrete tasks with short deadlines, defined responsibilities, and review points. Practical workshops and real-world business examples can help students understand how responsive teams organize work and adapt when requirements change.

The educational value of Smart Development lies in the habits it promotes: acting on available information, testing rather than overplanning, communicating frequently, responding to evidence, and improving a solution through successive iterations. These habits reinforce entrepreneurial initiative while remaining closely connected to professional skill development.

7. Discussion and Implications

The proposed framework suggests that entrepreneurial competence in vocational education is best developed as an integrated feature of professional preparation. The most important implication is that institutions should provide repeated opportunities for students to act, reflect, receive feedback, and try again. A single theoretical entrepreneurship course is unlikely to produce the same depth of learning as a sequence of authentic projects connected with the student's vocational field. This emphasis on explicit pedagogy and practical outcomes is also supported by Nabi et al. (2017), whose systematic review of 159

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published studies found that entrepreneurship education impact research often concentrates on short-term, subjective outcomes and frequently underdescribes the pedagogies being evaluated.

For educational management, this requires coordination among curriculum designers, teachers, industry partners, mentors, and support units such as entrepreneurship or incubation centers. Assessment systems should also reflect the practical character of the intended outcomes. Clear rubrics can be used to evaluate opportunity recognition, planning, collaboration, communication, resource use, adaptability, and the quality of project improvement. Such measures make entrepreneurial learning more visible and reduce overreliance on written examinations.

The framework also highlights the importance of strengthening the relationship between vocational institutions and the labor market. Industry participation can improve the authenticity of tasks and help students understand current professional expectations. At the same time, educational institutions should preserve a learning-oriented environment in which experimentation, ethical reflection, and constructive failure are treated as legitimate parts of development.

8. Conclusion

Developing entrepreneurial skills in secondary specialized vocational education requires a pedagogical system grounded in practice, innovation, adaptability, and sustainable development. The integration of vocational expertise with entrepreneurial competence can help graduates become more capable of recognizing opportunities, solving unfamiliar problems, working effectively in teams, and translating professional knowledge into useful products, services, and projects.

Six directions are particularly important for strengthening this system: (1) innovating admission and educational models; (2) fostering innovative thinking among students; (3) expanding workforce preparation through partnerships among industry, government, and educational institutions; (4) using social and institutional resources effectively; (5) creating smart educational environments; and (6) establishing interdisciplinary and integrated educational networks. Together, these directions can strengthen the quality and relevance of technical and vocational education.

The practical development of entrepreneurial competence should therefore be continuous rather than episodic. Contextual learning, experiential projects, mentorship, collaboration, competency-based assessment, design thinking, and iterative development provide mutually reinforcing mechanisms for connecting theory with action. When these mechanisms are aligned with vocational specialization and real-world practice, students are better prepared for employment, entrepreneurship, innovation, and responsible participation in economic and social development.

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