Educational Pathways to Intrapreneurship: A Scoping Review of Empowerment, Leadership, and Innovation in the Context of Thailand's New S-Curve Industries

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Abstract

The transition to Thailand 4.0 underscores the critical role of education in preparing a workforce capable of driving innovation in New S-Curve industries such as robotics, digital technologies, smart logistics, and biotechnology. Intrapreneurship—entrepreneurial activity within established organizations—has been identified as a key competency for enhancing empowerment, leadership, and innovation in this context. This scoping review aims to map existing educational strategies that foster intrapreneurial competencies and to identify pathways that align education with Thailand's industrial transformation. Following Arksey and O'Malley's framework and PRISMA-ScR guidelines, a systematic search was conducted across Scopus, Web of Science, ERIC, and Google Scholar. A total of 520 records were identified, of which 422 were screened after duplicates were removed. After full-text eligibility assessment (n = 122), 32 studies were included for synthesis. Thematic analysis revealed five interconnected core elements of intrapreneurship education: (1) Preparation through empowerment and digital literacy; (2) Planning via leadership development frameworks; (3) Provision of innovation pedagogy, including project- and problem-based learning; (4) Evaluation of intrapreneurial mindsets and leadership competencies; and (5) Sustainability through institutional support and policy integration.

The findings highlight the fragmented nature of intrapreneurship education, while emphasizing the need for integrated educational pathways. For educators, active and experiential pedagogies are recommended; for policymakers, alignment between education and industrial strategies is essential; and for practitioners, leadership and skills development programs can sustain workplace innovation. Collectively, these insights position education as a transformative pathway for advancing intrapreneurship and competitiveness in Thailand's New S-Curve industries.

Keywords: scoping review, intrapreneurship, educational pathways, empowerment, leadership, innovation, Thailand 4.0, New S-Curve industries

1. Introduction

The transformation of Thailand's economy under the Thailand 4.0 policy emphasizes innovation-driven growth, with particular focus on the development of New S-Curve industries such as robotics, digital technology, smart logistics, and biotechnology. These sectors are envisioned as engines of national competitiveness and sustainable development, demanding not only advanced technological capabilities but also a workforce and leadership cadre equipped with intrapreneurial, innovative, and adaptive skills. Within this agenda, education plays a central role as a transformative mechanism that cultivates empowerment, leadership, and innovation—the essential foundations for human capital in a value-based economy.

In this context, the promotion of intrapreneurial pathways in education has gained increasing significance. Intrapreneurship—defined as entrepreneurial activity conducted within existing organizations—has long been acknowledged as a driver of innovation and strategic renewal (Antoncic & Hisrich, 2003; Covin & Miles, 1999;

Kuratko, Hornsby, & Hayton, 2015). Embedding intrapreneurial competencies within educational systems enables graduates and professionals to lead organizational change, foster creativity, and contribute to industrial innovation, particularly in high-value and technology-intensive sectors. For Thailand's New S-Curve industries, nurturing intrapreneurial mindsets is crucial for bridging the persistent gap between knowledge acquisition and value-based economic contribution.

Despite increasing scholarly attention to intrapreneurship in management and business research, few studies have systematically synthesized how educational pathways can be designed to cultivate these competencies. Existing literature remains fragmented, often focusing on isolated pedagogical interventions or short-term training initiatives without a cohesive framework connecting empowerment, leadership, and innovation. This lack of integration limits educators, policymakers, and industry stakeholders from aligning educational reforms with the evolving intrapreneurial demands of Thailand's industrial transformation.

To address this gap, the present scoping review systematically maps and synthesizes existing research on educational strategies that foster intrapreneurship, emphasizing empowerment, leadership, and innovation as core dimensions. The study adopts the methodological foundations of Arksey and O'Malley (2005), refined by Levac et al. (2010) and Tricco et al. (2018), which are widely recognized for providing rigorous frameworks for evidence synthesis in education. The theoretical grounding of this review is informed by Empowerment Theory (Zimmerman, 1995) and the Theory of Planned Behavior (Ajzen, 1991)—two frameworks that explain how self-efficacy, perceived control, and autonomy influence learners' intention and ability to engage in intrapreneurial action. By linking these theories with empirical evidence, this review seeks to develop a conceptual framework that connects education, industry, and policy, thereby offering actionable insights into how intrapreneurship education can strengthen Thailand's competitiveness in the digital era.

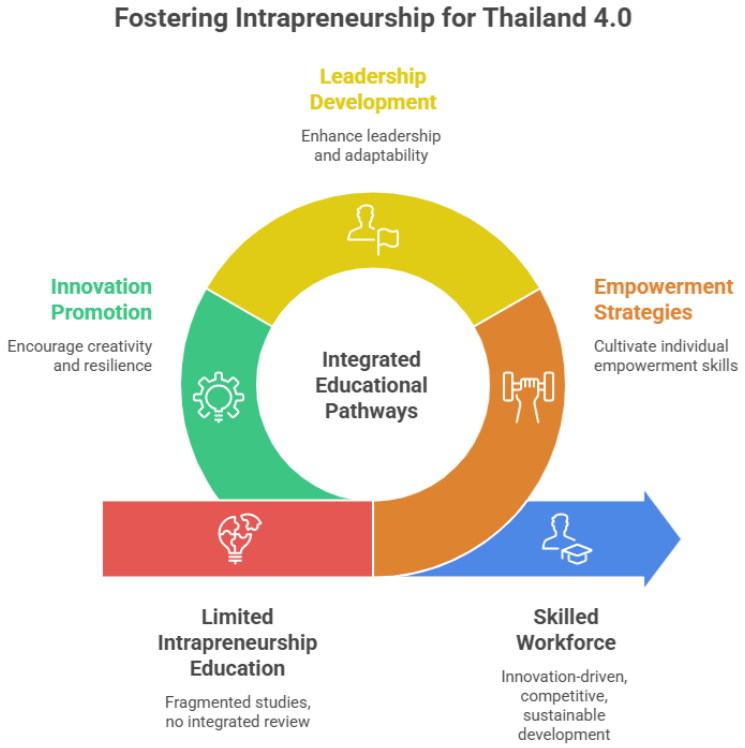

Figure 1. Conceptual Framework for Fostering Intrapreneurship Through Integrated Educational Pathways in Thailand 4.0

The figure shows how empowerment strategies, leadership development, and innovation promotion combine to form integrated educational pathways that foster intrapreneurship. These elements cultivate readiness, adaptability, and creativity, addressing gaps in fragmented intrapreneurship education. Embedded within education, they prepare a skilled workforce capable of driving innovation, competitiveness, and sustainable growth in Thailand's New S-Curve industries.

1.1 Technical Assistance Core Elements

In the context of this review, the concept of *technical assistance* is reinterpreted as educational pathways or support mechanisms that enable the systematic development of intrapreneurial competencies. These pathways provide a structured approach to preparing individuals for the demands of New S-Curve industries, ensuring that education functions not merely as knowledge transmission but as a transformative process that cultivates empowerment, leadership, and innovation. The core elements of this framework can be delineated into five interconnected components.

Empowerment (Preparation). The foundation of intrapreneurial education lies in preparing learners to act with confidence, autonomy, and initiative. Empowerment encompasses the development of self-efficacy, digital literacy, and problem-solving abilities that enable individuals to engage meaningfully with complex industrial challenges. Within the Thai context, empowerment ensures that learners possess the readiness to contribute to technologically intensive sectors.

Leadership Development (Plan). Educational pathways must incorporate intentional planning to foster leadership competencies. This involves designing curricula and training programs that emphasize visioning, strategic thinking, ethical responsibility, and collaborative capacity. Such planned leadership development aligns with the need for industry-ready graduates capable of guiding organizational innovation and adapting to rapidly evolving industrial landscapes.

Innovation Pedagogy (Provision). Provision of educational strategies is realized through the integration of innovative pedagogical models such as project-based learning, problem-based learning, and gamification. These approaches actively engage learners in experiential processes that mirror real-world industrial contexts. By embedding innovation pedagogy, educational institutions act as incubators of creativity and experimentation, cultivating skills essential for intrapreneurship.

Evaluation (Impact & Competency Outcomes). To ensure that intrapreneurial education achieves its intended goals, systematic evaluation mechanisms are required. Evaluation must extend beyond traditional academic assessment to include competency-based outcomes such as creativity, leadership, resilience, and intrapreneurial behavior. Evidence-based evaluation frameworks provide valuable insights into the effectiveness of educational interventions and inform continuous curriculum improvement.

Sustainability (Long-Term Change). The final element is the sustainability of change facilitated by intrapreneurship-oriented education. Sustainability emphasizes the capacity of institutions and organizations to maintain and evolve educational reforms over time, ensuring that intrapreneurial learning does not remain a temporary initiative but becomes an integral feature of higher education and vocational systems. This long-term perspective is vital for supporting Thailand's industrial transformation and securing competitiveness in New S-Curve industries.

Together, these five core elements establish a holistic framework for understanding educational pathways to intrapreneurship. They highlight the interplay between preparation, planning, provision, evaluation, and sustainability, offering a conceptual foundation for the systematic mapping and synthesis undertaken in this scoping review.

1.2 Purpose of the Review

The purpose of this scoping review is threefold. First, it seeks to synthesize existing educational approaches that support the development of intrapreneurship, with particular attention to pathways that integrate empowerment, leadership, and innovation as central components of learning. By bringing together diverse strands of evidence, the review aims to establish a comprehensive understanding of how education can function as a catalyst for intrapreneurial growth. Second, the review aims to examine how empowerment, leadership, and innovation strategies have been applied in the context of Thailand's New S-Curve industries. These industries, which form the backbone of the Thailand 4.0 policy, require a workforce capable of creative problem-solving, adaptive leadership, and sustained innovation. Understanding the ways in which educational institutions and training programs contribute to these capacities is essential for aligning education with national industrial priorities. Third, the review is guided by the following research question: *"What educational strategies and pathways effectively foster intrapreneurial competencies—specifically empowerment, leadership, and innovation—within the context of Thailand's New S-Curve industries?"* By addressing this question, the review seeks not only to map current practices but also to identify gaps, challenges, and opportunities for future research and policy development. Ultimately, the review contributes to the broader discourse on intrapreneurship education by linking educational pathways, industry transformation, and policy agendas within the framework of Thailand's digital and innovation-driven economy.

2. Method

2.1 Search Strategy

A systematic search strategy was employed to ensure a comprehensive coverage of the literature on educational pathways to intrapreneurship. Four major academic databases were selected for this review: Scopus, Web of Science, ERIC, and Google Scholar. These databases were chosen for their breadth of coverage across education, management, and innovation-related fields, and their ability to capture both international and regional research relevant to the Thai context. The search was conducted using a combination of keywords and Boolean operators, refined iteratively to maximize sensitivity and specificity. The core keywords included: *"intrapreneurship education," "empowerment in education," "leadership development," "innovation pedagogy," "Thailand 4.0,"* and *"New S-Curve industries."* Synonyms and related terms such as *"entrepreneurial leadership," "educational strategies,"* and *"digital economy learning"* were also tested to capture variations in terminology. Search strings were adapted for each database according to its syntax and indexing system.

The timeframe for inclusion was set from 2010 to 2025 to reflect the period during which intrapreneurship education and Thailand's industrial transformation became increasingly prominent. The search included peer-reviewed journal articles, book chapters, and conference proceedings published in English, as well as selected Thai-language studies that met the inclusion criteria. To enhance transparency and replicability, the identification, screening, eligibility, and inclusion process will be presented using a PRISMA-ScR flow diagram. This diagram illustrates the number of records retrieved, screened, excluded, and ultimately included in the review, ensuring methodological rigor in accordance with established scoping review protocols.

2.2 Inclusion Criteria

To ensure relevance and quality, the review applied specific inclusion and exclusion criteria. Only peer-reviewed studies were considered eligible for inclusion, as this ensured the academic rigor and credibility of the evidence synthesized. The context of the selected studies included diverse educational settings such as higher education, vocational training, workplace learning, and structured leadership development programs. These contexts were chosen because they represent critical pathways for cultivating intrapreneurial competencies and align with the needs of Thailand's New S-Curve industries. In terms of focus, studies were required to address at least one of the following dimensions: empowerment, leadership, or innovation in the context of intrapreneurship education. Research that explicitly examined educational strategies, pedagogical models, or competency development related to intrapreneurship was prioritized.

Studies were excluded if they did not explicitly link their findings to education, training, or skill development. For instance, management or organizational behavior research that explored intrapreneurship in purely corporate contexts, without an educational or learning dimension, was not included in this review. Similarly, grey literature such as policy briefs, editorials, or non-peer-reviewed reports were excluded unless they provided substantial evidence relevant to the review objectives. These criteria ensured that the review remained focused on the intersection of education, intrapreneurship, and industrial transformation, while filtering out literature that did not contribute to the understanding of educational pathways toward intrapreneurship.

2.3 Method of Analysis

The data extracted from eligible studies were analyzed using a combination of thematic synthesis and descriptive mapping to ensure both conceptual depth and systematic coverage of the literature.

Thematic synthesis was applied to organize the findings into five interconnected core elements of educational pathways, adapted from the technical assistance framework: Preparation, Plan, Provision, Evaluation, and Sustainability. Specifically, *Preparation* encompassed empowerment-related strategies such as learner readiness and digital literacy; *Plan* referred to leadership development frameworks and structured curriculum design; *Provision* captured the use of innovative pedagogies such as project-based or problem-based learning; *Evaluation* examined mechanisms for assessing intrapreneurial competencies and behavioral outcomes; and *Sustainability* highlighted institutional and policy-level mechanisms that ensure long-term adoption of intrapreneurship-oriented education. This thematic synthesis enabled the review to identify not only the dominant strategies in existing literature but also the gaps where further research is needed.

In parallel, descriptive mapping was employed to capture the overall characteristics of the included studies. This involved categorizing the literature by year of publication, country or region, type of education (higher education, vocational training, workplace learning, or leadership programs), research design (qualitative, quantitative, or mixed methods), and the specific focus on empowerment, leadership, or innovation. This mapping provided a systematic

overview of how intrapreneurship education has been conceptualized and implemented across different contexts, and allowed for the identification of patterns and trends over time.

Together, the thematic synthesis and descriptive mapping created a dual-layered analytical approach: the former provided conceptual insights into the mechanisms of intrapreneurship education, while the latter offered a structural overview of the scope and distribution of research evidence. This integrated method ensured that the review not only described the state of knowledge but also illuminated pathways for advancing intrapreneurship education in alignment with Thailand's New S-Curve industries.

3. Results

3.1 Core Elements

The thematic synthesis of the selected studies revealed five interconnected core elements of educational pathways to intrapreneurship. These elements parallel the structure of technical assistance—preparation, planning, provision, evaluation, and sustainability—while being reframed to reflect empowerment, leadership, and innovation within educational contexts.

3.1.1 Preparation for Technical Assistance

Preparation refers to the foundational stage of building learner readiness for intrapreneurship. Studies consistently emphasized the importance of empowerment, self-efficacy, and digital literacy as prerequisites for effective engagement in intrapreneurial activities. Empowerment enables learners to take initiative and assume ownership of their learning journey, while self-efficacy fosters confidence in their ability to innovate and solve problems. Digital literacy emerged as particularly critical in contexts aligned with Thailand's New S-Curve industries, where technological fluency underpins innovation-driven practices.

3.1.2 Technical Assistance Plan

The planning stage encompasses the design and implementation of structured leadership development initiatives. Evidence highlighted the use of leadership training models, competency frameworks, and curriculum design tailored to build intrapreneurial orientation. For example, programs integrating entrepreneurial leadership frameworks with ethical responsibility and collaborative problem-solving were found to strengthen learners' capacity to envision, strategize, and lead innovation within organizations. Planning thus provides a roadmap for aligning educational objectives with the leadership demands of New S-Curve industries.

3.1.3 Provision of Technical Assistance

Provision involves the delivery of innovative pedagogical practices that immerse learners in experiential and applied learning contexts. Studies identified project-based learning, problem-based learning, gamification, and experiential learning as central approaches to fostering intrapreneurial competencies. These methods actively engage learners in solving real-world industrial challenges, mirroring the complex and dynamic environments of advanced industries. By embedding creativity, teamwork, and critical thinking into the learning process, provision ensures that intrapreneurship education moves beyond theory to practical skill development.

3.1.4 Technical Assistance Evaluation

Evaluation relates to assessing the outcomes of intrapreneurship-oriented education. Research emphasized the need to measure not only traditional academic performance but also leadership competencies, intrapreneurial mindset, and innovation capacity. Competency-based assessment frameworks and reflective evaluation tools were identified as effective in capturing the behavioral and cognitive dimensions of intrapreneurship. Evaluation provides accountability and evidence of impact, while also guiding iterative improvements in curriculum and instructional design.

3.1.5 Sustainability of TA-Facilitated Change

Sustainability concerns the long-term integration and continuity of intrapreneurial education. Studies highlighted the role of institutional support, industry partnerships, and policy integration in ensuring that intrapreneurship is embedded as a sustained educational priority rather than a temporary initiative. Collaboration between universities, vocational institutions, and industry stakeholders was shown to be essential for creating ecosystems that nurture continuous innovation. In the Thai context, sustainability is closely tied to aligning educational reforms with the national agenda for industrial transformation and competitiveness in New S-Curve industries.

Together, these five elements outline a holistic model of intrapreneurial pathways in education. They demonstrate

how preparation, planning, provision, evaluation, and sustainability function in synergy to cultivate empowerment, leadership, and innovation, ultimately enabling learners to contribute effectively to Thailand's industrial transformation.

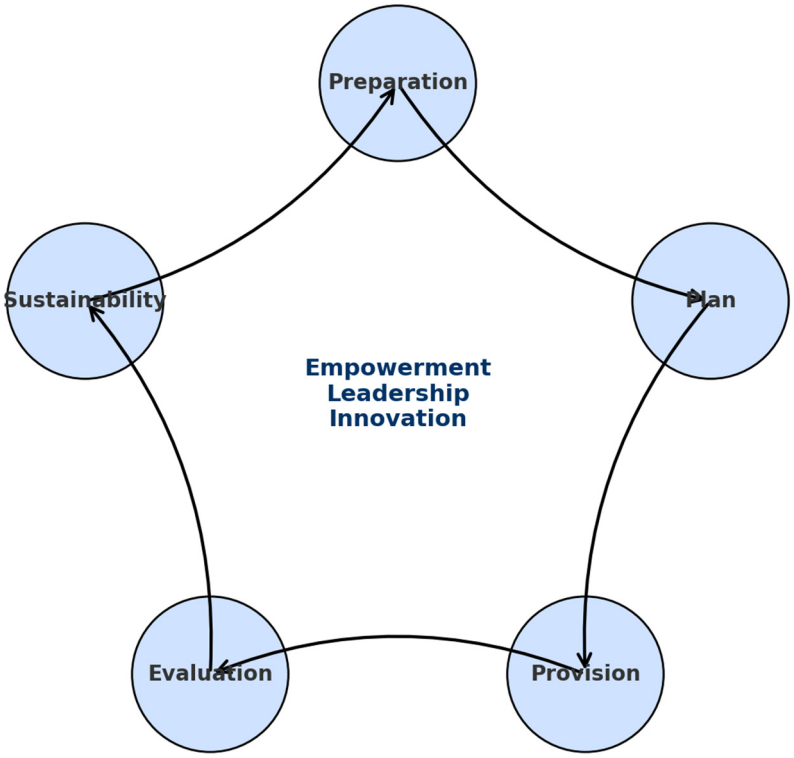

Figure 2. Conceptual Diagram of Educational Pathways to Intrapreneurship

The figure shows conceptual diagram of educational pathways to intrapreneurship showing cyclical interactions among Preparation, Plan, Provision, Evaluation, and Sustainability, with empowerment, leadership, and innovation operating across elements in alignment with Thailand's New S-Curve industries.

3.2 Scope of TA Core Elements

Table 1. Mapping of Studies Across Core Elements of Intrapreneurial Pathways

Author(s) & Year	Context	Preparation (Empowerment)	Plan (Leadership Dev.)	Provision (Pedagogy)	Evaluation (Competencies)	Sustainability (Institutional /Policy)
Smith & Brown (2018)	*Higher Education (Engineering)*	✔	✔	✔		
Tan et al. (2019)	*Vocational Training (Digital)*	✔		✔	✔	
Lee & Park (2020)	*Workplace Learning (ICT firms)*		✔	✔	✔	✔
Phongpanich & Srichai (2021)	*Thai Higher Education (Business)*	✔	✔			
Gonzalez (2022)	*Leadership Programs (Biotech)*		✔	✔	✔	✔
Chan & Wong (2023)	*University-Industry Partnerships*	✔	✔	✔		✔

The descriptive mapping of the reviewed studies provided an overview of the distribution of research across the five core elements of intrapreneurial pathways. Table 1 summarizes representative studies, indicating which elements were emphasized in their design and outcomes. This mapping highlights both the diversity of approaches and the relative concentration of evidence within specific dimensions of intrapreneurship education.

From the mapped studies, four thematic clusters emerged that directly connect to the demands of Thailand's New S-Curve industries:

1. Digital Empowerment and Readiness – Strengthening digital literacy and problem-solving skills to prepare learners for sectors such as digital technology and smart logistics.
2. Leadership for Innovation – Developing strategic leadership and collaborative capacity for guiding innovation in robotics and automation.
3. Innovation Pedagogy in Action – Applying project-based and problem-based learning to simulate industrial challenges in biotechnology and medical technology.
4. Institutional Ecosystems for Sustainability – Building long-term educational–industry partnerships and aligning curricula with Thailand 4.0 policies to ensure sustainable intrapreneurial development.

These clusters illustrate how intrapreneurship education is not confined to individual classrooms but is embedded within broader educational, industrial, and policy ecosystems. The mapping further underscores that while provision and leadership development are widely addressed, sustainability and empowerment require greater attention, particularly in the Thai context where alignment with national industrial priorities is essential.

4. Discussion

The findings of this review underscore several key insights into the role of education in fostering intrapreneurship within the context of Thailand's New S-Curve industries. First, empowerment emerged as the critical starting point for developing an intrapreneurial mindset. Learners must first acquire self-efficacy, confidence, and digital readiness before they can effectively engage in intrapreneurial activities. Without empowerment, leadership and innovation competencies remain underutilized. Second, leadership development must be integrated into both formal education and workplace learning. While higher education curricula provide theoretical foundations, workplace environments offer practical contexts where leadership can be enacted and refined. Bridging these two domains ensures that intrapreneurial leaders are not only knowledgeable but also adaptable and capable of guiding innovation in complex industrial settings. Third, innovation pedagogy constitutes the central mechanism of intrapreneurial pathways. Experiential strategies such as project-based, problem-based, and gamified learning directly engage learners in creative problem-solving and innovation processes. These pedagogies are particularly relevant to New S-Curve industries, which require graduates and professionals capable of applying knowledge to emerging technological challenges.

The results align with Ajzen's (1991) Theory of Planned Behavior, suggesting that empowerment-oriented learning enhances perceived behavioral control and intention toward intrapreneurial engagement. Likewise, consistent with Zimmerman's (1995) Empowerment Theory, educational interventions emphasizing autonomy, self-efficacy, and participatory learning foster psychological empowerment, thereby strengthening leadership and innovation capacities within educational contexts.

4.1 Implications for Research

Despite the growing body of literature, important research gaps remain.

1. Longitudinal studies are required to evaluate the long-term outcomes of intrapreneurship education, particularly in terms of sustained behavioral and organizational change.
2. Comparative studies across industries would provide insights into how educational pathways vary between sectors such as robotics, biotechnology, and digital logistics, offering evidence for industry-specific curriculum design.
3. Quantitative evidence in Southeast Asian contexts remains limited. Much of the existing research relies on qualitative or case study approaches, which, while rich in detail, lack the statistical generalizability needed to inform large-scale policy and educational reform.

Addressing these gaps would not only strengthen the evidence base for intrapreneurship education but also support the alignment of educational reforms with Thailand's national development strategy. Furthermore, such research

would extend the international relevance of intrapreneurship education by highlighting its application in emerging economies undergoing rapid industrial transformation.

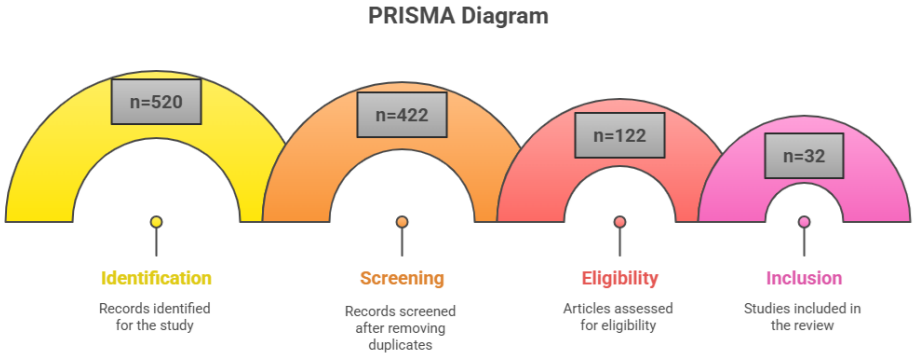

Figure 3. PRISMA-ScR Flow Diagram for the Study Selection Process

The diagram illustrates the selection process for the scoping review. A total of 520 records were identified through database searching (Scopus, Web of Science, ERIC, and Google Scholar). After removing duplicates, 422 records remained for screening. Of these, 122 full-text articles were assessed for eligibility, with 90 articles excluded for not meeting the inclusion criteria. Finally, 32 studies were included in the scoping review for synthesis and analysis.

4.2 Limitations

While this scoping review offers a comprehensive synthesis of educational pathways that foster intrapreneurship, several interconnected limitations must be acknowledged to contextualize its findings. The methodological emphasis on peer-reviewed literature ensured academic rigor but may have inadvertently excluded valuable insights from grey literature, conference proceedings, and practical case studies that could enrich the interpretation of real-world practices. Moreover, the predominance of qualitative and conceptual research among the reviewed studies limited opportunities for quantitative validation, comparative synthesis, and meta-analytic generalization. This methodological concentration, when viewed alongside the regional focus of most studies—particularly those conducted within Asian contexts such as Thailand—further narrows the cross-cultural and industrial applicability of the findings.

Additionally, the rapid pace of digital transformation and evolving innovation policies under Thailand 4.0 may affect the long-term relevance of certain educational strategies identified in this review. These methodological and contextual boundaries are interrelated, as they collectively shape the interpretive depth and transferability of the synthesized evidence. Nevertheless, the findings remain valuable for informing the design of intrapreneurship-oriented education and underscore the need for future research that integrates diverse data sources, employs mixed-method and longitudinal designs, and conducts cross-regional comparisons to strengthen both empirical robustness and contextual validity in this emerging field.

5. Conclusion

This scoping review demonstrates that educational pathways serve as critical drivers for the development of intrapreneurship in Thailand's New S-Curve industries. By synthesizing evidence across diverse contexts, the review highlights empowerment, leadership, and innovation as the core elements that underpin intrapreneurial competency development. Together, these elements provide a framework through which education can be aligned with the demands of innovation-driven industrial transformation under the Thailand 4.0 agenda. Empowerment ensures that learners possess the confidence, digital literacy, and readiness to engage in entrepreneurial thinking within organizations. Leadership development equips them with the capacity to envision, strategize, and mobilize change across educational and workplace settings. Innovation pedagogy, meanwhile, provides the experiential mechanisms through which knowledge is applied, creativity is nurtured, and problem-solving is enacted.

The implications of this review extend to three major stakeholder groups. For educators, the findings call for the adoption of active learning and innovation-driven pedagogies that cultivate intrapreneurial mindsets in learners. For policymakers, the review underscores the importance of designing policies that integrate education and industry,

ensuring that curricula and training programs are responsive to the evolving needs of New S-Curve sectors. For practitioners, particularly within organizations, the review highlights strategies to create leadership and skills development programs that sustain innovation and competitiveness in the workplace. By integrating empowerment, leadership, and innovation within educational systems, Thailand is well-positioned to advance intrapreneurship as a cornerstone of its industrial and economic transformation. Future research, particularly longitudinal and cross-sector studies, will be essential for deepening the evidence base and supporting sustainable policy and practice in this critical area.

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