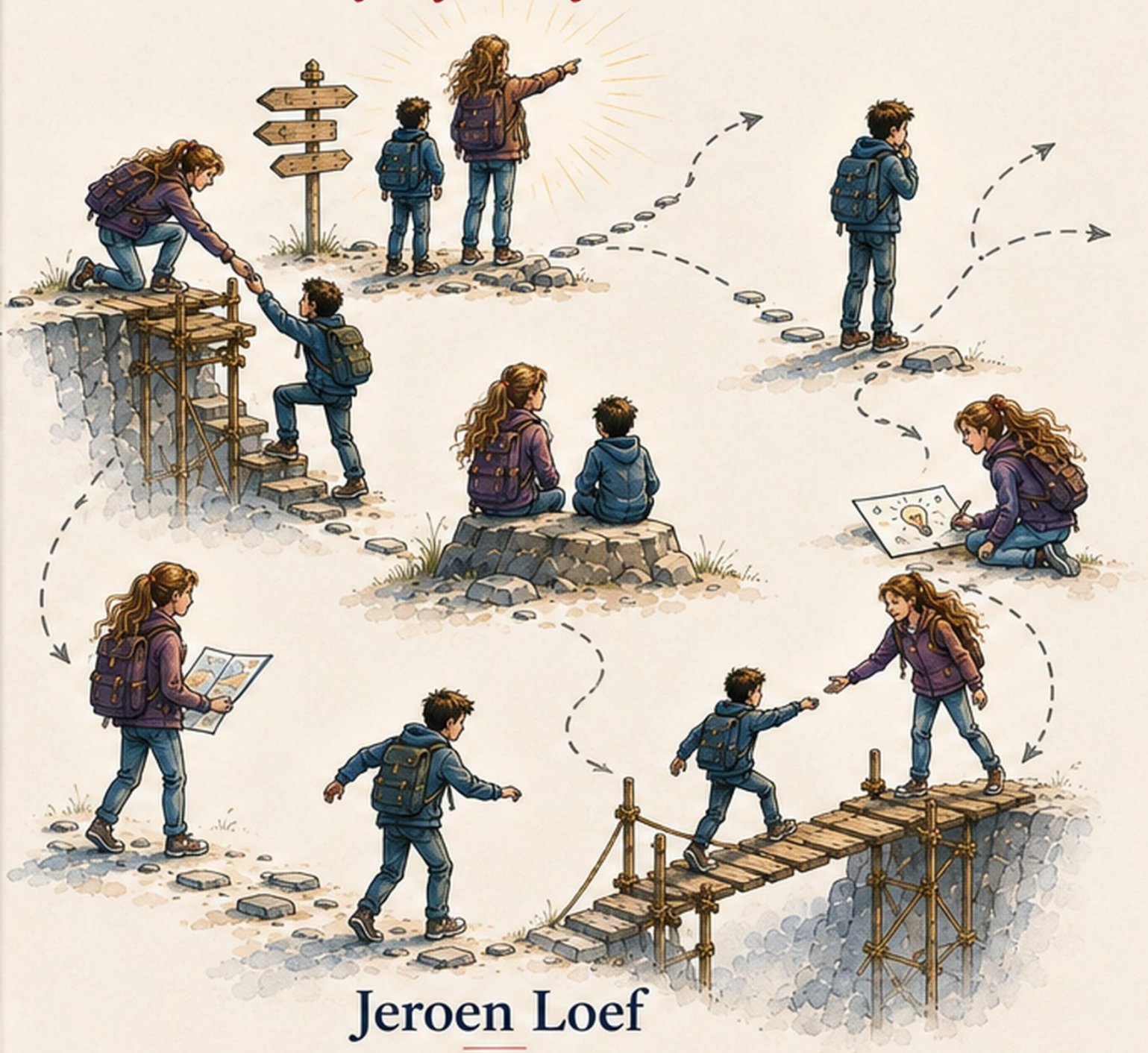




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Scaffolding Entrepreneurial Mindset Development

with the Gift of Confidence



Jeroen Loef

PhD thesis

November 2026

Scaffolding Entrepreneurial Mindset Development

with the Gift of Confidence

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PhD thesis

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on the authority of the
Rector Magnificus Prof. J.M.A. Scherpen
and in accordance with
the decision by the College of Deans.

This thesis will be defended in public on
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To those learners and educators who are still searching for how to connect.

May this thesis serve as a scaffold for conversations yet to be had.

It is through interactions that we grow.

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1

Introduction

1.1 Setting the Scene

“If you always do what you’ve always done, you always get what you’ve always gotten.”
— Jessie Potter

The contemporary world is characterized by accelerating change, structural uncertainty, and complex interdependencies (Dimov, 2020). In such environments, the capacity to recognize opportunities, mobilize resources, and adapt to unfolding circumstances becomes increasingly vital. Entrepreneurship is therefore widely regarded as a driver of innovation, economic renewal, and societal value creation (Fayolle, 2007; Rae, 2006).

Over the past decades, entrepreneurship education (EE) has become firmly embedded in higher education systems worldwide. Scholars have clarified why EE matters—highlighting its contribution to entrepreneurial competencies, mindset development, and economic dynamism (Fayolle & Gailly, 2008; Kuratko, 2005; Nabi et al., 2017). At the same time, significant progress has been made in defining what should be taught, including opportunity recognition, effectual reasoning, business model development, and value creation (Neck & Greene, 2011; Sarasvathy, 2001; Fayolle, 2018).

Pedagogically, EE has shifted from predominantly didactic formats toward experiential and action-based learning (Neck & Corbett, 2018; Pittaway & Cope, 2007). Frameworks such as “about, for, in, and through” entrepreneurship, as well as more recent taxonomies (Aadland & Aaboen, 2020), illustrate the field’s diversification. Programs increasingly emphasize real-world engagement, collaboration, and iterative experimentation.

Despite this conceptual and institutional maturation, debates persist regarding the effectiveness of entrepreneurship education. Studies have produced mixed findings concerning venture creation, entrepreneurial intention, and long-term impact (Fayolle et al., 2006; Matlay, 2008; Nabi et al., 2017). Evaluations frequently emphasize measurable outputs—such as business plans, venture counts, or self-reported intentions—while paying comparatively less attention to the learning processes through which entrepreneurial competence develops.

This creates a fundamental tension. Entrepreneurship education increasingly asks students to learn in uncertainty yet often evaluates them as if entrepreneurship were predictable. Programs encourage experimentation, iteration, and ambiguity, while rewarding template compliance, polished pitches, and post-hoc coherence. The field has become increasingly sophisticated in describing what entrepreneurship education should achieve, yet it still struggles to explain how those achievements are produced in real classrooms.

It is within this tension that a persistent blind spot becomes visible.

1.2 The Research Gap: Opening the Pedagogical Black Box

Although entrepreneurship education has advanced in clarifying its objectives (“why”) and curricular content (“what”), considerably less attention has been devoted to the pedagogical mechanisms through which entrepreneurial learning unfolds (“how”).

Much of the existing literature evaluates program outcomes or categorizes teaching formats. Far fewer studies systematically examine the micro-level interactions between educators and learners that shape developmental trajectories in real time (Fayolle, 2007; Hattenberg, 2022).

The internal pedagogical dynamics of EE—how support is adjusted, how uncertainty is mediated, and how learner differences are addressed—remain insufficiently theorized and empirically examined. In this sense, the pedagogical “black box” of entrepreneurship education persists (Lackéus et al., 2015).

This matters because when the pedagogical process remains opaque, educators are left with improvisation without language. They may intuitively sense that different students require different forms of support yet lack empirically grounded principles for adapting in real time. In such environments, experiential learning can unintentionally function as a filter—benefiting those who already possess confidence, networks, or tolerance for ambiguity, while disadvantaging learners who require calibrated guidance to engage productively with uncertainty.

The gap becomes particularly salient when considering learner diversity. Students enter EE programs with heterogeneous levels of prior experience, motivational readiness, self-efficacy, and tolerance for ambiguity (Fayolle & Gailly, 2008; Nabi et al., 2017; Hattenberg et al., 2019). Empirical observations consistently show that identical educational interventions can generate markedly different responses among learners. Yet many pedagogical frameworks implicitly assume relative homogeneity or advocate experiential formats without specifying how instructional support should vary according to learner readiness or mindset configuration.

At the same time, adaptive teaching and scaffolding are well established within broader educational research (Vygotsky, 1978; Wood, Bruner, & Ross, 1976; Van de Pol, Volman, & Beishuizen, 2010). These frameworks emphasize calibrated support, gradual transfer of responsibility, and alignment with learners’ developmental zones. However, their systematic integration into entrepreneurship education remains underdeveloped.

Entrepreneurship education presents distinctive pedagogical challenges. Uncertainty is not peripheral but constitutive (Sarasvathy, 2001). Identity formation and resilience are central developmental outcomes (Rae, 2006; Lackéus, 2016). Learning unfolds iteratively rather than linearly. Yet existing EE models seldom articulate how educator responsiveness, scaffolding intensity, and learner profiles interact within such environments.

Consequently, three interrelated gaps can be identified:

1. **A pedagogical process gap** – limited empirical understanding of how educators enact adaptive scaffolding in entrepreneurship classrooms (Fayolle, 2007; Hattenberg, 2022).
2. **A learner differentiation gap – insufficient modeling of distinct learner configurations and their developmental implications (Fayolle & Gailly, 2008; Hattenberg et al., 2019).**
3. **An alignment gap** – absence of an empirically grounded framework linking learner profiles, scaffold types, and educator responsiveness in entrepreneurial contexts (Van de Pol et al., 2010; Neck & Greene, 2011).

Addressing these gaps requires shifting the unit of analysis: from program formats and end-results to the interactional mechanisms through which entrepreneurial development is shaped—moment by moment—by educator responsiveness, scaffolding choices, and learner configurations.

1.3 Research Question

In response to these gaps, this dissertation investigates the following overarching question:

How can entrepreneurship education be tailored to diverse entrepreneurial mindset profiles through adaptive scaffolding and educator responsiveness?

To address this question, the dissertation is structured around four sub-questions:

Chapter	Research Question
2	What pedagogical and didactic approaches are currently used in entrepreneurship education, and how are they theorized?
3	How do entrepreneurship educators design, deliver, and adapt their teaching practices?
4	What distinct entrepreneurial mindset archetypes exist among students?
5	Which scaffolding strategies are effective for supporting the development of different mindset archetypes?

Table 1. Research Questions

Together, these questions examine the conceptual foundations of entrepreneurship education, the lived practice of educators, the heterogeneity of learners, and the effectiveness of differentiated support strategies.

1.4 Core Concepts and Working Definitions

Entrepreneurial mindset. Entrepreneurial mindset is conceptualised in this dissertation as a developmental and context-sensitive configuration that shapes how individuals perceive, interpret, and act upon opportunities and uncertainty. This perspective moves away from treating entrepreneurial mindset primarily as a stable collection of individual traits and instead emphasises the interaction between individual capacities, motivational readiness, and the context in which entrepreneurial action occurs (Fayolle & Gailly, 2008; Hattenberg et al., 2019; Hattenberg, 2022).

The distinction between *ability* and *willingness* is particularly relevant in this respect. Ability concerns an individual's perceived and developed capacity to engage in entrepreneurial action, whereas willingness concerns the motivation or readiness to mobilise that capacity. Entrepreneurial mindset development can consequently be understood as involving changes in both dimensions rather than progression towards a single predefined entrepreneurial ideal. This developmental interpretation is consistent with perspectives that conceptualise entrepreneurship as an unfolding and non-linear journey in which individuals learn to navigate uncertainty through action, experience, and adaptation (Sarasvathy, 2001; Dimov, 2020).

The entrepreneurial mindset archetypes developed later in this dissertation should therefore be understood as empirically recurring configurations of developmental starting points rather than fixed categories of learners.

Entrepreneurial learning. Entrepreneurial learning refers to the processes through which individuals develop their capacity to think and act entrepreneurially through experience, interaction, experimentation, and reflection. Entrepreneurial learning differs from the acquisition of entrepreneurship-related knowledge alone because entrepreneurship requires individuals to interpret ambiguous situations, make judgements under uncertainty, learn from action, and continually adjust their understanding in response to emerging circumstances (Rae, 2006; Sarasvathy, 2001).

From an educational perspective, learning therefore involves cognitive development alongside motivational, emotional, and social processes. Illeris (2003, 2018b), for example, conceptualises learning as an interaction between content, incentive, and interaction dimensions, highlighting that competence development cannot be separated from motivation, identity, emotion, and participation.

Applied to entrepreneurship education, entrepreneurial learning is consequently understood here as a developmental process through which learners progressively expand both their capacity and their confidence to engage with uncertainty and create value. Such development is neither uniform nor necessarily linear; learners enter educational settings from different starting points and may require different forms and levels of pedagogical support as they progress.

Zone of Proximal Development and scaffolding. The pedagogical mechanism through which such differentiated development is examined in this dissertation is scaffolding. Building on Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD), learning can be understood as occurring in the space between what learners are able to accomplish independently and what becomes possible through appropriate assistance.

Scaffolding describes the temporary support provided within this developmental space to enable learners to undertake tasks, reasoning processes, or forms of action that would otherwise remain beyond their current independent capability (Wood et al., 1976). Effective scaffolding is therefore inherently contingent: the nature and intensity of support should respond to the learner's present needs and be progressively withdrawn as competence and autonomy develop (Van de Pol et al., 2010).

This principle is particularly relevant to entrepreneurship education because uncertainty and open-endedness are constitutive features of entrepreneurial activity rather than problems that can simply be removed from the learning environment (Sarasvathy, 2001). The educational challenge is consequently not to eliminate uncertainty, but to calibrate support so that learners can productively engage with it. Too little support may place demands beyond the learner's current developmental reach, whereas excessive or insufficiently faded support may constrain the autonomy and judgement that entrepreneurial learning ultimately seeks to develop.

These three concepts fulfil distinct but complementary functions within the dissertation. Entrepreneurial mindset provides a conceptual lens for understanding differences in learners' developmental starting points; entrepreneurial learning describes the process through which these capacities develop; and scaffolding provides the pedagogical mechanism through which educators can support that development. The Zone of Proximal Development supplies the underlying developmental logic by directing attention to the relationship between learner readiness and the support required to enable further progression (Vygotsky, 1978; Wood et al., 1976).

Together, these perspectives position entrepreneurial mindset development as neither an exclusively individual phenomenon nor the straightforward outcome of exposure to entrepreneurial activities. Rather, development emerges through the interaction between learner characteristics, educational experiences, educator responsiveness, and context.

This theoretical relationship provides the foundation for the central argument developed throughout the dissertation: entrepreneurship education should not merely expose learners to uncertainty and experiential activity but should enable educators to adapt their support to learners' evolving ability and willingness to engage entrepreneurially.

1.5 Conceptual Orientation

This dissertation is informed by a set of complementary theoretical perspectives that together frame entrepreneurial learning as a developmental, relational, and context-sensitive process. Rather than relying on a single theory, the study brings together insights from entrepreneurship research, learning theory, and socio-cultural pedagogy to examine how learner diversity, educator responsiveness, and scaffolding interact in entrepreneurship education.

A first group of concepts concerns entrepreneurial development as a heterogeneous and non-linear process. Entrepreneurship is understood as a journey in which learners differ in their starting points, motivations, and ways of engaging with uncertainty (Dimov, 2020; Fayolle & Gailly, 2008). Closely related to this is the distinction between novice and more expert forms of entrepreneurial reasoning, particularly in relation to effectuation, where learners gradually move from structured, predictive approaches toward more adaptive ways of thinking and acting under uncertainty (Sarasvathy, 2001; Alsos et al., 2020). Within this developmental perspective, entrepreneurial mindset is approached not as a fixed trait, but as a dynamic interplay between ability and willingness (Hattenberg, 2022; Hattenberg et al., 2019). This makes it possible to understand why learners respond differently to similar educational interventions and why differentiated support may be necessary.

A second group of concepts concerns how learning is supported pedagogically. This dissertation draws on Vygotsky's concept of the Zone of Proximal Development and the related notion of scaffolding to understand how educators can provide calibrated support that matches learner needs and gradually transfers responsibility as competence develops (Vygotsky, 1978; Wood et al., 1976). In addition, the study draws on the idea of personal-professional knowledge to account for the fact that educator behavior is shaped not only by formal teaching strategies, but also by beliefs, experience, judgment, and situational interpretation (Illeris, 2018b; Fayolle, 2018b). Together, these concepts support the view that pedagogy in entrepreneurship education is not a matter of applying a universal method, but of adapting support in response to learner profiles and contextual demands.

A third group of concepts concerns learning as interaction and knowledge transformation. Illeris' understanding of learning as an interplay between cognitive, emotional, and social dimensions provides a lens for examining entrepreneurial learning as more than content acquisition alone (Illeris, 2003, 2018b). Complementing this, Nonaka and Takeuchi's SECI model highlights how tacit and explicit knowledge are transformed through cycles of socialization, articulation, combination, and internalization (Nonaka & Takeuchi, 1995). These perspectives are important because entrepreneurship education depends not only on what learners know, but also on how they make sense of experience, interact with others, and turn emerging insight into action.

Taken together, these conceptual perspectives support a shift from curriculum-driven to learner-responsive forms of entrepreneurship education. Rather than assuming that all learners should adapt to a predefined pedagogical structure, this dissertation explores how educational designs can be adjusted to accommodate different developmental pathways and learner profiles.

This orientation aligns with inclusive pedagogy (Florian & Black-Hawkins, 2011) and design-based research in education (McKenney & Reeves, 2012), both of which emphasize responsiveness, iteration, and alignment with learner needs. In this sense, the study contributes to a broader movement toward more human-centered, relational, and developmentally attuned approaches to entrepreneurship education.

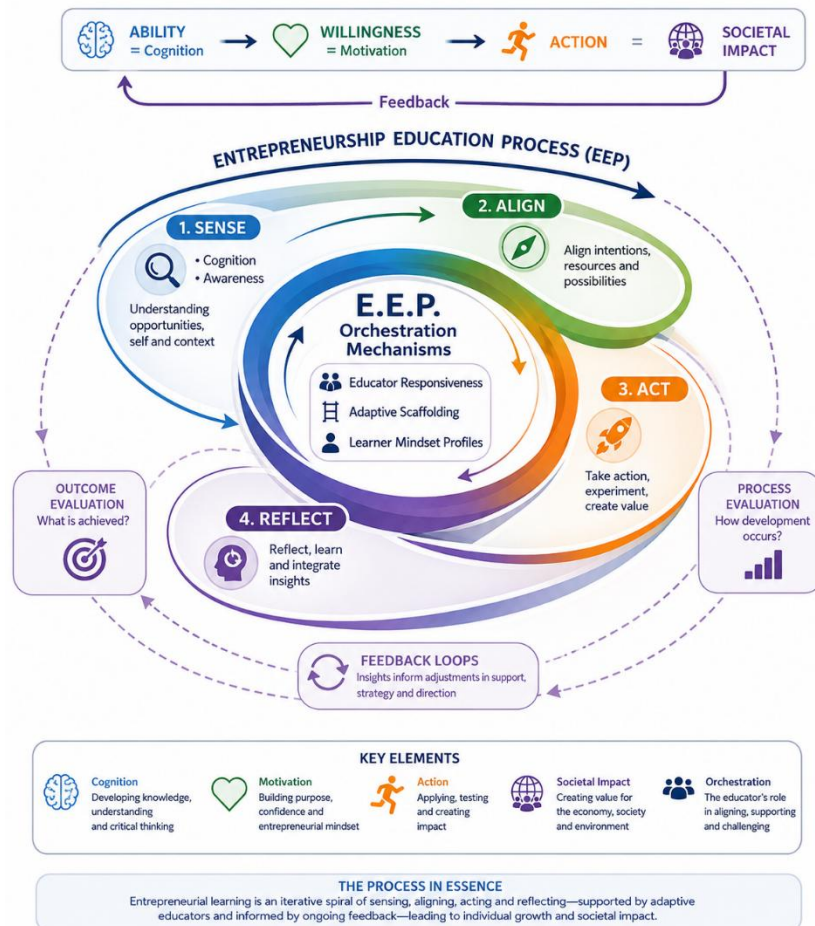


Figure 1: The Entrepreneurship Education Program as a spiral model for development under uncertainty

The above figure provides a conceptual representation of the Entrepreneurship Education Process (EEP) as it is explored in this dissertation. It visualizes entrepreneurial learning as an iterative and developmental process in which cognition, motivation, action, and reflection interact over time.

The spiral structure reflects how individuals and teams develop through repeated cycles of experience, alignment, action, and reflection, rather than through a linear sequence of steps. Within this process, the Zone of Proximal Development (ZPD) is conceptualized as a field of uncertainty that stimulates learning and progression.

The model integrates key elements discussed in this chapter, including entrepreneurial mindset development, adaptive scaffolding, and the role of feedback and evaluation. A distinction is made between outcome evaluation (what is achieved) and process evaluation (how development occurs), both of which contribute to ongoing feedback loops.

This figure serves as a conceptual orientation for the dissertation. It does not represent a finalized framework, but rather an integrative lens that guides the analysis of how entrepreneurial learning unfolds in educational contexts. The model is further elaborated and empirically grounded in the chapters that follow.

1.6 Research Design

To investigate this problem, the dissertation adopts a multi-method research design that combines conceptual, qualitative, quantitative, and experimental approaches. This design was chosen because the pedagogical black box of entrepreneurship education cannot be opened through a single method alone. Conceptual analysis is needed to clarify the field's theoretical tensions; qualitative inquiry is needed to understand educator practice in context; quantitative analysis is needed to identify systematic learner differences; and experimental and reflective methods are needed to examine how different forms of support influence development across learner profiles.

The research design therefore follows the logic of the central question itself: if entrepreneurship education is to be understood as adaptive, developmental, and relational, then the research must also be capable of capturing these multiple dimensions.

Chapter	Question	Method	Rationale
2	What pedagogical and didactic approaches are currently used in entrepreneurship education, and how are they theorized?	Narrative literature review with thematic synthesis	A narrative literature review with thematic synthesis is used to systematically map pedagogical approaches, identify dominant theoretical frameworks, and surface tensions and gaps in the literature. This enables a structured understanding of how entrepreneurship education is conceptualized and provides the foundation for subsequent empirical inquiry.
3	How do entrepreneurship educators design, deliver, and adapt their teaching practices?	Qualitative multiple-case study using semi-structured interviews and classroom observations, analysed through thematic coding	A qualitative case-based approach allows for an in-depth exploration of educator practice. Thematic coding of interviews and observations enables the identification of recurring patterns in how educators adapt their teaching in response to learner needs and contextual factors.
4	What distinct entrepreneurial mindset archetypes exist among students?	Quantitative survey research with cluster analysis	Survey data is used to measure dimensions of entrepreneurial mindset, after which cluster analysis identifies recurring learner archetypes. This method enables the systematic modelling of learner heterogeneity based on empirical patterns rather than assumptions.
5	Which scaffolding strategies are effective for supporting the development of different mindset archetypes?	Experimental design combined with mixed-method analysis (quantitative comparison and qualitative reflection analysis)	Experimental design allows for the comparison of scaffolding strategies across different learner profiles. Quantitative analysis assesses differences in engagement and outcomes, while qualitative reflection data provides insight into how learners experience and internalize support mechanisms.
Conclusion	How can entrepreneurship education be tailored to diverse learner profiles through adaptive scaffolding and educator responsiveness?	Integrative framework synthesis	Framework synthesis integrates findings across chapters into the Adaptive Entrepreneurial Development Framework (AEDF). This method connects conceptual insights and empirical results into a coherent model that informs both theory and practice.

Table 2. Overview of Research Design

This combination of methods allows the dissertation to move from conceptual clarification to empirical exploration, to practical synthesis. Rather than treating theory and practice as separate domains, the research design is intended to connect them in a coherent inquiry into how entrepreneurship education can be made more adaptive and developmentally grounded.

1.7 Structure of the Dissertation

This dissertation employs a multi-method research design to unravel the complex and multidimensional pathways through which entrepreneurial mindsets develop in educational settings. The study is structured as an integrated inquiry, combining literature review, qualitative fieldwork, quantitative analysis, and experimental interventions to address the research questions across the dissertation's chapters (see table 2 for an outline of methods and rationale).

Chapter 2 begins with a comprehensive literature review to map the landscape of pedagogical and didactic approaches within entrepreneurship education. Rather than limiting the analysis to a single dominant framework, this chapter systematically examines a broad array of models, surfacing both convergences and theoretical tensions (Fayolle & Gailly, 2008; Fayolle et al., 2006). This approach is necessary because the field is characterized by diverse and sometimes conflicting perspectives, and a purely document-based or single-theory review would fail to capture this complexity (Nabi et al., 2017).

Chapter 3 transitions from theory to practice, exploring how entrepreneurship educators design, deliver, and adapt their teaching. Here, a mixed-method approach—combining in-depth interviews with classroom observations—was chosen to capture both the explicit strategies and the tacit, adaptive behaviors of educators (Hattenberg, 2022; Polman, 2000). This dual approach provides a nuanced understanding that purely quantitative or survey-based methods would not reveal, especially considering the contextual and relational nature of classroom dynamics (Pittaway & Cope, 2007).

Chapter 4 shifts the focus to learners, using quantitative survey methods and cluster analysis to identify distinct entrepreneurial mindset archetypes among students. This approach allows for the systematic identification of recurring profiles based on measurable dimensions such as risk tolerance, creativity, and resilience (Hattenberg, Groen, & Belousova, 2019; Fayolle et al., 2017). The rationale for this method lies in the need to move beyond anecdotal or one-size-fits-all models, enabling a more differentiated and evidence-based understanding of learner diversity (Nabi et al., 2017).

Chapter 5 employs experimental and diary-based methods to test the effectiveness of various scaffolding strategies in supporting the development of different mindset archetypes. Classroom experiments and comparative observations allow scaffolding responses to be examined under structured but authentic educational conditions, while reflective diaries provide longitudinal, qualitative insights into how learners internalize and respond to these supports over time (Wood, Bruner, & Ross, 1976; Vygotsky, 1978). This combination is essential for capturing both the immediate and sustained impacts of educational interventions (Polman, 2000).

Chapter 6 synthesizes the empirical findings into the Adaptive Entrepreneurial Development Framework (AEDF), integrating insights from all previous chapters. This synthesis is not merely a summary but a structured framework that connects learner profiling, scaffolding strategies, and educator responsiveness (Illeris, 2018b; McKenney & Reeves, 2012). The AEDF is validated through iterative feedback and aims to bridge the gap between theory and practice, offering actionable guidance for educators and policymakers (Fayolle, 2018b).

Throughout the dissertation, methodological choices are guided by a commitment to theory-practice integration, adaptivity, mixed-method rigor, and actionable outcomes (Bell & Bell, 2020; Fayolle, 2018). Each chapter builds upon the previous, creating a coherent narrative that advances the field of entrepreneurship education toward more inclusive, responsive, and evidence-based practice.

Co-authorship and Author Contributions

Chapters 2–5 were developed as co-authored manuscripts with Aard Groen and retain their article-based structure within this dissertation. Together, these studies form a connected sequence addressing the conceptual foundations of entrepreneurship education, educator practice, learner diversity, and adaptive scaffolding. Chapter 1 provides the overarching theoretical and methodological framing for these studies, while Chapter 6 integrates their findings and develops their combined theoretical and practical implications.

Across Chapters 2–5, I had primary responsibility for the conceptualisation of the research, research design, data collection, data analysis, interpretation of the findings, and preparation of the original manuscript drafts. Aard Groen contributed to the conceptual and methodological refinement of the studies, the interpretation of findings, and the critical review and revision of the manuscripts. Both authors contributed to the final refinement of the chapters and approved the versions included in this dissertation.

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2

**Exploring the gap between theory
and practice**

Rethinking Entrepreneurship Education: Bridging outcome-centric pedagogies and process-oriented learning

Authors: Loef, J., Groen, A.J.

Abstract

Entrepreneurship education (EE) has become a prominent element of higher education worldwide, valued for its potential to foster innovation, value creation, and entrepreneurial mindsets. While substantial progress has been made in clarifying the objectives (“why”) and curricular content (“what”) of EE, persistent challenges remain in the pedagogical and didactic approaches (“how”) through which these goals are pursued. A dominant share of EE practice and evaluation continues to privilege outcome-based deliverables—such as business plans, venture creation, and short-term intention measures—often requiring students to conform to standardized models and assessment regimes. This outcome-centric bias risks neglecting the developmental, iterative, and heterogeneous nature of entrepreneurial learning.

This chapter presents a narrative literature review that maps how entrepreneurship education has been theorized and enacted across the why/what/how dimensions (Fayolle & Gailly, 2008), and examines the theory–practice gap through eight established conceptual lenses drawn from entrepreneurship theory, learning sciences, and socio-cultural perspectives (Illeris, 2018b; Fayolle, 2018b). These lenses illuminate how entrepreneurial learning unfolds across diverse learners, why pedagogy often misaligns with entrepreneurial realities, and which tensions in the literature motivate a turn toward process-oriented, learner-responsive approaches. The chapter concludes by articulating propositions and hypotheses that emerge from the reviewed tensions, forming a grounded agenda for subsequent empirical chapters.

Keywords: entrepreneurship education; pedagogy; scaffolding; process-oriented learning; learner diversity; evaluation.

2.1 Introduction

Entrepreneurship education (EE) is widely recognized as an important element of contemporary higher education, associated with innovation, economic development, and the cultivation of mindsets that enable individuals to navigate uncertainty and create value across contexts (Kuratko, 2005; Neck & Greene, 2011). In the past decades, scholarship has advanced considerably in clarifying why EE matters—linking it to competencies such as opportunity recognition, resilience, and creative problem-solving—and in expanding what is taught, ranging from business model design to responsible innovation and sustainability (Fayolle & Gailly, 2008; Gibb, 2002; Lackéus, 2016).

Yet despite this progress, the pedagogical “how” remains contested. The literature documents a recurring tension between the dynamic, iterative character of entrepreneurship in practice and the relatively static, deliverable-driven structures often used in formal education (Neck & Corbett, 2018). Many EE programs continue to rely on outcome-based templates and assessments—business plans, pitch decks, venture formation, or intention measures—that enable comparability and accountability but may inadvertently reduce entrepreneurship to linear performance (Honig, 2004; Rideout & Gray, 2013; Walter & Block, 2016).

This tension is sharpened by two realities. First, entrepreneurial learning is inherently developmental: novices and more experienced learners differ fundamentally in how they interpret uncertainty, mobilize resources, and learn from feedback (Sarasvathy, 2001; Dimov, 2020). Second, learners entering EE are heterogeneous in motivations, prior knowledge, identity formation, and aspirations—including pathways toward entrepreneurship, intrapreneurship,

social entrepreneurship, and entrepreneurial citizenship (Nabi et al., 2017; Neck & Corbett, 2018). When pedagogy is standardized around narrow deliverables, it risks mismatching the learner and the learning task, reinforcing a gap between what is taught and what entrepreneurship requires in practice.

This chapter addresses that gap by reviewing entrepreneurship education through the why/what/how organizing framework (Fayolle & Gailly, 2008), while interpreting the literature through eight conceptual lenses that foreground developmental progression, learner diversity, educator variability, and the transformation of knowledge into practice (Illeris, 2018b; Fayolle, 2018b). The goal is not to synthesize a new framework in this chapter, but to map the field, surface theoretical tensions, and establish the grounds from which propositions and hypotheses logically follow.

2.2 Methodology: Narrative Literature Review

This chapter employs a narrative literature review to examine how entrepreneurship education (EE) has been theorized and enacted, with particular attention to tensions between outcome-centric and process-oriented pedagogies. This approach aligns with the overall research design of the dissertation, which combines conceptual, qualitative, quantitative, and experimental methods to investigate entrepreneurship education as a developmental, adaptive, and relational process.

A narrative review is particularly suitable for entrepreneurship education, as the field is inherently interdisciplinary and fragmented, spanning entrepreneurship, management, and educational sciences. Rather than aiming for exhaustive aggregation, the purpose of this review is to provide conceptual integration, critical interpretation, and theory development, enabling the identification of underlying tensions that inform subsequent empirical inquiry (Baumeister & Leary, 1997; Green et al., 2006; Ferrari, 2015).

The choice of a narrative rather than systematic review follows from this purpose. The objective is not to estimate the prevalence or effectiveness of a narrowly specified intervention, nor to aggregate a homogeneous body of empirical studies. Instead, the review seeks to integrate theoretical and pedagogical perspectives across disciplinary traditions to examine how entrepreneurial development and educational support have been conceptualised.

A systematic review would offer greater procedural exhaustiveness for a narrowly bounded question, whereas the present research question requires conceptual synthesis across a heterogeneous theoretical field. The narrative approach is therefore combined with a transparent search strategy, explicit inclusion and exclusion criteria, and a documented literature base to retain methodological traceability.

Search Strategy and Scope

The literature was identified through structured searches in Scopus and Web of Science, complemented by backward and forward snowballing from seminal and highly cited publications. Search terms included combinations of:

- *entrepreneurship education*
- *entrepreneurial mindset*
- *pedagogy / didactics*
- *experiential learning*
- *scaffolding*

The search focused on peer-reviewed journal articles, review studies, and influential conceptual works. The primary time frame spans 2000–2023, reflecting the period in which entrepreneurship education has developed as a distinct scholarly field, while selectively incorporating foundational earlier works (e.g., Kolb, 1984; Vygotsky, 1978; Wood et al., 1976) where theoretically relevant.

Although entrepreneurship education forms the substantive focus of the review, relevant educational and learning theories were deliberately included from adjacent research domains. Concepts such as scaffolding, the Zone of Proximal Development, experiential learning, and knowledge transformation originated outside entrepreneurship research but address mechanisms central to the pedagogical question investigated here.

Their inclusion is therefore theoretically purposive rather than an attempt to broaden the review indiscriminately. Entrepreneurship education is treated as an interdisciplinary educational field in which entrepreneurship theory helps explain entrepreneurial action and development, while educational theory helps explain how such development may be supported.

Inclusion and Exclusion Criteria

Studies were included if they:

- address entrepreneurship education in higher education contexts.
- engage explicitly with pedagogical or didactic approaches, including both outcome-oriented and process-oriented perspectives.
- contribute conceptual or empirical insights into entrepreneurial learning, mindset development, or educational design.

Studies were excluded if they:

- focus primarily on entrepreneurial ecosystems, finance, or policy without pedagogical relevance.
- conceptualize entrepreneurship education solely in terms of venture creation outcomes, without consideration of broader forms such as intrapreneurship or entrepreneurial behaviour within organizations.

In line with the conceptual orientation outlined in Chapter 1, entrepreneurial mindset is therefore treated as a context-transcending construct, encompassing both venture creation and entrepreneurial action within organizational and societal settings.

Overview of the Literature Base

The literature base is weighted toward publications from 2010 onwards, reflecting the maturation and growing diversification of entrepreneurship education research, while earlier seminal works were included where they remain theoretically foundational.

The final body of literature consists of 98 core sources (appendix A), supplemented by seminal works identified through snowballing. The selected studies include a balanced mix of:

- Empirical studies (quantitative surveys, qualitative case studies, experimental and mixed-method designs);
- Conceptual and theoretical contributions.
- Review and meta-analytic studies.

The literature is drawn primarily from journals in entrepreneurship and education, including *Academy of Management Learning & Education*, *Journal of Small Business Management*, *Entrepreneurship Education and Pedagogy*, *Education + Training*, and *Technovation*, reflecting the interdisciplinary nature of the field.

Across this body of work, different methodological traditions and epistemological perspectives are represented, allowing for a comparative analysis of how entrepreneurship education is conceptualized and operationalized.

Analytical Strategy: From Framework to Interpretation

The synthesis is structured using the established why/what/how framework (Fayolle & Gailly, 2008), which distinguishes between:

- the objectives of entrepreneurship education (“why”),
- the content domains (“what”),
- and the pedagogical approaches (“how”).

The why/what/how framework is used here as an organising structure rather than as a comprehensive pedagogical model. This choice reflects the purpose of the review: not primarily to classify different forms of entrepreneurship teaching, but to examine how the objectives, content, and pedagogical enactment of entrepreneurship education relate to the developmental and heterogeneous nature of entrepreneurial learning.

The framework therefore provides a sufficiently broad structure for mapping the field while allowing pedagogical questions to be interpreted through complementary theoretical perspectives concerned with learning, development, learner diversity, and educator responsiveness (Fayolle & Gailly, 2008; Illeris, 2018b; Fayolle, 2018b). No single theoretical perspective is consequently treated as sufficient to explain the developmental and interactional processes examined in this review.

Within this structure, the analysis is guided by eight theoretical perspectives drawn from entrepreneurship theory, learning sciences, and socio-cultural pedagogy. These perspectives function as sensitizing lenses rather than as a synthesized framework. They structure how patterns in the literature are identified and interpreted.

Section 2.3 summarizes these lenses, their theoretical grounding, and their relevance to examining the theory–practice gap in entrepreneurship education (Table 3), thereby enabling a systematic interpretation of patterns in the literature related to:

- developmental progression in entrepreneurial learning,
- learner heterogeneity,
- educator behaviour and responsiveness,
- and the transformation of knowledge into practice.

The analytical approach combines deductive and iterative elements. The overall structure is deductively informed by the why/what/how framework, while the interpretation of literature within this structure is developed through iterative comparison across studies, allowing for the identification of recurring patterns, tensions, and divergences.

Theme Identification and Synthesis

The themes presented in this chapter (reflected in the section headings that follow) emerge from an iterative synthesis process that integrates:

1. **Deductive structuring** through the why/what/how framework.
2. **Theory-informed interpretation** using the eight conceptual lenses.
3. **Cross-study comparison**, identifying converging and diverging perspectives across the literature.

This approach ensures that the themes are both theoretically grounded and empirically informed, rather than imposed a priori or derived from purely inductive coding.

In line with good practice in narrative review methodology, each theme is supported by multiple sources representing different perspectives, allowing the analysis to capture both dominant views and alternative interpretations within the field.

From Literature Tensions to Propositions and Hypotheses

The aim of this review is not only descriptive but also analytical and generative. The synthesis focuses on identifying systematic tensions within the literature, including:

- the misalignment between iterative entrepreneurial processes and outcome-based educational designs.
- the mismatch between learner heterogeneity and standardized pedagogical approaches.
- and the gap between process-oriented rhetoric and outcome-driven evaluation practices.

These tensions form the basis for the propositions articulated in Section 2.8. The subsequent hypotheses translate these conceptual relationships into empirically testable expectations, which are examined in the empirical chapters that follow.

Importantly, the review does not rely solely on confirmatory evidence. Where relevant, competing perspectives and contradictory findings are incorporated, ensuring that the resulting propositions reflect the diversity and complexity of the field rather than a single dominant narrative.

Limitations

As a narrative literature review, this approach does not aim for exhaustive coverage or statistical generalization. Instead, it prioritizes conceptual depth, theoretical integration, and explanatory insight. The selection and interpretation of literature inevitably involve researcher judgment, particularly in the identification of relevant themes and tensions.

To mitigate this limitation, the review:

- makes its analytical structure explicit.
- grounds its interpretation in established theoretical perspectives.
- and ensures transparency in selection criteria and scope.

This enables future researchers to replicate, extend, or critically evaluate the analysis presented in this chapter.

2.3 Analytical Lenses

Lens	Theoretical Foundation	Core Analytical Focus	Sensitizing Question for the Review	Relevance to the Theory–Practice Gap
1. Novice–Expert Continuum in Effectuation	Sarasvathy (2001, 2008, 2023); Dew et al. (2009); Read et al. (2009, 2016); Chandler et al. (2011); Alsos et al. (2016); Ruiz-Jiménez et al. (2021); Sundström et al. (2020); Van Gelderen (2022); Neck & Greene (2011); Kolb (1984)	Developmental progression from predictive to adaptive reasoning under uncertainty	Do pedagogical designs support progression from structured reliance toward adaptive entrepreneurial agency?	Highlights whether EE aligns with developmental differences in reasoning and uncertainty navigation.
2. Entrepreneurial Journey and Individual Differences	McMullen & Dimov (2013); Dimov & Pistrui (2022); Rae (2006); Politis (2005); Politis et al. (2022); Fayolle & Gailly (2015); Gibb (2002); Lackéus (2015); Lackéus & Williams Middleton (2015); Hägg (2021); Aadland et al. (2024); Mei & Symaco (2022)	Non-linear, iterative, identity-shaping entrepreneurial trajectories	Does the curriculum reflect the iterative and individualized nature of entrepreneurial development?	Reveals mismatches between standardized curricula and diverse entrepreneurial pathways.
3. Entrepreneurial Mindset — Ability–Willingness Nexus	Ajzen (1991); Bandura (1997); Chen et al. (1998); Krueger et al. (2000); Shepherd et al. (2000); Haynie et al. (2010); Fayolle et al. (2014); Liñán & Fayolle (2015); Cardon & Kirk (2015); Bacigalupo et al. (2016); Mawson et al. (2022); Shi et al. (2023)	Interplay between cognitive competence and motivational readiness	Does pedagogy address both competence development and volitional engagement?	Exposes imbalance when programs prioritize skills over identity, motivation, self-efficacy, passion, and agency.
4. Zone of Proximal Development and Scaffolding	Vygotsky (1978); Wood et al. (1976); Van de Pol et al. (2010, 2015, 2019); Hmelo-Silver et al. (2007); Belland et al. (2013, 2017); Doo et al. (2020); Margolis (2020); Martin et al. (2019); Hermkes et al. (2022); Oliver & Oliver (2022)	Calibrated instructional support enabling developmental progression	Is support adjusted to learner readiness, and gradually withdrawn as autonomy increases?	Illuminates alignment or misalignment between learner capability, task demand, support intensity, and transfer of responsibility.
5. Personal–Professional Knowledge of Educators	Ruskovaara & Pihkala (2013, 2015); Ruskovaara et al. (2016); Berger & Lê Van (2019); Ilonen (2021); Raappana et al. (2021); Oksanen et al. (2022); Peura & Hytti (2023); Wraae et al. (2023, 2025); Clayback et al. (2023); Joensuu-Salo et al. (2024)	Influence of educator beliefs, identity, risk tolerance, experience, and institutional norms	How do teacher dispositions and institutional constraints shape pedagogical enactment?	Explains why process-oriented pedagogy may be rhetorically endorsed yet unevenly implemented in practice.
6. Learning as a Triadic Process (Illeris)	Illeris (2003, 2007, 2014, 2016, 2018b); Mezirow (2000); Jarvis (2006); Bell & Bell (2020); Lackéus (2020); Eschenbacher & Fleming (2020); Politis et al. (2021)	Interaction among cognitive/content, incentive/motivational, and interaction/social dimensions	Do EE designs balance knowledge acquisition with motivation, emotion, identity, and social participation?	Reveals dominance of cognitive/output focus over motivational, emotional, and relational learning processes.
7. SECI Knowledge Conversion Model	Nonaka (1994); Nonaka & Takeuchi (1995); Nonaka et al. (2006); Nonaka & von Krogh (2009); Tynjälä (2008); Tynjälä et al. (2016); Brix (2017); Farnese et al. (2019); Jing (2022); Wuytens et al. (2022); Hu et al. (2023); Kim & Wang (2023)	Cycles between tacit and explicit knowledge: socialization, externalization, combination, internalization	Do learning activities enable conversion of explicit concepts into tacit entrepreneurial practice?	Identifies whether EE fosters embodied entrepreneurial competence or merely conceptual reproduction.
8. Learner-Following Educational Design	Florian & Black-Hawkins (2011); Florian (2015); Tomlinson (2001); McKenney & Reeves (2018); Smale-Jacobse et al. (2019); Fornauf & Erickson (2020); Moriña (2021); Nind & Lewthwaite (2018); Rodrigues (2023); Timuš et al. (2023); du Plooy et al. (2024); Kim (2025)	Educational designs that adapt to learner diversity rather than enforce uniform pathways	Is rigor structured as developmental progression rather than standardized compliance?	Frames the core pedagogical tension between standardization and learner responsiveness.

Table 3: Analytical Lenses Guiding the Narrative Literature Review

The eight lenses are not intended as separate theoretical silos, but as complementary layers for examining the theory–practice gap in entrepreneurship education. The first two lenses position entrepreneurial learning as developmental and non-linear, moving from novice reasoning toward more adaptive forms of entrepreneurial judgment (Sarasvathy, 2001, 2008; Dew et al., 2009; McMullen & Dimov, 2013; Dimov & Pistrui, 2022).

The third lens focuses on the psychological conditions of entrepreneurial agency, particularly the relationship between perceived ability, self-efficacy, motivation, passion, and willingness to act (Ajzen, 1991; Bandura, 1997; Chen et al., 1998; Cardon & Kirk, 2015; Mawson et al., 2022).

The fourth and fifth lenses examine how learning is supported and enacted pedagogically, through adaptive scaffolding and educator personal–professional knowledge (Wood et al., 1976; Van de Pol et al., 2010; Ruskovaara & Pihkala, 2013; Wraae et al., 2023).

The final three lenses broaden the analysis toward learning as a cognitive, emotional, social, and knowledge-conversion process, and toward educational designs that respond to learner diversity rather than standardize pathways (Illeris, 2003, 2018b; Nonaka & Takeuchi, 1995; Florian & Black-Hawkins, 2011; McKenney & Reeves, 2018).

The inclusion of the SECI model requires some qualification because it was originally developed to explain organisational knowledge creation rather than individual learning or entrepreneurship education (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009). Its use in this review is therefore heuristic rather than a direct transfer of organisational learning theory to the classroom. The relevance of SECI lies in its conceptualisation of knowledge as dynamically transformed between tacit and explicit forms through socialisation, externalisation, combination, and internalisation.

This provides a useful lens for examining a central challenge in entrepreneurship education: how learners move beyond the reproduction of explicit concepts and frameworks towards situated entrepreneurial judgement and action. This interpretation is supported by subsequent applications of knowledge-conversion perspectives in professional and higher-education learning contexts (Tynjälä, 2008; Tynjälä et al., 2016), as well as more recent studies demonstrating the applicability of SECI-based processes in collaborative, higher-education, and entrepreneurial knowledge settings (Farnese et al., 2019; Jing, 2022; Wuytens et al., 2022; Hu et al., 2023; Kim & Wang, 2023).

SECI is consequently used here as a complementary analytical lens for examining how experiential and tacit entrepreneurial knowledge may be articulated, shared, recombined, and internalised through educational interaction, rather than as a comprehensive theory of entrepreneurial learning.

2.4 The “why” of entrepreneurship education: aims and tensions

Entrepreneurship education is commonly justified based on its contributions to economic growth, innovation capacity, and societal value creation (Kuratko, 2005; Gibb, 2002). However, even within broad agreement on these aims, the literature reveals tensions in how goals are operationalized, measured, and translated into pedagogy.

Economic growth and job creation

Entrepreneurship contributes to innovation, productivity, and employment at system level (Audretsch & Keilbach, 2004; Van Praag & Versloot, 2007). EE is rarely a direct generator of jobs; rather, it develops capacities that may increase the likelihood that graduates contribute to entrepreneurial activity as founders or intrapreneurs (Neck & Greene, 2011). This distinction matters pedagogically: if system-level outcomes are treated as immediate educational deliverables, programs may overemphasize venture creation outputs and underemphasize developmental learning processes that precede such outcomes. Through the novice–expert lens, this suggests that early-stage learners may need support oriented toward capability development rather than venture performance.

Innovation and adaptability

EE is often positioned as a vehicle for cultivating innovation and adaptability in uncertain environments. Approaches such as design thinking and lean startup emphasize iterative experimentation and learning from customer feedback (Ries, 2011; Glen et al., 2014). Empirical research on expert–novice differences in entrepreneurial decision-making further shows that adaptive, means-driven reasoning is a hallmark of entrepreneurial expertise, with novices defaulting to predictive logic (Dew et al., 2009; Chandler et al., 2011; Read et al., 2009).

Yet the literature notes a mismatch when innovation is taught through static, linear assignments. From the entrepreneurial journey lens, innovation is better understood as an iterative pathway marked by revision and uncertainty rather than compliance with pre-defined templates (Honig, 2004). This suggests that effectual reasoning should not be treated merely as conceptual content, but as a form of learnable entrepreneurial expertise that can be cultivated through repeated practice, simulation, reflection, and exposure to uncertainty (Sarasvathy, 2008, 2023; Sundström et al., 2020; Van Gelderen, 2022).

Cultivating entrepreneurial mindsets

Mindset development is increasingly recognized as central to EE, reflecting the view that entrepreneurship extends beyond starting firms and includes acting entrepreneurially in varied domains (Neck & Corbett, 2018). However, many EE designs implicitly assume homogeneous learner readiness and motivation. The mindset lens suggests that cultivating entrepreneurial action requires attention to both ability and willingness—meaning that a single pedagogical approach may not equally support learners with different motivational profiles or developmental stages.

However, empirical studies show mixed results regarding how effectively EE influences mindset development, particularly when measured through intention-based proxies (Fayolle & Gailly, 2008; Nabi et al., 2017; Liñán & Fayolle, 2015). A metacognitive perspective further suggests that effective mindset development requires cultivating situated, adaptive awareness — not only domain knowledge — pointing to the importance of both cognitive and motivational dimensions (Haynie et al., 2010). This suggests that entrepreneurship education may influence entrepreneurial mindset in more complex ways than intention-based measures alone can capture, particularly when broader forms of entrepreneurial action are considered (Neck & Corbett, 2018; Fayolle & Gailly, 2008; Nabi et al., 2017).

Value creation beyond ventures

EE has expanded toward sustainability, social entrepreneurship, and ethical value creation (Tracey & Phillips, 2007; Mars & Rios-Aguilar, 2010). These broadened aims further increase learner heterogeneity: not all students aspire to venture creation, and many pursue entrepreneurial agency within communities, organizations, or policy contexts.

This strengthens the case for learner-following design rather than venture-normative pedagogy. It also reflects a broader orientation toward value creation in competence-based frameworks that emphasize societal and ethical impact alongside economic outcomes (Bacigalupo et al., 2016; Lackéus, 2016). Recent work on venture creation programmes, extracurricular start-up learning, and entrepreneurial identity construction further shows that students follow different aspirational pathways, including start-up, intrapreneurial, social, and broader enterprising trajectories (Lackéus & Williams Middleton, 2015; Politis et al., 2022; Mei & Symaco, 2022; Aadland et al., 2024).

The process gap in EE's objectives

Across these aims, a persistent gap emerges: EE often claims to develop adaptive capabilities yet is operationalized through outcome-based measures that privilege short-term deliverables (Rideout & Gray, 2013; Walter & Block, 2016). Framed through Illeris' triadic learning lens, this gap reflects an imbalance in which cognitive content and measurable output dominate, while motivational and interactional dimensions—crucial for developing willingness and identity—receive less systematic attention.

2.5 The “what” of entrepreneurship education: content domains and learning implications

The “what” of EE has diversified significantly, moving beyond business planning toward multidisciplinary content that includes opportunity evaluation, team dynamics, innovation processes, finance, strategy, and responsible value creation (Lackéus, 2016). However, content selection alone does not guarantee entrepreneurial learning; it must be taught in ways that enable learners to translate explicit concepts into tacit, actionable competence.

Mindset and psychology of entrepreneurship

A central content domain concerns self-efficacy, intention formation, resilience, and identity development (Ajzen, 1991; Bandura, 1997; Rae, 2006; Krueger et al., 2000). Entrepreneurial passion — as a mediator between self-efficacy and persistence — is increasingly recognised as a motivational construct relevant to EE design (Cardon & Kirk, 2015).

Recent work frames entrepreneurial mindset as a learnable configuration of cognitive and affective capacities rather than a fixed trait (Mawson et al., 2022). This literature supports a developmental view: students form entrepreneurial identities through iterative experiences, feedback, and reflection rather than through mastery of static knowledge. The novice–expert lens suggests that early learners may rely on external validation and structured tasks, requiring careful scaffolding to build confidence and agency.

This also aligns with competence-based approaches such as EntreComp, where entrepreneurial development includes not only opportunity recognition and action, but also self-awareness, motivation, perseverance, and resource mobilization (Bacigalupo et al., 2016). Recent large-scale evidence further suggests that EE influences entrepreneurial intention through mindset development, but that this relationship is moderated by motivational quality and prior exposure (Shi et al., 2023).

Teams, roles, and collaboration

Entrepreneurial work is frequently collective, making team processes a key content area: formation, complementarity, conflict management, decision rights, and role clarity (Kamm et al., 1990; Ensley et al., 2006). Through Illeris' interaction dimension, team learning is not peripheral but central to how entrepreneurial competencies develop in social contexts. This aligns with broader learning theory, which emphasizes interaction and collaboration as core mechanisms through which competencies develop in social contexts (Illeris, 2003).

Strategy and market analysis

Frameworks such as Five Forces and PESTEL provide analytic structure for understanding competition and context (Porter, 1980; Aguilar, 1967). In EE, the challenge is to teach these tools not as checklists but as supports for iterative decision-making. Within entrepreneurship education, these analytic tools are most valuable when embedded in opportunity-driven and iterative learning processes, rather than taught as static frameworks to be completed for assessment purposes (Neck & Greene, 2011). The SECI lens frames this as a conversion problem: explicit strategic knowledge must be internalized through application and reflection, not merely reproduced in assignments.

Business models, opportunity evaluation, and experimentation

Tools like the Business Model Canvas are widely used to structure entrepreneurial reasoning (Osterwalder & Pigneur, 2010). Critics caution that over-reliance on templates can lead to performative compliance rather than learning (Honig, 2004). This concern is echoed in entrepreneurship education research emphasizing that tools are most effective when used as vehicles for reflection and iteration, rather than as ends in themselves (Neck & Corbett, 2018). Effectuation and lean startup offer alternatives that foreground experimentation and adaptation (Sarasvathy, 2001; Ries, 2011). From the entrepreneurial journey lens, these tools align more closely with non-linear learning processes.

Finance, resources, innovation, and internationalisation

EE curricula increasingly include resource orchestration and financing processes (Drover et al., 2017), innovation dynamics and IP strategy (Tushman & Anderson, 1986; Teece, 1986), and internationalisation pathways (Johanson & Vahlne, 1977). These domains further highlight learner diversity: different ventures, contexts, and aspirations require differentiated engagement. This supports a learner-following orientation, where pathways through content are tailored rather than uniform.

Value creation and responsible entrepreneurship

Responsible value creation, ethics, and sustainability have gained prominence, aligning EE with broader societal challenges and frameworks such as EntreComp (Bacigalupo et al., 2016) and competence models in sustainable entrepreneurship (Ploum et al., 2018; Diepolder et al., 2021). These content expansions reinforce the need to evaluate learning beyond venture creation outputs—since many intended outcomes are developmental, relational, and long-term. At the same time, scholars caution that integrating social and ethical objectives into EE introduces additional complexity, requiring pedagogies that go beyond traditional venture-centric models (Tracey & Phillips, 2007; Mars & Rios-Aguilar, 2010).

2.6 The “how” of entrepreneurship education: pedagogies, didactics, and misalignment

While agreement on the “why” and broadening of the “what” have progressed, the “how” remains the most contested dimension of EE. Pedagogies range from lecture-based instruction to experiential projects and self-directed venture creation. Yet across this diversity, the literature identifies a recurring bias: many approaches remain structured around measurable deliverables and standardized assessment regimes.

Traditional pedagogies and their limits

Lecture-based learning efficiently transmits concepts but is often criticized for passivity and limited engagement with uncertainty (Neck & Greene, 2011). More broadly, review studies suggest that teacher-centered approaches may be effective for transmitting concepts but are less suited to developing the adaptive and practice-based competencies associated with entrepreneurial learning (Nabi et al., 2017).

Case studies and business plan competitions foster analysis and presentation skills but may reinforce linear conceptions of entrepreneurship and prioritize polished outputs over experimentation (Honig, 2004). Through the novice–expert lens, such pedagogies may support early structure but risk limiting developmental progression if they become the dominant mode.

Experiential and action-based approaches

Action-based learning immerses students in real or realistic entrepreneurial activity and can foster resilience, adaptability, and confidence (Rasmussen & Sørheim, 2006). Design thinking supports creativity through iterative cycles of empathy, ideation, prototyping, and testing (Glen et al., 2014). Simulations offer low-risk environments for decision practice but may lack the stakes and identity consequences of real entrepreneurial engagement (Neck & Greene, 2011).

At the same time, scholars caution that experiential pedagogies do not automatically produce deep learning; their effectiveness depends on the quality of reflection, feedback, and instructional design that accompanies the experience (Pittaway & Cope, 2007; Neck & Corbett, 2018; Bell & Bell, 2020). A large-scale comparative study confirms that emotional engagement and learning event intensity — rather than format alone — are the primary drivers of outcomes in experiential EE (Lackéus, 2020). From the SECI lens, these pedagogies are powerful because they enable movement between tacit experience and explicit conceptualization—provided reflection and articulation are actively designed rather than assumed.

Taxonomies of EE pedagogy and the question of fit

Taxonomies such as “about/for/in/through” entrepreneurship (Neck & Greene, 2011) and Aadland & Aaboen’s (2020) six-class model map EE pedagogies along dimensions of authenticity and learner agency. Such models help describe variation in instructional forms but also foreground a key issue: effectiveness depends on the alignment between pedagogical demands and learner readiness.

Through the ZPD lens, pedagogy must be calibrated to what learners can accomplish independently versus with guidance. High-authenticity, high-agency tasks may support advanced learners but overwhelm novices without scaffolding (Dew et al., 2009; Hmelo-Silver et al., 2007). Meta-analytic evidence confirms that scaffolding effects in problem-based contexts are contingent on learner readiness: tasks without calibrated support produce disengagement rather than development (Belland et al., 2017).

Conversely, overly teacher-directed tasks may constrain learners who are ready for autonomy. This alignment problem becomes central when EE classrooms contain heterogeneous learners following different entrepreneurial journeys.

Scaffolding and learner-responsive didactics

Scaffolding offers a process-oriented instructional strategy that adapts support to learner development (Wood et al., 1976). In EE, scaffolding can include structured reflection prompts, staged experimentation tasks, iterative feedback loops, role rotation in teams, and gradually increasing ambiguity. The pedagogical challenge is to design for progression: moving learners from structured activity toward independent entrepreneurial judgment under uncertainty.

Illeris’ model reinforces that scaffolding must address not only cognitive content but also incentive (motivation, emotion) and interaction (social participation). This is particularly relevant when learners experience failure, uncertainty, or identity tension—common features of entrepreneurial learning. Empirical research on scaffolding further emphasizes the importance

of adaptive support that is contingent on learner needs and gradually withdrawn as competence develops (Van de Pol et al., 2010; 2015; 2019).

A design framework distinguishes conceptual, metacognitive, procedural, and strategic scaffolding functions (Belland et al., 2013). Meta-analytic findings confirm positive effects of adaptive scaffolding across higher education contexts (Doo et al., 2020), and research on fading shows that gradual — rather than abrupt — withdrawal of support preserves learning gains and promotes transfer (Martin et al., 2019).

Educator variability and implementation gaps

Even when pedagogical designs are well-articulated, enactment depends on educators. The personal–professional knowledge lens highlights how teacher beliefs, risk tolerance, and institutional constraints shape implementation (Illeris, 2018b; Florian & Black-Hawkins, 2011).

In practice, teachers may value learner-centered approaches but feel compelled to maintain standardization due to assessment requirements or program accountability. This helps explain why the theory–practice gap persists: process-oriented pedagogy may be endorsed rhetorically but enacted unevenly. Empirical studies of entrepreneurship educators further demonstrate that classroom practices vary significantly depending on teacher beliefs and institutional contexts (Ruskovaara & Pihkala, 2013; Raappana et al., 2021).

A configurational analysis identifies distinct educator profiles clustering around risk orientation, experience, and institutional affiliation (Wraae et al., 2023). Research on educator identity further shows that the learning environments educators create reflect the interplay between professional self-conception and practical student knowledge (Ilonen, 2021; Berger & Lê Van, 2019).

More recent studies show that entrepreneurship educators differ in how they adopt, interpret, and sustain EE practices over time, with teacher identity, prior training, institutional support, and professional sensemaking shaping whether pedagogies become genuinely student-centred or remain selectively implemented (Oksanen et al., 2022; Peura & Hytti, 2023; Joensuu-Salo et al., 2024; Wraae et al., 2025).

Toward a learner-following orientation in EE

The literature increasingly suggests that entrepreneurship education is most defensible when it follows the learner’s development rather than enforcing a single pathway. Learner-following does not imply lack of rigor; rather, it implies designing rigor as developmental progression, where authenticity and autonomy increase as learners build competence and confidence. This orientation is further supported by research showing that entrepreneurship learners vary substantially in motivation, confidence, and prior experience, making differentiated pathways more appropriate than uniform pedagogical designs (Fayolle & Gailly, 2008; Nabi et al., 2017).

This aligns with inclusive pedagogy and design-based research (Florian & Black-Hawkins, 2011; Florian, 2015; McKenney & Reeves, 2012) and provides a principled response to learner diversity documented across the EE field. Differentiated instruction frameworks offer concrete design principles for varying content, process, and product by learner readiness (Tomlinson, 2001; Smale-Jacobse et al., 2019). Systematic reviews of inclusive pedagogical approaches confirm that adapting instruction to individual differences is associated with improved engagement and outcomes (Moriña, 2021).

2.7 Evaluating entrepreneurship education: from outputs to developmental evidence

Evaluation practices shape pedagogy by signaling what counts as success. Much of the EE evaluation literature relies on outcome-centric indicators such as entrepreneurial intentions, venture creation rates, and short-term skill acquisition (Liñán & Chen, 2009; Walter & Block, 2016). Yet these measures often struggle to capture entrepreneurial development as a process.

Dominant metrics and their limitations

These dominant evaluation approaches are widely discussed in the literature, yet they differ in the extent to which they capture short-term outputs versus longer-term developmental processes (Rideout & Gray, 2013; Martin et al., 2013; Nabi et al., 2017).

- **Entrepreneurial intentions** are widely used but do not reliably translate into entrepreneurial action (Rideout & Gray, 2013).
- **Venture creation** aligns with venture-centric aims but excludes intrapreneurship, social value creation, and longer-term trajectories.
- **Skill and knowledge tests** capture short-term content acquisition but neglect uncertainty navigation and identity formation.
- **Economic impact metrics** require long-term data and are difficult to attribute directly to EE (Martin et al., 2013).

Process-oriented evaluation as a response

A developmental perspective implies evaluation should capture learning trajectories: reflection quality, experimentation logic, adaptation under uncertainty, collaboration patterns, and identity progression (Neck & Corbett, 2018b). Illeris' model suggests evaluation should include evidence across cognitive, motivational, and interaction dimensions.

The mindset lens further implies that assessment should capture changes in both ability and willingness, not only performance outputs. From a learning theory perspective, process-oriented evaluation aligns with models that conceptualize learning as an integration of cognitive, emotional, and social dimensions (Illeris, 2003, 2018b), as well as with perspectives that emphasize the transformation of knowledge through experience and application (Tynjälä, 2008).

Through the SECI lens, evaluation must attend to whether learners are internalizing knowledge—turning explicit concepts into tacit entrepreneurial practice—rather than merely reproducing them. From this perspective, assessment should examine whether learners are able to move between explicit frameworks and tacit entrepreneurial judgment.

Recent SECI-based studies show that knowledge conversion processes can be operationalized and measured in organizational, online, collaborative, and higher education settings, including entrepreneurial orientation and tacit entrepreneurial knowledge (Farnese et al., 2019; Jing, 2022; Wuytens et al., 2022; Hu et al., 2023; Kim & Wang, 2023).

2.8 From Literature Tensions to Research Agenda: Propositions and Hypotheses

The preceding review has identified a set of persistent and structurally significant tensions within entrepreneurship education. First, EE is increasingly justified as developmental, transformative, and inclusive, yet it is frequently operationalized through standardized deliverables such as business plans, pitch decks, or short-term intention measures.

Second, entrepreneurship practice is widely theorized as iterative, uncertain, and non-linear, while educational designs often remain linear and outcome driven.

Third, learners differ substantially in readiness, motivation, prior knowledge, and aspiration, yet many pedagogical approaches presume homogeneity.

Fourth, although process-oriented learning is rhetorically endorsed, institutional evaluation regimes continue to privilege measurable outputs over developmental progression.

Logical Emergence from the Literature

If entrepreneurship is iterative and shaped by uncertainty (Sarasvathy, 2001; Dimov, 2020), pedagogies privileging static outputs are conceptually misaligned (P1, P2).

If learners differ in developmental stage and mindset configuration (Hattenberg et al., 2019; Fayolle & Gailly, 2008), calibrated scaffolding becomes theoretically necessary (P3).

If entrepreneurship education serves diverse aspirations beyond venture creation (Neck & Corbett, 2018), differentiation is required (P4).

If evaluation practices influence pedagogical behavior (Rideout & Gray, 2013), output-dominant metrics will reproduce output-dominant teaching (P5).

The hypotheses then translate these conceptual relationships into empirically examinable expectations. H1 operationalizes alignment between pedagogy and competency development. H2 specifies the expected effects of scaffolding on engagement and learning. H3 translates differentiation into measurable inclusivity and effectiveness. H4 operationalizes the alignment between evaluation logic and developmental assessment.

Structured Overview of Emergent Propositions and Hypotheses

The table below summarizes how each proposition and hypothesis emerges.

Type	Statement	Literature Tension Addressed	Theoretical Anchors
P1	Outcome-centric pedagogies risk neglecting the iterative, adaptive, and identity-forming nature of entrepreneurial learning.	Development vs. Deliverables	Honig (2004); Neck & Corbett (2018); Dimov (2020)
P2	The uncertain and non-linear nature of entrepreneurship requires pedagogies prioritizing reflection, experimentation, and adaptation over static outputs.	Iteration vs. Linearity	Sarasvathy (2001); Ries (2011); Kolb (1984)
P3	Scaffolding, aligned with the Zone of Proximal Development, enables calibrated developmental progression from guided participation to autonomous entrepreneurial action.	Heterogeneity vs. Homogeneity	Vygotsky (1978); Wood et al. (1976); Illeris (2018b)
P4	Effective entrepreneurship education must differentiate pathways to accommodate learner diversity in readiness, motivation, and aspiration.	Learner Diversity vs. Standardization	Nabi et al. (2017); Florian & Black-Hawkins (2011)
P5	Evaluation regimes shape pedagogical practice; process-oriented metrics better align assessment with developmental learning than output-based metrics alone.	Process Rhetoric vs. Output Evaluation	Rideout & Gray (2013); Neck & Corbett (2018)
H1	Process-oriented pedagogies are associated with stronger development of entrepreneurial competencies than outcome-centric approaches.	Derived from P1 & P2	Effectuation; Iterative learning theory
H2	Adaptive scaffolding enhances student engagement and learning outcomes compared to rigid teaching models.	Derived from P3	ZPD; Developmental progression
H3	Student-centered, process-oriented EE increases inclusivity and effectiveness across diverse learner profiles.	Derived from P4	Learner heterogeneity; Mindset diversity
H4	Process-oriented evaluation metrics provide more accurate assessment of entrepreneurial development than traditional output metrics.	Derived from P5	Developmental and triadic learning theory

Table 4 Emergent Propositions and Hypotheses from the Literature Review

2.9 Conclusion

This chapter has examined entrepreneurship education through the *why/what/how* framework, interpreted via eight complementary conceptual lenses that foreground developmental progression, learner heterogeneity, educator variability, and the transformation of knowledge into practice. Taken together, these perspectives reveal a structural misalignment within the field. While entrepreneurship is widely theorized as iterative, uncertain, relational, and identity-forming, entrepreneurship education is frequently enacted and evaluated through standardized deliverables and short-term outcome metrics. The result is a persistent theory–practice gap: educational designs often fail to fully reflect the developmental and heterogeneous nature of entrepreneurial learning.

The review demonstrates that this gap is not attributable to a lack of pedagogical innovation or theoretical insight. Rather, it stems from insufficient integration of developmental theory, learning science, and assessment logic into coherent educational design. Entrepreneurship education aspires to cultivate adaptability, judgment under uncertainty, and value creation across diverse contexts, yet its dominant pedagogical and evaluative structures do not always align with these ambitions. Particularly in heterogeneous classrooms—where learners differ in readiness, motivation, identity formation, and aspiration—standardized, outcome-centric models risk constraining rather than enabling entrepreneurial development.

By articulating a set of propositions and hypotheses grounded in the reviewed literature, this chapter moves beyond descriptive critique toward structured research direction. The propositions clarify the conceptual architecture implied by the field: that entrepreneurship education must be understood as developmental, process-oriented, and responsive to learner diversity. The hypotheses translate this architecture into empirically examinable expectations, specifying how pedagogical alignment, scaffolding, differentiation, and evaluation practices relate to entrepreneurial competency development.

In doing so, Chapter 2 establishes the analytical foundation for the remainder of the dissertation. The empirical chapters that follow do not introduce new theoretical premises; rather, they investigate the mechanisms and relationships derived here. Through this progression—from literature synthesis to conceptual clarification to empirical examination—the dissertation advances from mapping tensions in the field toward generating explanatory and evidentiary contribution.

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3

Adaptive Teaching Practice & Personal Professional Knowledge in Entrepreneurship Education

Scaffolding Entrepreneurship Education: Exploring Adaptive Teaching Practices and the Role of Personal Professional Knowledge

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Abstract

This chapter examines how educators facilitate entrepreneurship education (EE) by exploring the interplay between scaffolding practices, situational adaptability, and Personal Professional Knowledge (PPK) in teaching. Using a qualitative case study of the “How to Run a Student Company” program, the study draws on semi-structured interviews and classroom observations to analyze how educators scaffold entrepreneurial learning, adapt their strategies to emergent classroom conditions, and activate professional experience and reflective practice in interaction with students. Interpreting the data through scaffolding theory and the Model of Contingent Teaching (MCT), findings indicate that EE teaching involves ongoing calibration between structured guidance and student autonomy.

Educators deployed a repertoire of scaffolding techniques—most prominently feedback, questioning, and modelling/storytelling—while selectively using explaining and instructing to restore clarity at critical moments. Affective support appeared interwoven with cognitive guidance, particularly in episodes marked by fear of failure, uncertainty, or confidence deficits. The chapter clarifies how PPK functions as an interpretive resource through which educators read situations and decide when and how to intervene. The analysis provides practice-grounded insight into micro-level pedagogical mechanisms in EE and informs educator development and curriculum design aimed at more adaptive, learner-responsive teaching.

Keywords: Scaffolding; Entrepreneurship Education; Adaptive Teaching; Personal Professional Knowledge (PPK); Psychological Safety; Experiential Learning

3.1 Introduction

Entrepreneurship education (EE) is increasingly positioned as a key educational domain for developing learners’ capacity to navigate uncertainty, mobilize resources, and create value across contexts (Neck & Greene, 2011; Neck & Corbett, 2018). Like other practice-oriented fields—such as laboratory sciences, clinical training, and engineering design—EE frequently emphasizes experiential learning. However, EE is distinctive in that its experiential dimension often unfolds in conditions where goals shift, information is incomplete, and outcomes are uncertain. Learning is therefore not only about applying known procedures but also about acting under ambiguity, iterating, and learning from setbacks (Sarasvathy, 2001).

While research has substantially developed EE’s aims (“why”) and content (“what”), the pedagogical mechanisms through which learning is shaped in real time (“how”) remain comparatively under-examined (Fayolle, 2013; Lackéus et al., 2015). In particular, there is limited empirical insight into micro-level teacher–student interaction: how educators decide when to guide, when to hold back, and how they adjust support to differences in learner readiness, group dynamics, and affective states.

Building on the pedagogical process gap identified in Chapter 2, this chapter investigates how educators enact adaptive scaffolding in EE practice and how their Personal Professional Knowledge (PPK) informs these judgments and interventions. The study examines teaching practice within the “How to Run a Student Company” program and addresses three questions:

1. How do educators scaffold entrepreneurial learning?
2. How do educators adapt their teaching strategies to emergent classroom dynamics and learner needs?
3. How does Personal Professional Knowledge (PPK) inform educators' pedagogical decisions and interventions?

While not predefined as categories, the analysis revealed recurring tendencies in how educators combine pedagogical and entrepreneurial knowledge in practice (Shulman, 1987; Neck & Greene, 2011). These tendencies are later conceptualized as development-oriented and practice-structuring orientations, reflecting different ways in which Personal Professional Knowledge (PPK) is enacted in scaffolding decisions.

By focusing on enacted practice rather than program outcomes or teaching format labels, the chapter contributes practice-grounded insight into how learner support is produced moment-by-moment in entrepreneurial learning environments.

3.2 Theoretical Framing

This study is informed by three connected bodies of literature: scaffolding theory, the Model of Contingent Teaching (MCT), and Personal Professional Knowledge (PPK). These frameworks guide interpretation but do not function as fixed containers; they operate as sensitizing concepts that orient attention to interactional mechanisms while allowing patterns to emerge abductively from the empirical material.

3.2.1 Scaffolding and the Zone of Proximal Development

Scaffolding theory, rooted in Vygotsky's (1978) Zone of Proximal Development (ZPD), conceptualizes learning support as temporary assistance that enables learners to perform beyond what they can accomplish independently. Scaffolding is inherently adaptive: educators adjust support levels based on learner readiness and progressively fade guidance as competence increases (Wood et al., 1976; Van de Pol et al., 2010). In EE contexts, this adaptivity is especially salient because tasks are often open-ended, iterative, and shaped by uncertainty (Sarasvathy, 2001).

3.2.2 The Model of Contingent Teaching (MCT)

To operationalize scaffolding in interaction, this study draws on the Model of Contingent Teaching (MCT) (Van de Pol et al., 2010; 2012). The MCT differentiates six scaffolding techniques—feedback, hints, questioning, modelling, instructing, and explaining—which vary in the degree of teacher control and learner autonomy. The model also emphasizes contingency: effective scaffolding depends on educators' responsiveness to learner cues and situational signals (Van de Pol et al., 2012).

3.2.3 Emotional Support and Psychological Safety in EE

In EE, uncertainty and potential failure are not exceptions but recurring conditions. As a result, affective experiences—anxiety, fear of failure, imposter feelings, frustration—may directly influence engagement and learning. Psychological safety, defined as a shared belief that it is safe to take interpersonal risks (Edmondson, 1999), is frequently associated with experimentation, voice, and learning in uncertain contexts. This chapter treats affective support not as separate from pedagogy, but as interwoven with scaffolding episodes in which educators normalize uncertainty, reframe setbacks, and build confidence alongside cognitive guidance.

In this study, affective support is not treated as an add-on to cognitive scaffolding but as an embedded dimension of contingent teaching in uncertainty-rich environments. In entrepreneurship education, emotional regulation and task progression frequently co-occur; thus, scaffolding often simultaneously addresses conceptual clarity and confidence to act. This suggests that scaffolding in EE may require explicit recognition of its dual cognitive–affective character.

3.2.4 Personal Professional Knowledge (PPK)

Personal Professional Knowledge (PPK) refers to the experiential, contextual, and narrative knowledge teachers draw upon in practice (Clandinin & Connelly, 1996). PPK includes professional biography, identity, values, and situated experience, and is often expressed through examples, metaphors, and stories in interaction. In EE, educators may draw on entrepreneurial experience (or adjacent professional experience) to interpret student situations, make abstract concepts tangible, and decide how to intervene. This chapter examines PPK as an interpretive resource that mediates contingent teaching: it shapes how educators “read the room,” evaluate learner needs, and choose scaffolding moves.

3.3 Methodology and Research Design

3.3.1 Research Design

The study uses a qualitative case study approach suited to investigating complex pedagogical phenomena in context (Yin, 2018). The “How to Run a Student Company” program provides a structured yet experiential setting in which learners progress through entrepreneurial tasks such as ideation, validation, operations, and pitching. This environment is appropriate for examining adaptive scaffolding because uncertainty and iteration are built into the learning trajectory.

3.3.2 Context and Participants

A purposive sample of eight educators was selected to reflect variation in professional background, entrepreneurial experience, and pedagogical training. This variation supports comparative analysis of how different knowledge resources and orientations shape teaching interaction.

Educator	Professional background	Entrepreneurial experience	Pedagogical training	PPK in action (illustrative)
A	Business consultant	10+ years advising SMEs	Limited formal training	Practical tools, business cases
B	Serial entrepreneur	Multiple startups	None	Storytelling and experiential reflection
C	Higher education lecturer	Limited (intrapreneurial roles)	Extensive (M.Ed.)	Structured scaffolding and reflection
D	Finance/operations professional	Moderate (co-founder role)	Some teacher training	Execution focus, feasibility framing
E	Innovation manager	Several innovation projects/ventures	Formal training	Design thinking + reflection workshops
F	Startup mentor	Strong mentoring portfolio	Informal	Individualized feedback, role modelling
G	Educational researcher	Minimal entrepreneurial practice	PhD in education	Theory-driven scaffolding, reflection
H	Practitioner-turned-teacher	SME founder	Short pedagogical course	Practitioner anecdotes + structured assignments

Table 5. Characteristics of Educators in the Study (Anonymized)

Confidentiality was ensured through anonymization and pseudonyms consistent with qualitative research ethics (Tracy, 2010).

3.3.3 Data Collection

Two data sources were used:

1. **Semi-structured interviews** (8 educators; 45–60 minutes), audio-recorded and transcribed verbatim. The semi-structured format ensured coverage of core themes while allowing probing and emergent directions (Mena & Clarke, 2021).
2. **Classroom observations** (4 educators), focused on teacher–student interaction during feedback sessions, group work, coaching moments, and presentations. Observations targeted scaffolding episodes and real-time adaptations. Field notes were supplemented by video where feasible to support fine-grained interactional analysis (Heath et al., 2010).

A maximum variation sampling strategy guided the selection of observed educators to reflect diversity in background and teaching approach (Patton, 2015).

3.3.4 Analytical Approach: Abductive, Process-Sensitive Analysis

The analysis followed an abductive logic, iterating between empirical material and theoretical concepts to develop plausible, grounded explanations of practice (Timmermans & Tavory, 2012). Scaffolding theory, MCT, and PPK informed an initial coding template, but functioned as sensitizing concepts rather than fixed categories. This enabled emergent themes (e.g., ambiguity-dosing, boundary-setting for autonomy) to be retained when they improved explanatory coherence across cases.

Coding procedure

1. **First-cycle coding (hybrid template + open coding)**
 - MCT codes: feedback, hints, questioning, modelling, instructing, explaining (Van de Pol et al., 2010; 2012)
 - Adaptability codes: adjustments to learner/task/context; responses to ambiguity and affect (Van de Pol et al., 2012; Lajoie, 2021)
 - PPK codes: experience-in-use, reflective practice, stance/values (Clandinin & Connelly, 1996)
 - Open codes captured unexpected practices (e.g., micro-contracting milestones).
2. **Second-cycle coding (thematic consolidation)**

First-order codes were aggregated into second-order themes and then into higher-level dimensions aligned with the research questions (Gioia et al., 2013).
3. **Cross-case comparison**

Patterns were compared across educators to identify regularities and contrasts (Eisenhardt, 1989), with process memos capturing how scaffolding shifted over phases of sessions (Langley, 1999).
4. **Triangulation**

Interview claims were compared with observations to examine alignment and productive tensions (Denzin, 1978; Jick, 1979; Flick, 2004).

3.3.5 Trustworthiness

Credibility was strengthened through triangulation and member checking (Lincoln & Guba, 1985). Dependability was supported through codebook development and team discussions of early transcripts. Confirmability was supported by an audit trail linking excerpts to codes and themes. Transferability was supported through thick description of context and practice.

3.4 Findings

Findings are organized around the three research questions: scaffolding repertoire, adaptive calibration, and the role of PPK in shaping intervention choices. Where possible, claims are supported by convergence between interview and observation evidence.

3.4.1 Scaffolding Techniques in EE Practice

Across interviews and observations, educators used a repertoire consistent with the MCT model (Van de Pol et al., 2010). In total, 142 scaffolding instances were coded in the observation and interview-linked episode data.

Scaffolding instances were defined as discrete educator moves directed at enabling task progress or sensemaking (e.g., a question, feedback statement, clarification, modelling episode), demarcated by a shift in pedagogical function.

Scaffold	Relative Educator Control	Typical Use in EE
Questioning	Low	Stimulating reasoning under uncertainty
Feedback	Low–Moderate	Direction without takeover
Modelling	Moderate	Externalizing tacit judgment
Explaining	Moderate	Conceptual clarification
Instructing	High	Procedural boundary-setting
Hints	Transitional	Steering without solution

Table 6: Scaffolding techniques

This gradient illustrates how educators modulate autonomy while maintaining ownership with learners. Counts were derived from observation transcripts and interview-linked critical-incident episodes to avoid inflation through general descriptions of practice. The distribution was:

- **Feedback (38%)**
- **Questioning (24%)**
- **Modelling/storytelling (18%)**
- **Explaining (12%)**
- **Instructing (6%)**
- **Hints (2%)**

Feedback, questioning, and modelling/storytelling dominated. Educators described feedback as a way to keep ownership with students while still directing attention to improvement areas (e.g., narrowing scope, strengthening assumptions). Questioning was frequently used to stimulate reasoning under uncertainty (“Why now?”, “What would you test first?”, “What would make this false?”). Modelling/storytelling often externalized professional experience by showing how entrepreneurs respond to setbacks, ambiguity, and iteration.

Explaining and instructing appeared less frequently but played distinct roles. Educators used explaining to clarify conceptual confusions (e.g., profit vs. revenue) and instructing to resolve procedural uncertainty or prevent teams from becoming stuck in unproductive loops (e.g.,

compliance steps, submission requirements). Hints were rare and typically appeared as partial prompts between questioning and instruction.

Scaffold	Total	%	Typical function in episodes
Feedback	54	38%	Direction without takeover; iterative improvement
Questioning	34	24%	Reasoning prompts; assumption testing; autonomy support
Modelling / storytelling	25	18%	Making practice tangible; demonstrating judgment under uncertainty
Explaining	17	12%	Conceptual clarification; restoring shared understanding
Instructing	9	6%	Procedural clarity; preventing stagnation; boundary-setting
Hints	3	2%	Gentle steering without full direction

Table 7. Frequency and Patterns of Scaffolding Techniques (n = 142)

3.4.2 Adaptive Calibration: Contingency in Real Time

Scaffolding was not applied uniformly. Educators adjusted the form and intensity of support in response to learner readiness, group dynamics, and the state of the work. Observations indicated a recurrent pattern:

- When groups were **struggling or overwhelmed**, educators increased structure through explaining and instructing and narrowed tasks into feasible next steps (“Start with one test this week”).
- When groups were **functioning well or moving fast**, educators leaned toward questioning and feedback that stretched autonomy rather than providing solutions.

Educators also adapted based on affective cues. Episodes marked by visible hesitation, fear of pitching, conflict, or imposter feelings triggered more explicit normalization of uncertainty and reframing of failure as part of learning. These affective moves were typically coupled with cognitive scaffolds (e.g., safe-to-fail experiments, staged deliverables).

3.4.3 Affective Support as Part of Scaffolding Episodes

Across cases, educators repeatedly addressed fear of failure and uncertainty as pedagogically relevant rather than incidental. Affective support often took the form of:

- Normalizing uncertainty (“Not knowing yet is part of the process”)
- Reframing setbacks (“This result is useful information”)
- Confidence-building (“You can handle the next step—make it smaller”)
- Boundary-setting to reduce anxiety (“For now, just test one assumption”)

These moves contributed to psychological safety (Edmondson, 1999) by reducing the interpersonal risk of being wrong and by legitimizing iteration. Importantly, affective support was typically embedded within task progress support; it functioned as a condition for continued engagement rather than as separate “motivation talk.”

In several observed episodes, affective scaffolding preceded renewed task engagement, indicating that emotional stabilization was not peripheral but functioned as a gateway to cognitive progress.

3.4.4 PPK as an Interpretive Resource for Teaching Decisions

Educators' intervention choices were shaped by how they interpreted situations—what they saw as the “real problem” in a moment (conceptual misunderstanding, lack of action, fear, conflict, overconfidence). PPK functioned as a resource for this interpretation. Three PPK patterns were especially visible:

1. **Experience-in-use:** educators drew on professional episodes to illustrate decision logic under uncertainty, provide credible examples, and model resilience.
2. **Reflective practice:** educators described learning from prior teaching moments and adjusting their tendency to intervene too quickly or too late (Schön, 1983; Day & Gu, 2020).
3. **Pedagogical stance/values:** educators' beliefs about autonomy, ownership, and failure shaped whether they prioritized questioning and struggle tolerance or faster clarification and direction.

3.4.5 Two Recurring Practice Orientations

Across interviews and observations, educators did not separate neatly into “entrepreneurial” versus “pedagogical” types. However, two recurring practice orientations were visible as tendencies in how educators enacted support. These orientations reflect patterned tendencies in how educators integrate scaffolding and PPK rather than stable identities. Empirically, educators often moved along this continuum within sessions, suggesting that effective EE practice may involve the deliberate integration of developmental autonomy-support with practice-structuring clarity. These are offered **as heuristic labels**, not categorical types:

- **Development-oriented orientation (“entrepreneurial teacher”):** greater emphasis on autonomy-supportive scaffolds (questioning, feedback, modelling), higher tolerance for productive struggle, and frequent normalization of uncertainty.
- **Practice-structuring orientation (“teaching entrepreneur”):** greater reliance on experience-based explanation, clearer procedural instruction at bottlenecks, and stronger focus on feasibility framing and execution discipline.

The most supportive episodes often combined both: educators-maintained student ownership while also restoring clarity at moments when ambiguity became unproductive.

Theme	Interview evidence	Observation evidence	Convergent insight
Experiential formats	7/8 emphasize “learning by doing”	4/4 show project-based work	Experiential mode dominates
Scaffolding	8/8 describe feedback/questioning	4/4 show iterative prompts	Feedback/questioning as core
Adaptability	6/8 describe role shifting	3/4 show tightening/loosening	Contingency is central
PPK activation	6/8 describe experience-in-use	2/4 show storytelling episodes	Experience used selectively but salient
Reflection	5/8 describe reflective adjustment	3/4 show debrief/reflection	Reflection embedded across settings

Table 8. Interview–Observation Convergence

3.5 Discussion

This chapter examined how EE educators scaffold learning in uncertain, iterative tasks, how they adapt support in situ, and how PPK informs these judgments. The discussion highlights three implications for understanding EE teaching as enacted interaction.

3.5.1 Scaffolding in EE as Contingent, Multi-Modal Support

Consistent with scaffolding theory (Vygotsky, 1978; Wood et al., 1976; Van de Pol et al., 2010), educators provided support that varied in intensity and form. The MCT repertoire was evident, with feedback and questioning dominating and explaining/instructing used strategically rather than continuously. This pattern suggests that in EE, scaffolding often aims to maintain student ownership while preventing drift, stagnation, or confusion at critical moments.

3.5.2 Adaptability as a Pedagogical Requirement in Uncertain Tasks

A central pattern across cases was ongoing calibration: educators tightened or loosened structure in response to group progress and learner readiness (Van de Pol et al., 2012; Van de Pol et al., 2019). Rather than applying a single preferred method, educators shifted stance—coach, instructor, facilitator—depending on whether ambiguity was functioning productively or blocking progress. This underscores that in entrepreneurial learning environments, adaptability is not an optional teaching quality but a practical requirement of the task structure. Importantly, variation in scaffolding intensity and form suggests that learner differences are already implicitly shaping educator behaviour. However, these differences remain informally diagnosed rather than systematically modelled.

3.5.3 Affective Support as Embedded in Scaffolding Episodes

The findings indicate that affective moves—normalizing uncertainty, reframing failure, confidence-building—were frequently embedded within scaffolding episodes. This aligns with the view that psychological safety supports risk-taking and learning in uncertain environments (Edmondson, 1999). In EE, affective support appears to operate as a condition for continued experimentation: if fear dominates, iteration collapses into avoidance or compliance. Educators therefore scaffold not only task completion but also the learner's capacity to remain engaged in uncertainty.

3.5.4 PPK as the Lens for Contingent Intervention

PPK (Clandinin & Connelly, 1996) helps explain why educators enact similar scaffolding repertoires differently. Educators' experience-in-use, values, and reflective habits shaped what they noticed and how they judged the appropriate level of intervention. This suggests that PPK functions less as a static "knowledge store" and more as an interpretive resource through which educators diagnose situations and choose scaffolding moves.

The role of PPK also raises the question of how educators' professional backgrounds, identities, beliefs, and values shape the enactment of adaptive teaching. PPK is inherently biographical and situated, incorporating professional identity, values, and accumulated experience alongside formal pedagogical knowledge (Clandinin & Connelly, 1996).

In entrepreneurship education, this may be particularly consequential because educators can enter the classroom from markedly different professional trajectories, including academic, pedagogical, entrepreneurial, consultancy, and venture-based practice. Such backgrounds may shape what educators attend to in uncertain situations, which forms of knowledge they privilege, and how they judge the appropriate balance between intervention and learner autonomy.

The present study deliberately included variation in professional background, entrepreneurial experience, and pedagogical training, but it was not designed to systematically compare educator identity groups. The findings therefore do not support conclusions that, for example, academically oriented and practice-oriented educators scaffold learning in systematically different ways.

Rather, they suggest that professional biography and identity form part of the interpretive resources through which PPK is enacted. Future research could examine more explicitly how professional identity, beliefs, values, entrepreneurial experience, and pedagogical formation interact in shaping educators' adaptive judgement and scaffolding practices.

The heuristic distinction between development-oriented and practice-structuring orientations helps describe recurring tendencies in how PPK was enacted. Importantly, the strongest support episodes often integrated both: autonomy-supportive guidance combined with timely restoration of clarity.

3.5.5 Theoretical implications

The findings extend scaffolding theory into entrepreneurship education by demonstrating that contingency in uncertainty-rich tasks involves simultaneous calibration of cognitive guidance and affective stabilization. Furthermore, the analysis reframes Personal Professional Knowledge (PPK) as an interpretive mechanism through which educators diagnose learner states and select scaffolding intensity. Rather than positioning scaffolding as technique alone, this study highlights the relational and judgment-based nature of adaptive pedagogy in EE.

3.6 Practical Implications

3.6.1 Educator Development

Professional development for EE educators should focus on:

- Expanding scaffolding repertoires (especially questioning, feedback, and modelling)
- Developing diagnostic sensitivity (reading learner readiness and group dynamics)
- Practicing role-shifts (coach ↔ instructor)
- Building competence in affective scaffolding (normalizing uncertainty, reframing failure, confidence-building)

Reflective practice should be treated as a learnable skill that supports more calibrated intervention decisions (Schön, 1983; Day & Gu, 2020).

3.6.2 Curriculum and Program Design

Programs should embed experiential projects while ensuring structured reflection and staged task progression. Designs can support adaptive teaching by:

- Building “decision points” where educators can tighten/loosen structure
- Creating safe-to-fail experiments early
- Providing shared language for uncertainty and iteration
- Aligning assessment with process evidence (learning logic, iteration quality), not only polished outputs

3.6.3 Institutional Support

Institutions can improve EE teaching quality by recognizing the complementary value of different educator backgrounds and enabling collaboration (e.g., co-teaching, communities of practice) where pedagogical and entrepreneurial expertise can be exchanged (Wenger, 1998).

3.7 Limitations and Future Research

This study examines one program and uses a qualitative design, which supports depth but limits generalization. Future research could:

- Compare adaptive scaffolding across EE programs and institutional contexts
- Use longitudinal designs to examine how adaptive teaching shapes learner trajectories over time
- Study scaffolding in hybrid/digital EE settings and how technology mediates contingency and autonomy
- Connect educator practice patterns to learner profiles (setting up the bridge to Chapters 4–5)

3.8 Conclusion

This chapter opened part of the pedagogical “black box” of entrepreneurship education by focusing on micro-level interactional mechanisms through which learning support is enacted. Educators used a repertoire consistent with the MCT scaffolding model, with feedback, questioning, and modelling/storytelling dominating and explaining/instructing used strategically at bottlenecks. Scaffolding was contingent rather than uniform: educators calibrated support in response to learner readiness, group dynamics, and affective states. Affective support was embedded within scaffolding episodes, contributing to psychological safety and sustaining engagement in uncertainty.

Personal Professional Knowledge (PPK) shaped how educators interpreted classroom situations and chose when and how to intervene. The analysis identified two recurring practice orientations—development-oriented and practice-structuring—as heuristic tendencies rather than fixed types, with the most supportive moments integrating both.

By clarifying how educators enact contingent scaffolding under conditions of uncertainty, this chapter contributes a practice-grounded account of adaptive entrepreneurship education. It establishes the pedagogical mechanism side of the dissertation’s central argument: that learner diversity and educator responsiveness must be understood relationally rather than independently.

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4

Starting Points of Entrepreneurial Development

Entrepreneurial Mindset Archetypes: Exploring Starting Points, Developmental Journeys, and Scaffolding Strategies in Entrepreneurship Education

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Abstract

Entrepreneurship education often shows striking classroom divergence: students exposed to the same program and scaffolds perceive their learning in opposite ways. We explain this divergence using a sequential mixed-methods design. First, focus groups, interviews, and diary studies revealed emergent learner profiles that we mapped onto the Ability × Willingness framework. Second, survey data from 834 students were analysed using k-means screening followed by Gaussian mixture modelling, yielding five empirically grounded archetypes—Visionary Risktaker, Pragmatic Innovator, Adaptive Opportunist, Systemic Executor, and Resilient Pioneer. These archetypes clarify why identical scaffolds empower some learners yet frustrate others, and they inform adaptive pedagogy by matching scaffolds to archetype-specific needs. The study contributes a person-centered typology of entrepreneurial mindsets and a practical route to differentiated entrepreneurship education.

Keywords: Entrepreneurial Mindset, Archetypes, Scaffolding, Effectuation Theory, Entrepreneurship Education

1. Introduction

Entrepreneurship education (EE) aspires to cultivate entrepreneurial mindsets—dynamic configurations of attitudes, skills, and behaviours that enable individuals to navigate uncertainty, recognize opportunities, and take innovative action (Neck, Greene, & Brush, 2021). These mindsets are not static; rather, they evolve through iterative processes, shaped by an interplay of individual traits, contextual influences, and experiential learning (Hattenberg, Loef, Groen, & Belousova, 2022). Despite growing consensus on the importance of fostering entrepreneurial mindsets, less is known about how such mindsets emerge, develop, and interact with educational interventions. Addressing this gap, the present study explores divergent student experiences in entrepreneurship education and investigates how these differences can be understood through empirically grounded archetypes.

At the heart of entrepreneurial behaviour lie four key elements: ability, willingness, urgency, and action (Shepherd et al., 2010). These elements collectively shape an individual's capacity to engage in entrepreneurial activities. Foundational theories such as Bandura's (2006) self-efficacy theory, Ryan and Deci's (2000) self-determination theory, and Ajzen's (1991) theory of planned behaviour offer valuable insights into the psychological and behavioural underpinnings of entrepreneurial development. Together, these perspectives underscore the importance of confidence, intrinsic motivation, and intention in shaping entrepreneurial action.

However, entrepreneurship education often reveals a striking characteristic: classroom divergence. Even when students are taught by the same educators using the same scaffolds, evaluations can vary dramatically. Some learners describe the experience as inspiring and transformative, while others perceive the identical practices as frustrating or ineffective. Research on student heterogeneity in experiential learning contexts (e.g., Bolger, Davis, &

Rafaeli, 2003; Conner, Tennen, Fleeson, & Barrett, 2009) suggests that such divergence is not merely noise but reflects deeper differences in how learners perceive and engage with scaffolding. Below a case narrative of a real-life situation within an undergraduate entrepreneurial educational program.

Recent advances in the literature, notably the concept of entrepreneurial mindset archetypes introduced by Hattenberg et al. (2022), provide a framework for understanding this diversity of starting points. By identifying specific configurations of affective, cognitive, and skill-based elements, this approach highlights heterogeneity in entrepreneurial development and offers a basis for more personalized educational interventions.

This perspective resonates with Sarasvathy's (2001) effectuation theory, which emphasizes how expert entrepreneurs leverage available means and embrace uncertainty, contrasting with novices who rely on prediction and structured planning. Similarly, Dimov's (2007, 2010) work on the entrepreneurial journey frames entrepreneurship as an evolving, non-linear process, while Shepherd's (2010) concept of learning spirals underscores the iterative cycles of experimentation, feedback, and reflection that characterize entrepreneurial learning.

Central to this discourse is the concept of scaffolding, first articulated by Wood, Bruner, and Ross (1976), which involves providing tailored support to bridge the gap between learners' current abilities and their potential. Building on Vygotsky's (1978) notion of the zone of proximal development (ZPD), scaffolding in entrepreneurship education enables learners to navigate uncertainty, experiment with opportunity identification, and engage in venture creation. Yet, given the diversity of learner responses, scaffolding cannot be "one-size-fits-all." It must be adaptive, responsive, and attuned to the varied ways in which learners experience entrepreneurial learning.

To empirically investigate this diversity, this study employs a mixed-methods approach combining qualitative exploration (focus groups, interviews, diary studies) and quantitative analysis (the Entrepreneurial Mindset Profile survey and cluster analysis). The aim is to identify empirically grounded archetypes of entrepreneurial mindset that explain classroom divergence and provide a foundation for adaptive pedagogical strategies.

The structure of this paper is as follows. Section 2 reviews relevant literature on entrepreneurial mindsets, scaffolding, and developmental frameworks, establishing the study's theoretical foundation. Section 3 outlines the methodology, detailing the data collection and analysis procedures. Section 4 presents the findings from both qualitative and quantitative phases, followed by an integrated analysis in Section 5. Section 6 discusses the implications for theory and practice, and Section 7 concludes with recommendations for future research and educational practice.

To illustrate this phenomenon, we present a case narrative drawn from an undergraduate entrepreneurship program on the next page.

Case Narrative: The Divergent Classroom

In an undergraduate EE programme rolled out across eight parallel classes, the teaching design was deliberately consistent: the same modules, scaffolds and pacing. From a design perspective, students should have had similar experiences. Yet evaluations told a different story. Some participants described the course as “the most inspiring class I’ve ever taken,” while others called it “the most frustrating learning experience of my studies.”

Focus groups and interviews revealed that this divergence could not be attributed to teacher style or course structure. The same classroom interaction—for example, being asked to work without a clear framework—was experienced as liberating by some students and anxiety-inducing by others. Students began to articulate distinct preferences: some craved “freedom to explore,” whereas others asked for “clearer steps” or “a structure to fall back on.” These observations suggested that differences in perception lay not in what was offered but in how it was received. Students’ mindsets seemed to shape whether a scaffold was experienced as supportive or as a barrier.

Emergent profiles and the ability–willingness lens

Drawing on methods from customer journey mapping, the research team recognised parallels between these emerging patterns and “personas” used in design: composite portraits capturing underlying differences in how people experience the same process. Interviews and diaries revealed emergent profiles of students that differed systematically in how they engaged with scaffolding. To make sense of these profiles, we turned to Hattenberg et al.’s ability × willingness matrix (2022), which conceptualises entrepreneurial mindsets along two axes: the capacity to act and the motivation to act. In workshops with programme lecturers, this framework resonated strongly. When the nine theoretical cells were drawn on a 3 × 3 grid, educators recalled students in specific segments. Five segments kept surfacing in these discussions—students high in willingness but low in ability, those high in both dimensions, those highly able but low in willingness, and two intermediate combinations—suggesting a pattern that aligned with the emergent profiles from our qualitative data.

From profiles to archetypes: a research agenda

The recurring segments identified by teachers and the qualitative patterns observed in student accounts highlighted the need for a more systematic investigation. While Hattenberg’s matrix provided a valuable conceptual lens, its categories remained abstract and untested empirically. To build on this framework, we began coding interviews to identify proto-profiles and designed a quantitative study to examine whether these patterns could be validated in a larger sample. The present paper therefore pursues two objectives: (1) to explain classroom divergence by identifying empirically grounded archetypes of entrepreneurial mindset, and (2) to show how these archetypes can inform adaptive pedagogical practices.

2 Literature Review

The entrepreneurial mindset is widely recognized as a dynamic, multifaceted process that enables individuals to sense, act, and mobilize in response to opportunities under uncertainty (Shepherd et al., 2010). Rather than a fixed trait, it is shaped through the interplay of ability, willingness, urgency, and action—core elements that underpin entrepreneurial behaviour and development. Understanding how these elements interact and evolve is central to advancing both theory and practice in entrepreneurship education.

2.1 Conceptualising the Entrepreneurial Mindset

Entrepreneurial mindset research has shifted from trait-based descriptions to developmental and contextualised understandings. Shepherd et al. (2010) conceptualise it as a process in which individuals continuously sense and seize opportunities. Rather than assuming homogeneity, this view recognises that students arrive with varied capabilities and motives. Understanding these differences is crucial for designing curricula that support diverse developmental starting points.

Recent research emphasizes that entrepreneurial mindsets are dynamic and context-dependent, rather than static traits. Hattenberg et al. (2022) conceptualize them as capabilities that activate in “spikes” when individual characteristics align with situational demands. This view highlights the importance of adaptive, learner-centred approaches in entrepreneurship education and challenges one-size-fits-all pedagogies.

Despite increasing interest, the concept of the entrepreneurial mindset remains contested. Scholars differ in whether it should be conceptualised as a stable set of traits (e.g., Lumpkin & Dess, 1996), a dynamic cognitive process (Shepherd et al., 2010), or a context-dependent capability activated in interaction with environments (Hattenberg et al., 2022).

Recent reviews (e.g., Nabi et al., 2017; Neck et al., 2021) highlight fragmentation in definitions and measurement approaches, complicating cumulative knowledge development. This lack of conceptual convergence reinforces the need for empirically grounded, person-centred approaches that capture how entrepreneurial mindsets manifest in practice.

2.2 The Ability × Willingness Framework

Hattenberg et al. (2021, 2022) propose a matrix mapping entrepreneurial mindsets along two core dimensions: ability (the capacity to act) and willingness (the motivation to act). Their 3 × 3 model suggests that individuals occupy different positions, ranging from high-ability/high-willingness “pioneers” to low-ability/low-willingness “reluctant” types.

While conceptually powerful, this framework remains abstract and does not prescribe how these dimensions can be empirically measured. It nevertheless provides a useful lens for interpreting why identical educational scaffolds may be experienced as empowering by some learners and burdensome by others.

To operationalise these dimensions, this study draws on the Entrepreneurial Mindset Profile (EMP; Davis et al., 2016), a validated instrument that integrates both trait-based and skill-based components of entrepreneurial functioning. Unlike narrower measures focused solely on intention (Ajzen, 1991) or orientation (Lumpkin & Dess, 1996), the EMP captures a broader configuration of entrepreneurial capabilities and motivations, making it suitable for person-centred analyses.

In this study, ability is reflected in skill-based dimensions such as execution, persistence, and idea generation, while willingness is captured through motivational and attitudinal traits such as risk acceptance, independence, and action orientation. These dimensions are measured via self-report Likert-scale items, consistent with established psychometric practice.

2.3 Developmental Perspectives on Entrepreneurship

Entrepreneurship is often described as an iterative, non-linear journey. Sarasvathy's (2001) effectuation theory distinguishes between expert entrepreneurs, who leverage available means and embrace uncertainty, and novices, who follow predictive, causal approaches. Dimov (2007, 2010) frames entrepreneurship as progressing from potential to nascent to established stages, while Shepherd's (2010) "learning spirals" depict cycles of experimentation, feedback and reflection. These perspectives imply that learners at different stages will engage differently with educational interventions, reinforcing the need to recognise heterogeneity in starting points.

2.4 Classroom Divergence and Learner Heterogeneity

Educational research increasingly documents classroom divergence, whereby students in the same learning environment report radically different experiences. Diary and experience-sampling methods show that individuals interpret identical events in strikingly varied ways (Bolger, Davis, & Rafaeli, 2003; Conner, Tennen, Fleeson, & Barrett, 2009). In entrepreneurship education, one student may view structured guidance as supportive, while another perceives it as constraining. Such heterogeneity underscores the value of analytical approaches that move beyond average effects to examine profiles of learners with distinct combinations of skills, motivations and responses.

2.5 Scaffolding and the Zone of Proximal Development

To support diverse learners, pedagogy must be flexible and adaptive. The concept of scaffolding, introduced by Wood, Bruner and Ross (1976), describes how teachers provide tailored support that helps learners progress beyond their current abilities. Rooted in Vygotsky's (1978) zone of proximal development, scaffolding is effective when it adapts to learner needs, gradually fades and transfers responsibility to the learner (Van de Pol, Volman & Beishuizen, 2010). In entrepreneurship education, scaffolding plays a critical role in helping students navigate ambiguity, opportunity identification, and iterative venture development. Yet its effectiveness depends on how learners perceive and respond to it—hence the importance of understanding archetypes.

2.6 Person-Centred Profiling and Archetypes

Person-centred approaches, such as latent profile analysis and cluster analysis, allow researchers to identify subgroups with distinct configurations of traits and behaviours (Marsh, Lüdtke, Trautwein, & Morin, 2009; Pastor, Barron, Miller, & Davis, 2007; Spurk, Hirschi, Wang, Valero, & Kauffeld, 2020). These approaches parallel the use of personas in customer journey mapping, where diverse consumer experiences are grouped into meaningful archetypes (Lemon & Verhoef, 2016; Rosenbaum, Otolara, & Ramírez, 2017; Al Subhi, Halinen, & Aramo-Immonen, 2023). Applying similar logic in entrepreneurship education provides a way to interpret classroom divergence and design scaffolds tailored to distinct learner types.

3. Methodology

3.1 Research Design

This study employed a sequential mixed-methods design (Creswell & Plano Clark, 2017; Molina-Azorin et al., 2012) to empirically identify and validate entrepreneurial mindset archetypes. The design was chosen to capture both the breadth of entrepreneurial mindset diversity and the depth of individual developmental trajectories.

An ethnographic strand was embedded in the design, involving reflective diaries, focus groups, and semi-structured interviews to capture the lived experiences of students in entrepreneurship education. These materials functioned as *field texts* (Emerson, Fretz, & Shaw, 2011), providing insights into how students interpreted scaffolding practices and entrepreneurial learning tasks in situ. The ethnographic phase produced emergent profiles that served as the initial basis for exploring learner diversity.

The study proceeded in three phases: (1) an ethnographic exploration of classroom divergence, (2) a large-scale quantitative survey using the Entrepreneurial Mindset Profile (EMP), and (3) integration of findings across strands. This structure ensured both contextual sensitivity and empirical robustness.

3.2 Qualitative Phase: Exploring Classroom Divergence

3.2.1 Data Collection

The qualitative strand was conducted across eight parallel entrepreneurship classes and comprised three complementary sources of data. First, eight focus groups were conducted following the year-long entrepreneurship programme, with approximately ten students participating in each session (approximately 80 participants in total). The focus groups explored why students who had participated in comparable educational activities and had been exposed to similar scaffolding practices nevertheless reported markedly different learning experiences.

Second, semi-structured interviews were conducted with 12 students selected from the participating classes. These interviews enabled more detailed reflection on particular learning situations, perceptions of educator support, and differences in how students experienced autonomy, structure, uncertainty, and feedback.

Third, reflective diaries were collected from approximately 150 students throughout the programme. The diaries captured students' lived experiences of entrepreneurial learning over time and provided insight into variations in engagement, motivation, perceived support, uncertainty, and responses to scaffolding. In line with diary research as a method for capturing temporal variation in experience (Bolger, Davis, & Rafaeli, 2003), these accounts also functioned as ethnographic field texts through which students' situated interpretations of their own learning could be examined.

The diary dataset used in this qualitative strand is the same underlying diary corpus subsequently analysed in Chapter 5. The two chapters address different questions using this shared dataset: Chapter 4 uses the qualitative material to identify and interpret recurring patterns of learner experience in relation to the quantitative EMP profiles, whereas Chapter 5 examines the diary material specifically in relation to scaffolding interactions and archetype-sensitive responses.

The qualitative and quantitative datasets overlapped substantially but were not identical in size. The EMP survey provided the broader quantitative sample (N = 834), while the qualitative strand involved smaller subsamples drawn from the participating programmes. Where participant identifiers permitted linkage, qualitative accounts were related to EMP-derived archetype classifications during the mixed-method integration. The integration should therefore be understood as partial participant-level linkage combined with triangulation across qualitative and quantitative evidence rather than complete one-to-one correspondence across all participants.

3.2.2 Analysis

All qualitative data were transcribed and thematically coded following Braun and Clarke (2006). Coding was both inductive (to allow emergent themes to surface) and deductive (mapping onto the Ability × Willingness framework of Hattenberg et al., 2022).

In addition, the analysis followed ethnographic traditions of narrative meaning-making (Clifford & Marcus, 1986). Rather than treating diaries and interviews solely as responses, they were interpreted as situated accounts of identity formation and learner positioning. This dual lens revealed emergent learner profiles, which reflected systematic differences in perceived ability, willingness, and scaffolding needs.

Hattenberg et al.'s (2021, 2022) framework served as a conceptual anchor for interpreting these profiles. However, the categories observed in this study were not identical to theirs. Instead, they were translated into empirically derived archetypes with labels designed to capture their distinct characteristics and pedagogical relevance.

To enhance reliability, coding was conducted iteratively with codebook refinement, and a subset of transcripts was independently coded by a second researcher. Discrepancies were discussed until consensus was reached, ensuring consistency in the interpretation of ability, willingness, and scaffolding-related themes.

3.3 Quantitative Phase: Survey and Cluster Analysis

3.3.1 Instrument

The primary quantitative instrument was the Entrepreneurial Mindset Profile (EMP), developed and validated by Davis, Hall, and Mayer (2016). The EMP assesses 14 dimensions of entrepreneurial mindset across two domains: seven personality traits (e.g., independence, risk acceptance, action orientation) and seven skills (e.g., idea generation, execution, persistence). Items were rated on a five-point Likert scale, following established psychometric guidelines (DeVellis, 2016).

The survey was adapted for the educational context and piloted with a small sample of students to ensure clarity. Feedback from the pilot led to refinements in the wording of items related to ambiguity tolerance and opportunity recognition.

3.3.2 Participants

The study population consisted of undergraduate students enrolled in entrepreneurship education programs at three Dutch universities of applied sciences. In total, 834 students completed the baseline EMP survey. The large sample size reflects the inclusion of multiple cohorts across programmes and years, enhancing the robustness of the clustering analysis and enabling stable estimation of latent profiles.

3.3.3 Educational Context

The entrepreneurship program was structured as a year-long curriculum combining theoretical modules with experiential projects. Students engaged in opportunity recognition, business model development, lean startup methodologies, pitching, networking, and the creation of student companies. Guest lectures from entrepreneurs and industry mentors enriched the program (Neck & Greene, 2011). This provided a consistent yet complex environment in which scaffolding played a central role.

3.3.4 Data Preparation and Analysis

After screening and standardising the 14 EMP scales in accordance with Tabachnick and Fidell (2019), we conducted exploratory cluster analyses (hierarchical and k-means) to assess the broad structure of the data. These exploratory methods suggested two to three clusters based on internal indices, but they assume spherical clusters with equal variance and therefore served only as a rough baseline. We subsequently applied a model-based latent profile analysis using Gaussian mixture models (GMM) with diagonal covariance matrices, allowing clusters to differ in variance and shape (Fraley & Raftery, 2002; Nylund, Asparouhov, & Muthén, 2007).

While the Ability $\times$ Willingness framework proposes nine theoretical cells, this structure was not imposed a priori. Instead, the number of clusters was determined inductively based on model fit criteria, resulting in five empirically supported archetypes. These archetypes can be interpreted as dominant configurations within the broader theoretical space.

Models with two through six classes were estimated. The optimal number of classes was selected primarily using the Bayesian Information Criterion (BIC), supported by the Integrated Completed Likelihood (ICL), classification entropy, and average posterior probabilities. Cross-validated log-likelihoods based on a 70/30 train-test split confirmed that the five-class solution generalised better than models with fewer or more classes.

Model stability was further assessed via bootstrapping, computing the Adjusted Rand Index (ARI) between resampled partitions and the full-data solution. The final five-class model showed entropy of approximately 0.78 and average on-diagonal posterior probabilities of at least 0.80, indicating adequate classification precision for interpretive purposes.

3.4 Mixed-Methods Integration

The qualitative and quantitative strands served complementary but analytically distinct purposes. The qualitative material was used to explore recurring differences in how students experienced entrepreneurial learning and responded to scaffolding, while the EMP analysis independently examined whether recurring configurations of entrepreneurial mindset could be identified quantitatively. The qualitative profiles therefore did not statistically determine the number or composition of the latent classes.

Integration occurred after the two strands had been analysed. Participant-level information enabled the qualitative profiles and experiences to be compared with EMP-based class membership where data could be linked. These comparisons were organised through cross-tabulation and matrix-based comparison, allowing patterns within and across the emerging configurations to be examined. The Ability $\times$ Willingness framework subsequently provided a theoretical lens through which convergence between the qualitative patterns and quantitative configurations could be interpreted.

The final archetypes therefore represent an integration of different forms of evidence. Their empirical structure derives from the quantitative profile analysis, while the qualitative findings contribute to understanding their experiential and pedagogical meaning. In this sense, the qualitative material contextualises and helps interpret the archetypes rather than statistically creating them.

Stage	Evidence	Analytical purpose	Contribution
Qualitative exploration	Diaries, interviews and focus groups	Identify recurring differences in learner experience and responses to scaffolding	Emergent qualitative profiles
Theoretical interpretation	Ability × Willingness	Interpret differences in capacity and motivational readiness	Conceptual positioning
Quantitative modelling	EMP, N = 834	Identify recurring empirical mindset configurations	Five latent classes
Mixed-method integration	Participant-level linkage, cross-tabulation and matrix comparison	Examine convergence between qualitative and quantitative patterns	Validation and interpretation
Archetype construction	Integrated evidence	Translate empirically supported configurations into pedagogically meaningful representations	Five entrepreneurial mindset archetypes

Table 9. Integration of qualitative and quantitative evidence in the development of the entrepreneurial mindset archetypes.

The integration phase linked the learner profiles emerging from the qualitative strand with the latent classes identified in the quantitative analysis of the Entrepreneurial Mindset Profile (EMP). Rather than imposing predefined categories, both strands were developed independently and brought together to examine convergence between lived classroom experiences and empirically derived mindset configurations.

To explore this alignment, we cross-tabulated each student’s latent class membership with the qualitative profiles derived from diaries, interviews, and focus groups (Creswell & Plano Clark, 2018). The qualitative profiles were inductively constructed by coding how students experienced and responded to scaffolding—for example, whether they described open-ended tasks as liberating or preferred structured guidance—and subsequently interpreted through the Ability × Willingness framework (Hattenberg et al., 2022).

The cross-tabulation revealed a significant association between latent classes and qualitative profiles (χ^2 , $p < .01$), with a medium effect size (Cramér’s $V \approx 0.38$). For instance, students identified as Visionary Risktakers more frequently aligned with profiles favouring “freedom to explore,” whereas Systemic Executors were more commonly associated with preferences for “clear structure.” This convergence indicates that the latent classes capture meaningful differences in how learners perceive and respond to pedagogical scaffolds.

We further examined how the empirically derived classes mapped onto the broader Ability × Willingness framework. Five dominant configurations consistently appeared across both data sources and were also recognisable in practitioner discussions, suggesting alignment between statistical patterns, qualitative experiences, and theoretical expectations.

This triangulation—integrating qualitative coding, quantitative classification, and theory-driven interpretation—strengthens the robustness of the identified archetypes. Rather than representing statistical artefacts or isolated narratives, the archetypes reflect empirically grounded learner configurations that help explain the divergent experiences observed in entrepreneurship education.

By cross-validating findings across methods and perspectives, the study enhances the interpretive and external validity of the framework, in line with established principles of mixed-methods research (Shadish et al., 2002). Because qualitative and quantitative data were not collected from fully identical subsamples, the cross-tabulation should be interpreted as indicative of alignment rather than strict one-to-one correspondence.

3.5 Reliability, Validity and Ethics

To ensure the robustness of our findings, we examined the reliability and validity of both the Entrepreneurial Mindset Profile (EMP) instrument and the clustering solutions derived from it.

Reliability

Internal consistency: For each of the EMP's 14 subscales (seven traits and seven skills), we calculated Cronbach's alpha and McDonald's omega (Nunnally & Bernstein, 1994). Alpha values ranged from 0.71 to 0.88 across the trait scales and from 0.73 to 0.90 across the skill scales, indicating acceptable to high internal consistency. Omega values were comparable (0.74–0.91), suggesting that each subscale captured a coherent underlying construct.

To assess temporal stability, we re-administered the EMP to a subsample of 94 students four weeks after the initial survey. We computed intra-class correlations (ICC) for each subscale; ICCs ranged from 0.68 to 0.86, implying moderate to strong stability. This bolstered confidence that the scales measured relatively stable traits and skills rather than transient states.

Cluster stability: We evaluated the reliability of the cluster solutions using three complementary techniques. First, we ran 100 bootstrapped resamples of the data (80 % with replacement), re-deriving the latent profile structure each time and computing the Adjusted Rand Index (ARI) and variation of information (VI) between the bootstrapped partitions and the full-sample solution. Mean ARI scores of ~0.42 and VI scores below 0.65 suggested moderate stability, with some profiles more robust than others. Second, we conducted a 70/30 train-test split and assessed whether the five-class model maintained similar class proportions, means and covariances across samples. Third, we examined the entropy values produced by the GMM (0.78 overall), which indicated satisfactory classification quality.

Validity

Construct validity: Prior research (Davis et al., 2016), has established the EMP's factor structure via confirmatory factor analysis, yielding fit indices such as CFI = 0.93 and RMSEA $\approx$ 0.06 that support the instrument's theoretical organization. In our sample, we replicated this structure using exploratory factor analysis with oblique rotation; results confirmed the two-factor (ability vs. willingness) higher-order structure.

Convergent validity was evidenced by strong positive correlations between conceptually related subscales (e.g., Persistence and Achievement Drive, $r = 0.64$), while discriminant validity was supported by lower correlations between dissimilar constructs (e.g., Risk Acceptance and Future Focus, $r = 0.26$).

Criterion validity: We compared archetype membership to behavioural indicators collected during the course (e.g., number of pitches volunteered, completion of venture assignments). Visionary Risktakers and Pragmatic Innovators engaged in significantly more voluntary pitches than Systemic Executors and Adaptive Opportunists ($p < 0.05$), and Resilient Pioneers showed the highest completion rates of venture assignments. These patterns aligned with theoretical expectations, supporting the profiles' predictive validity.

External validity: To triangulate the clusters with qualitative insights, we cross-tabulated archetype assignments with emergent profiles from interviews and diary data (Shadish, Cook, & Campbell, 2002). A series of chi-square tests indicated significant associations between quantitative classes and qualitative profiles (Cramér's $V \approx 0.38$), suggesting that the archetypes reflect meaningful differences observed in ethnographic accounts. We also compared our profiles to the theoretical segments in Hattenberg's ability–willingness matrix; five of the nine cells were repeatedly identified in teacher discussions, and these corresponded to the classes emerging from the GMM analysis.

Ethics

The study adhered to ethical guidelines outlined by the host institution and national research standards (Israel, 2014). Informed consent was obtained from all participants, who were assured that participation was voluntary and could be withdrawn at any time without penalty. The survey and diary prompts were designed to avoid sensitive topics.

Confidentiality was maintained by assigning anonymized codes to all responses; only aggregate data were reported. The study protocol was reviewed and approved by the institutional review board, and data were stored on secure servers with access limited to the research team. During the focus groups and interviews, participants were reminded that they could decline to answer any question. No incentives were offered that might unduly influence participation.

By rigorously assessing reliability and validity and ensuring ethical integrity, our study provides a sound basis for interpreting the five archetypes. These measures increase confidence that the profiles reflect meaningful differences in student mindsets rather than artefacts of measurement or analysis.

3.6 Methodological Contribution

By combining ethnographic exploration, quantitative validation, and integrative profiling, this study directly addresses the challenge of classroom divergence in entrepreneurship education. It provides both the breadth required to identify robust clusters and the depth needed to interpret them meaningfully. This approach makes an original methodological contribution by demonstrating how ethnographically informed mixed methods can yield empirically grounded archetypes that reflect both statistical structures and lived learner experiences.

4. Results

This section presents the results of the mixed-methods analysis in a sequential structure. The findings move from ethnographic emergence of divergent student experiences, through psychometric validation and cluster analysis, to the identification and interpretation of five entrepreneurial mindset archetypes. The integration of quantitative and qualitative evidence ensures both statistical robustness and ecological validity.

4.1 Ethnographic Emergence of Profiles

The analysis began with ethnographic exploration of *classroom divergence*: why students exposed to the same scaffolding practices reported radically different experiences. Focus

groups and diary entries revealed consistent patterns of divergence. For some, structured scaffolds such as templates and checklists provided clarity and empowerment; for others, the same tools felt restrictive, even demotivating (see table 10).

This divergence suggested the existence of *emergent learner profiles*, shaped by systematic differences in perceived ability and willingness. For instance, one student reflected: “*I’m full of ideas and energy when we start a project—but once the planning starts, I lose focus. I’d rather pitch than prototype.*” Another countered: “*Give me a checklist, and I’ll get it done. But if the goal is too vague or open-ended, I struggle to take the first step.*” These early ethnographic patterns provided the puzzle for the quantitative phase: could such differences be systematically captured and validated?

Emergent profile (from diaries)	Key characteristics in diary codes	Notes / justification
Pragmatic problem-solver	Practical, likes to start immediately, values clear tools	Strong focus on <i>doing</i> and immediate utility, aligns with innovation-by-application.
Reserved evaluator	Hesitant, holds back judgment, unsure about peer value	Cautious, prefers clarity before acting — leans toward structured, risk-averse stance.
Context engager	Values relevance of topic, links class to real-life	Sees opportunities in context, but engagement depends on perceived relevance.
Detached learner	Low motivation, minimal effort, gives numeric scores only	Fits <i>pre-archetype</i> : disengaged. Could be seen as “shadow” state of Executors or Opportunists.
Minimal responder	Writes one-word answers (“Gitless Bas”), avoids reflection	Signals compliance without depth — more about lack of scaffolding uptake.
Affirmative engager	Gives positive but shallow feedback	Appreciates support, but doesn’t elaborate. Engagement through affirmation.
Presenter	Focused on giving/seeing presentations, enjoys stage	Expressive, thrives on pitching/performing, but less reflective.
Motivated by structure	Responds to clear expectations, motivated by guidance	Relies on structured scaffolds and external clarity.
Appreciates scaffolding	Likes questions, simplification, feedback	Sees value in scaffolds that connect abstract to practical.
Socially distracted	Prioritizes friends/socializing over tasks	High willingness socially, low task orientation; opportunistic focus shift.
Autonomy-seeker	Likes freedom, resists-imposed structure	Independent, chafes under constraint, prefers own path.
Idea-driven	Inspired by teacher prompts, enjoys generating ideas	High creativity, values ideation.
Reflective learner	Uses questions/feedback for deeper reflection	Values growth, persistence through reflection.
Support-seeker	Likes supportive teachers, feels safe with guidance	Relies on encouragement, resilience built through support.
Clarity-seeker	Wants summaries, simplified explanations	Thrives on structure and certainty.
Emotional learner	Needs fears/uncertainties addressed	Emotional persistence: resilience tied to affective support.

Table 10: Emergent Profiles

The emergent profiles in table 10 are not meant to be mutually exclusive typologies, but rather heuristic patterns distilled from diaries and focus-group data. Because entrepreneurial mindsets are dynamic configurations of traits and skills that evolve through iterative learning and vary with context (Hattenberg et al. 2022), students often exhibited more than one profile

across different tasks. A learner could be a “pragmatic problem-solver” when working with checklists yet also be an “appreciates scaffolding” type when seeking feedback, or show “autonomy-seeker” tendencies in free-form projects while needing structure in unfamiliar contexts. The overlap you notice therefore reflects the fluid nature of entrepreneurial development: diaries capture situated responses rather than fixed personality types, so profiles naturally blend.

To make sense of this complexity, the qualitative codes were used as an inventory of salient behaviours, not as definitive categories. They provided a starting point for mapping patterns onto the Ability × Willingness framework and then testing them quantitatively. When the diary-based profiles were analysed with the Gaussian mixture model, the overlapping tendencies coalesced into five broader archetypes that reconcile the overlaps and capture the main sources of classroom divergence. In short, the table is a descriptive tool for seeing how students’ perceptions vary; it should not be interpreted as claiming that each learner belongs to one and only one category.

4.2 Psychometric Validation of the EMP

To quantify variation in entrepreneurial mindset, we administered the Entrepreneurial Mindset Profile (EMP; Davis, Hall & Mayer, 2016). The EMP comprises seven personality-trait scales (e.g., independence, risk acceptance, action orientation) and seven skill scales (e.g., idea generation, execution, persistence). Internal consistency was high: Cronbach’s alpha values ranged from .78 to .92, and McDonald’s omega values from .74 to .91. Confirmatory factor analysis replicated the expected two-factor (ability vs. willingness) structure (CFI = .93, RMSEA = .06), consistent with prior research (Davis, Hall, & Mayer, 2016). These psychometric results confirmed that the EMP was suitable for clustering analyses.

4.3 Model-Based Cluster Analysis

4.3.1 From k-Means Screening to Gaussian Mixture Models (GMM)

We first treated clustering as a screening step to understand gross structure. Using standardized EMP scores (14 traits/skills), hierarchical and k-means algorithms indicated $k \approx 2$ –3 groups on internal indices—the Elbow Method (Thorndike, 1953; Fig. 1), Silhouette (Rousseeuw, 1987; Fig. 2), Calinski–Harabasz, and Davies–Bouldin.

- Elbow: inflection at $k \approx 2$ –3
- Silhouette: peak at $k \approx 2$ –3

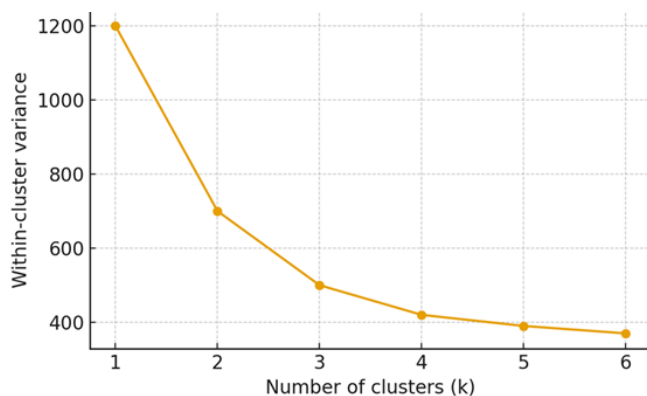


Figure 2. Elbow plot of within-cluster variance.

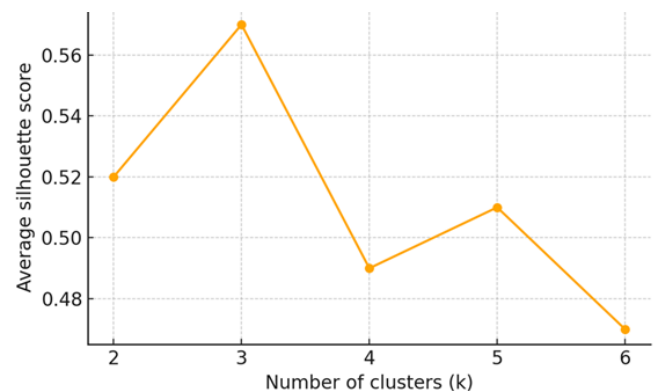


Figure 3. Silhouette scores for $k = 2$ –6.

However, two caveats apply in this context:

1. Geometry & variance. K-means partitions spherical, equal-variance clusters around a single scale, while psychological profiles on multi-dimensional Likert composites rarely satisfy these assumptions; subgroups often differ in shape and dispersion.
2. Substantive signal from ethnography. Diaries, interviews, and focus-group coding (Sections 3.2; 4.1) consistently surfaced richer differentiation than 2–3 groups, especially along Ability × Willingness and scaffold-response patterns.

Following a mixed-methods decision rule—*prefer the simplest model that fits both the statistics and the ethnographic patterns*—we advanced to Gaussian Mixture Models (GMM), which (i) allow elliptical, unequal-variance clusters, (ii) yield probabilistic (soft) memberships, and (iii) support principled model comparison via information criteria. To balance flexibility and parsimony with $p = 14$ and $N = 834$, we specified diagonal covariances (unequal variances, zero within-class covariances). We fit $K = 2 \dots 6$ with 200 random starts (k-means++ seeding), EM tolerance $1e-6$, and small covariance regularization to prevent degeneracy.

4.3.2 Selecting the Optimal Model

Model selection prioritized BIC (primary), supported by ICL, classification entropy, and average posterior probabilities. The BIC minimum at $K = 5$ favoured a five-class solution; ICL and entropy ≈ 0.78 indicated good separation with acceptable overlap. A 70/30 train–test split showed higher test log-likelihood for $K = 5$ than for $K = 2-3$. Bootstrap stability (100 resamples) yielded a moderate Adjusted Rand Index, indicating replicable structure with expected profile variability. Converging evidence across information criteria (BIC), overlap-penalizing criteria (ICL), classification quality (entropy, posterior probabilities), out-of-sample fit, and bootstrap stability—together with qualitative convergences supported five classes as the best balance of fit and parsimony. (Fraley & Raftery, 2002; Biernacki et al., 2000; Celeux & Soromenho, 1996; Nylund et al., 2007; McLachlan & Peel, 2000; Hubert & Arabie, 1985; Creswell & Plano Clark, 2018; Shadish et al., 2002).

Sensitivity & robustness.

Re-running k-means at $k = 5$ produced centroids closely aligned with GMM means (high profile-wise correlations) but worse separation, consistent with k-means' equal-variance constraint. Varying GMM starts/seeds produced near-identical likelihoods and profiles (mitigating local-optimum concerns). A spherical-covariance GMM collapsed classes toward 2–3, reinforcing the need for unequal variances. Results were stable under z-score standardization and winsorizing of extreme z-values.

4.3.3 Interpreting the Five Clusters

A MANOVA confirmed significant differences across all 14 EMP scales (Wilks' $\Lambda = 0.412$, $F(56, 1588) = 5.12$, $p < .001$). Figure 3 plots profile z-means. Detailed labels, trait patterns, and representative diary quotes appear in Table 2 and are elaborated in Section 4.4.

The Visionary Risktaker cluster combined high idea generation and nonconformity with lower execution and persistence; the Pragmatic Innovator displayed strong execution and future focus but lower risk acceptance and passion; the Systemic Executor was high on structure and execution but low on creativity; the Adaptive Opportunist scored high on independence and opportunity spotting but low on persistence; and the Resilient Pioneer combined high persistence and optimism with lower novelty orientation.

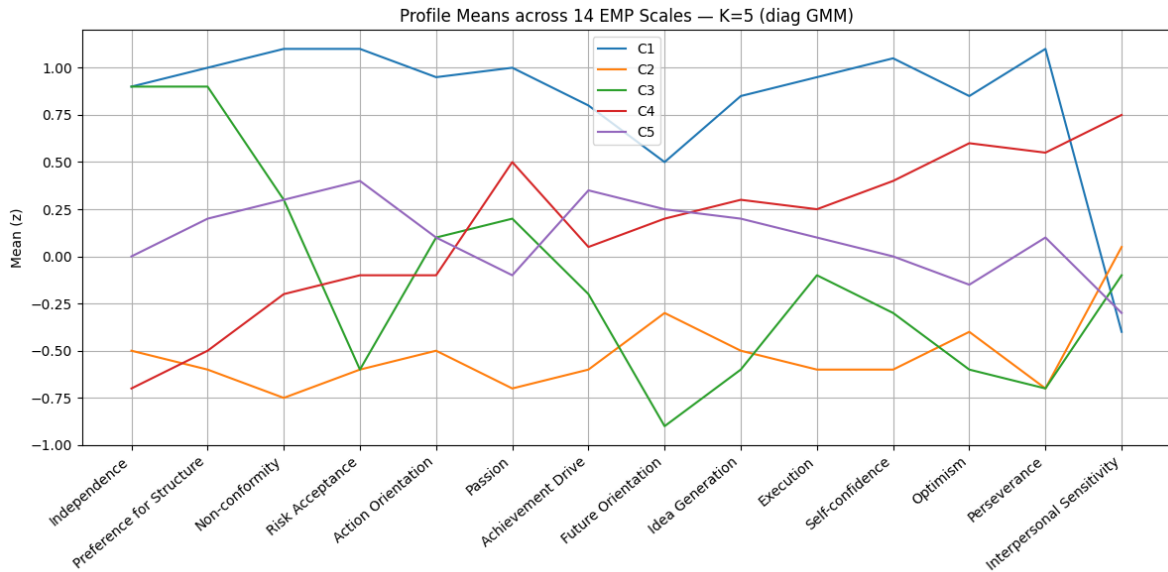


Figure 4: Profile Z-means across EMP scales

4.4 Archetype Profiles: Quantitative Traits × Ethnographic Voices

The five clusters were interpreted as *entrepreneurial mindset archetypes*, combining statistical differentiation with ethnographic insights. Each archetype captures a distinct configuration of traits, skills, and lived experiences:

- **Visionary Risktaker:** High nonconformity and idea generation; low execution and persistence. *“I’d rather pitch than prototype.”*
- **Pragmatic Innovator:** High execution and future focus; low risk acceptance and passion. *“I prefer improving what exists to starting from scratch.”*
- **Systemic Executor:** High execution and preference for structure; low nonconformity and creativity. *“Give me a checklist, and I’ll get it done.”*
- **Adaptive Opportunist:** High independence and opportunity spotting; low persistence. *“I often jump to the next idea before finishing the last one.”*
- **Resilient Pioneer:** High persistence and optimism; lower novelty orientation. *“When something doesn’t work, I don’t give up—I double down.”*

Trait / Skill	Visionary Risktaker	Pragmatic Innovator	Systemic Executor	Adaptive Opportunist	Resilient Pioneer
Nonconformity	High	Medium	Low	Medium	Medium
Idea Generation	High	Medium	Low	Medium	Low
Execution	Low	High	High	Low	Medium
Persistence	Low	Medium	Medium	Low	High
Future Focus	Medium	High	Medium	High	Medium
Risk Acceptance	High	Low	Low	Medium	Medium
Optimism	Medium	Medium	Medium	Medium	High
Independence	Medium	Medium	Medium	High	Medium
Passion	Low	Low	Medium	Medium	Low
Representative quote	“I’m full of ideas ... but once the planning starts, I lose focus.”	“I like improving what exists more than starting from scratch.”	“Give me a checklist and I’ll get it done.”	“I see possibilities everywhere, but I jump to the next idea.”	“If something doesn’t work, I don’t give up—I double down.”

Table 11. Archetype differentiation across EMP traits with representative diary quotes.

4.5 Mapping Archetypes onto Ability × Willingness

To interpret developmental implications, the archetypes were mapped onto the Ability × Willingness framework (Hattenberg et al., 2022). This revealed systematic positioning:

C1: Adaptive Opportunist: Moderately high willingness, moderately high ability

C2: Pragmatic Innovator: Moderate willingness, moderate ability

C3: Systemic Executor: Lower willingness, high ability

C4: Visionary Risktaker: High willingness, lower ability

C5: Resilient Pioneer: High willingness, High ability

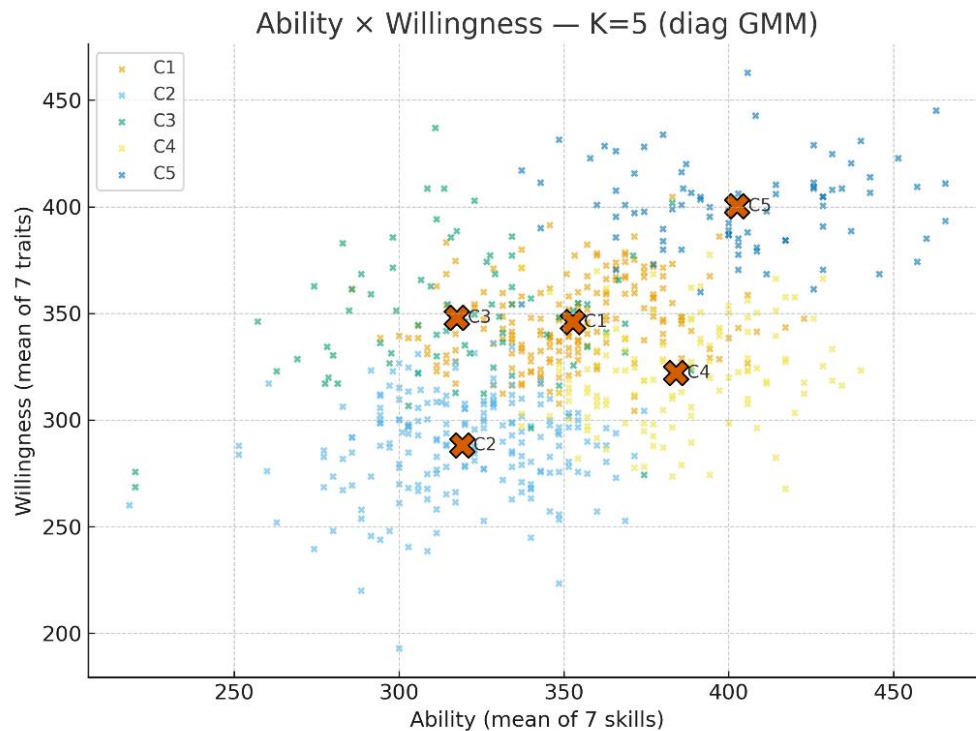


Figure 5. Archetypes mapped onto Ability × Willingness axes.

4.6 Integration of Quantitative and Qualitative Insights

Cross-tabulation of GMM class memberships with emergent qualitative profiles showed significant associations (χ^2 test, $p < .01$; Cramér's $V \approx 0.38$). Students in the Visionary Risktaker class tended to correspond with diary profiles favouring “freedom to explore,” whereas Systemic Executors aligned with profiles seeking “clear steps.”

This triangulation demonstrates that the statistical clusters reflect real differences in how learners perceive and respond to scaffolding. Moreover, five of the nine cells in Hattenberg's ability–willingness matrix were repeatedly highlighted in teacher discussions and aligned closely with the five GMM classes. Together, these findings indicate that the archetypes are not statistical artefacts but empirically grounded learner configurations.

Archetype	EMP Traits (summary)	Representative Diary Quote	Interpretation
<i>Visionary Risktaker</i>	High idea generation, nonconformity; low execution, persistence	“I’m full of ideas ... but once the planning starts, I lose focus.”	High creativity with weak implementation.
<i>Pragmatic Innovator</i>	High execution, planning; low risk acceptance, passion	“I like building things that work ... improving what exists.”	Structured, incremental innovation approach.
<i>Systemic Executor</i>	High structure; low ambiguity tolerance, low risk acceptance	“Give me a checklist ... vague goals make me struggle.”	Methodical and reliable, risk averse.
<i>Adaptive Opportunist</i>	High independence, future focus; low persistence	“I can spot possibilities everywhere ... but I jump to the next idea.”	Flexible, quick to pivot; low follow-through.
<i>Resilient Pioneer</i>	High persistence, optimism; lower novelty orientation	“When something doesn’t work, I don’t give up ... maybe too far sometimes.”	Tenacious, may overcommit to weak ideas.

Table 12. Triangulation of archetypes: EMP traits × ethnographic validation.

4.7 Summary

The results reveal that classroom divergence in entrepreneurship education can be understood through five empirically derived archetypes that reconcile overlapping qualitative profiles with nuanced quantitative clusters. The GMM analysis captured patterns that k-means could not, and the integration with ethnographic data and theory provided further support for the interpretation of these archetypes.

Importantly, the archetypes should not be understood as fixed learner types or stable personality categories. Rather, they represent empirically recurring configurations of entrepreneurial mindset at a particular point in time and within a particular educational context.

Consistent with a developmental and context-sensitive understanding of entrepreneurial mindset (Hattenberg et al., 2019; Hattenberg, 2022), individual learners may develop, shift between configurations, or display different configurations as their ability, willingness, experience, and contextual demands change.

The archetypes therefore represent developmental starting points rather than enduring classifications of learners, and their pedagogical value lies in supporting differentiated educational responses rather than in assigning labels. From this perspective, the five archetypes provide a foundation for examining how adaptive scaffolding can be aligned with learner diversity and changing developmental needs.

5. Discussion

The identification of five entrepreneurial mindset archetypes—Visionary Risktakers, Pragmatic Innovators, Systemic Executors, Adaptive Opportunists, and Resilient Pioneers—offers a nuanced framework for understanding the diversity of developmental starting points in entrepreneurship education.

What distinguishes this framework from earlier typologies is that the archetypes emerged not only from statistical clustering of EMP survey data but also from ethnographic observation of classroom dynamics and thematic analysis of student diaries. This dual grounding ensures that

the archetypes are both psychometrically robust and educationally meaningful, extending existing theories of entrepreneurial cognition by demonstrating how scaffolding practices are received in radically different ways depending on learners' configurations of ability and willingness.

5.1 Archetypes and Theoretical Contributions

The archetypes contribute to entrepreneurship theory in two important ways. First, they extend Sarasvathy's (2001) effectuation theory. For example, the Visionary Risktaker aligns naturally with effectual reasoning: embracing uncertainty, leveraging available means, and prioritizing ideation. By contrast, the Systemic Executor gravitates toward causal reasoning: preferring structured planning, predictability, and stepwise execution. These orientations reflect not a binary divide but a continuum of logics, mediated by initial mindset configurations.

Second, while Hattenberg et al. (2021, 2022) provided a valuable conceptual framework for mapping entrepreneurial mindset diversity along ability and willingness, their categories remained abstract. The present study builds on that framework but moves beyond it: the archetypes here were inductively derived from the convergence of quantitative clusters and ethnographic accounts. Renaming them was a deliberate act of translation—from analytical profiles to pedagogically actionable learner types. In this sense, the archetypes extend Hattenberg's lens by making it directly applicable in classroom practice.

Finally, mapping the archetypes onto Dimov's (2007, 2010) entrepreneurial journey framework highlights developmental plurality. Adaptive Opportunists, for instance, oscillate between stages of potential and nascent entrepreneurship as they pivot in response to feedback, while Resilient Pioneers embody Shepherd's (2004) notion of learning spirals, progressing incrementally despite setbacks. These findings underscore that entrepreneurial expertise is not linear but unfolds as diverse journey pathways shaped by archetype-specific tendencies.

5.2 Implications for Scaffolding and the ZPD

The archetypes highlight why uniform pedagogical strategies are insufficient. Ethnographic classroom data revealed that identical scaffolds—such as pitching templates or reflective journals—were perceived as empowering by some students but alienating by others. For example, a Visionary Risktaker described planning tools as stifling, while a Systemic Executor regarded them as indispensable.

This divergence resonates strongly with Vygotsky's (1978) Zone of Proximal Development (ZPD): scaffolding must be tailored to the learner's immediate developmental space and gradually adjusted. Archetype-specific strategies thus become essential:

- **Visionary Risktakers** benefit from structured translation of creative energy into action.
- **Systemic Executors** need ambiguity-rich challenges to stretch beyond routine.
- **Pragmatic Innovators** thrive on prototyping tasks that link execution with incremental improvement.
- **Adaptive Opportunists** require mentoring that channels flexibility into sustained commitment.
- **Resilient Pioneers** respond well to reflective practices that help calibrate persistence.

By aligning scaffolding with archetype-specific tendencies, educators can bridge gaps between current capacity and future potential more effectively.

5.3 Educational and Policy Implications

The archetype framework carries implications at three levels:

Curriculum design: Modular scaffolding strategies should be embedded so that content can be flexibly matched to archetypal needs. Ethnographic insights into student experiences ensure that these modules resonate with learners lived realities.

Educator training: Teachers require adaptive agility—the capacity to diagnose archetypes in real time and adjust their pedagogy accordingly (Florian & Black-Hawkins, 2011). The ethnographic accounts in this study provide concrete exemplars that can be used in professional development.

Policy: Policymakers should support longitudinal, cross-context research to monitor how archetypes evolve and how scaffolds perform across diverse cultural settings (OECD, 2015). Ethnographic evidence strengthens the case for policy interventions that prioritize learner diversity and context-sensitive education.

5.4 Limitations and Future Research

This study has several limitations. The Dutch sample restricts generalizability, and cultural differences in risk-taking, autonomy, and entrepreneurial intention (Cui, Sun, & Bell, 2021) must be explored in future research. The reliance on cross-sectional survey data, supplemented by diaries and interviews, limited the ability to capture transitions between archetypes over time. Longitudinal ethnography could reveal whether learners migrate from one archetype to another and under what conditions.

A second limitation lies in the interpretive dimension of ethnographic coding: while triangulation with quantitative clusters increased robustness, the categorization of diary and interview data inevitably involved researcher judgment. Future studies could strengthen validity through intercoder reliability checks, independent coding teams, or cross-validation with alternative instruments such as entrepreneurial orientation (Lumpkin & Dess, 1996) or bricolage (Baker & Nelson, 2005).

Finally, the study did not directly measure entrepreneurial outcomes. Future research should examine whether archetypes predict behaviours such as venture creation, innovation, or persistence, and whether combinations of archetypes within founding teams influence team resilience and performance.

6. Key Contributions

This study makes three primary contributions—theoretical, methodological, and practical—to entrepreneurship education and research.

Theoretical contribution. By empirically identifying five entrepreneurial mindset archetypes, this research extends effectuation theory (Sarasvathy, 2001) and related frameworks. It demonstrates that entrepreneurial reasoning (effectual vs. causal) is not only a function of experience but also of learners' initial mindset configurations. Integrating these archetypes with Dimov's (2007, 2010) entrepreneurial journey and Shepherd's (2004) learning spirals, the study shows that entrepreneurial expertise develops through multiple, archetype-specific pathways, rather than a linear progression. By situating the archetypes within Hattenberg et al.'s (2021, 2022) ability–willingness framework, the study bridges abstract theory with empirical learner realities.

Methodological contribution. The study advances mixed-methods research in entrepreneurship education. Statistical cluster analysis of EMP survey data was combined with ethnographic evidence from diaries, interviews, and classroom observations. This integration demonstrates how quantitative parsimony (5 clusters) can be expanded into richer, pedagogically meaningful archetypes when cross-validated with lived experiences. It provides a replicable model for future research that seeks to balance robustness with contextual depth.

Practical contribution. The findings inform the development of an Adaptive Entrepreneurial Development Framework (AEDF), which connects archetype diagnosis with tailored scaffolding strategies. Because these archetypes were enriched with ethnographic narratives, they are not abstract constructs, but recognizable learner types encountered in classrooms. This enables educators to design scaffolds that resonate with students' lived realities, enhances professional development by giving teachers diagnostic tools, and guides policymakers toward more inclusive and context-sensitive entrepreneurship education. This has direct implications for curriculum design, educator professionalization, and policy, moving the field beyond one-size-fits-all approaches toward more inclusive, learner-centered entrepreneurship education.

7. Conclusion

This study significantly advances our understanding of entrepreneurial development by empirically identifying five distinct entrepreneurial mindset archetypes—Visionary Risktakers, Pragmatic Innovators, Systemic Executors, Adaptive Opportunists, and Resilient Pioneers—that serve as foundational starting points in the entrepreneurial journey. By integrating concepts from effectuation theory (Sarasvathy, 2001), entrepreneurial learning (Dimov, 2007, 2010; Politis, 2005), and scaffolding theory (Wood, Bruner, & Ross, 1976; Vygotsky, 1978), the research provides a nuanced framework for conceptualizing how novice entrepreneurs progress toward expertise.

The findings extend effectuation theory by demonstrating that the adoption of effectual or causal logics is not uniform across entrepreneurs but is shaped by their initial mindset configuration, as reflected in the diversity of archetypes identified. This supports recent research emphasizing the contextual and developmental nature of entrepreneurial cognition (Shepherd & Patzelt, 2018). Moreover, the archetype framework enriches our understanding of the entrepreneurial journey as an iterative, context-dependent process, where individuals may traverse multiple developmental pathways rather than following a linear progression. This perspective aligns with Shepherd et al.'s (2010) concept of entrepreneurial spirals, where feedback loops between mindset and context reinforce certain behaviours and capacities over time.

Furthermore, the results contribute to bridging individual- and opportunity-based perspectives in entrepreneurship research (Shane & Venkataraman, 2000). The archetypes highlight how individual differences in entrepreneurial mindset interact with opportunity recognition and exploitation, offering a more holistic view of the entrepreneurial process. By demonstrating how specific archetypes correspond to strengths and developmental needs, the study provides insight into how entrepreneurial potential can be systematically nurtured through targeted educational interventions.

For entrepreneurship educators, the archetype framework offers valuable guidance for designing and implementing tailored pedagogical approaches. By diagnosing students' archetypes, educators can develop customized curricula and scaffolding strategies that align with archetype-specific needs—for example, providing Visionary Risktakers with structured planning tasks, or supporting Systemic Executors with ambiguity-tolerant exercises. This

approach has the potential to enhance the effectiveness of entrepreneurship education programs (Neck & Greene, 2011). Beyond education, the findings also have implications for incubators, accelerators, and policymakers, providing a foundation for more inclusive and differentiated support mechanisms for early-stage entrepreneurs. Recognizing the diversity of archetypes enables stakeholders to design interventions that are responsive to varied entrepreneurial pathways and challenges.

Future research should seek to validate and refine these archetypes across diverse educational and cultural contexts. Longitudinal studies tracking transitions between archetypes would provide a more dynamic perspective on entrepreneurial development, revealing whether, for instance, Adaptive Opportunists consistently pivot across opportunities before stabilizing, or whether Pragmatic Innovators evolve into more effectual reasoning as they accumulate experience. Additionally, research into team-level dynamics—exploring how combinations of archetypes within founding teams influence innovation, resilience, and venture outcomes—would yield valuable insights into collaborative entrepreneurial processes.

At its heart, this study began with a simple but pressing puzzle: why do students, exposed to the same scaffolding in entrepreneurship classrooms, diverge so radically in their experiences? The identification of five entrepreneurial mindset archetypes offers an answer: learners do not enter the classroom as blank slates but as differently configured bundles of ability and willingness, each requiring tailored forms of support.

By naming and grounding these archetypes in both data and lived experience, the research demonstrates that classroom divergence is not a failure of pedagogy, but evidence of learner diversity. Recognizing and working with that diversity transforms entrepreneurship education from a uniform transmission of content into an adaptive practice of scaffolding developmental journeys. In this sense, the archetypes not only explain classroom divergence but also provide a roadmap for turning it into a strength—cultivating entrepreneurial capacity in its many forms and preparing diverse learners to meet the uncertainties of the future.

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5

Tailoring Scaffolding to Entrepreneurial Mindset Profiles

Tailoring Scaffolding to Entrepreneurial Mindset Archetypes: A Mixed-Methods Study of Adaptive Pedagogy in Entrepreneurship Education

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Abstract

Entrepreneurship education must accommodate diverse learner profiles, yet most pedagogies remain standardized. This study investigates how differentiated scaffolding strategies interact with entrepreneurial mindset archetypes to support engagement, collaboration, and development. Using a mixed-methods design—combining reflective diaries, controlled classroom experiments, and student focus groups—we analyzed six evidence-based scaffolding techniques across five archetypes. Findings show that homogeneous groups accentuate archetypal strengths and blind spots, while heterogeneous groups enable peer scaffolding and higher-quality outcomes. Archetype–scaffold alignments reveal which supports are universally effective, which are profile-specific, and which risk being counterproductive. Synthesizing these insights, we introduce the Adaptive Entrepreneurial Development Framework (AEDF), a practical model that helps educators tailor scaffolding to learner profiles and design more inclusive, adaptive, and developmentally attuned entrepreneurship education.

Keywords: Entrepreneurial Mindset Archetypes; Scaffolding Strategies; Entrepreneurship Education; Adaptive Pedagogy; Mixed-Methods Research

Introduction

Entrepreneurship education (EE) faces the challenge of designing learning experiences that accommodate a diverse range of learner profiles. Students enter EE programs with markedly different cognitive, motivational, and behavioral starting points. Traditional one-size-fits-all pedagogy often fails to engage all learners equally, as evidenced by uneven outcomes in opportunity recognition, creativity, and venture success (Neck & Corbett, 2018; Nabi et al., 2017).

Scaffolding – the practice of providing tailored, temporary support to learners – has long been recognized as a cornerstone of effective teaching. By controlling elements of a task that are initially beyond a student’s capacity and gradually transferring responsibility as competence grows (the essence of Vygotsky’s Zone of Proximal Development), scaffolding can help every learner progress.

However, the effectiveness of scaffolding is contingent on alignment with the learner’s profile. Misalignment between support and student needs can impede learning; for example, *open-ended tasks may overwhelm learners who prefer structure, while rigid templates may stifle more creative students.*

Such mismatches risk leading to disengagement or even learned helplessness, where repeated failure without proper support erodes a student’s motivation and self-efficacy (Seligman, 1972). These concerns underscore the need for a more nuanced, adaptive approach to scaffolding in EE.

Learner heterogeneity in EE is increasingly recognized in recent scholarships. Hattenberg et al. (2021) conceptualize entrepreneurial mindsets as dynamic configurations of *ability* (cognitive and practical skills) and *willingness* (motivational readiness), activated in “spikes” as personal traits meet environmental demands.

Building on the identification of five entrepreneurial mindset archetypes in Chapter 4, this chapter examines how these profiles interact with different scaffolding strategies. Using a mixed-methods design, including reflective diaries, classroom experiments, and focus groups, we systematically investigate which supports foster engagement, reduce frustration, and advance learning for each archetype. The analysis culminates in the Adaptive Entrepreneurial Development Framework (AEDF), a practical synthesis that links archetypes to scaffolding strategies and pedagogical formats. The AEDF is presented not only as a conceptual contribution but as a toolkit for educators to design responsive, inclusive, and developmentally attuned entrepreneurship education.

Building on this perspective, five distinct *entrepreneurial mindset archetypes* have been identified among students: Visionary Risk-Takers, Pragmatic Innovators, Systematic Executors, Adaptive Opportunists, and Resilient Pioneers. Each archetype represents a unique combination of abilities, motivations, and learning needs (Loef et al., TBP). For instance, *Visionary Risk-Takers* tend to be high in creative drive (willingness) but lower in systematic execution skills (ability), whereas *Systematic Executors* excel in planning and analysis (ability) but often display lower risk tolerance or initiative (willingness). *Pragmatic Innovators* balance creativity with realism, *Adaptive Opportunists* readily pivot and experiment, and *Resilient Pioneers* show perseverance and emotional resilience. These archetypes offer a powerful lens for understanding learner diversity in EE. What remains insufficiently explored, and is the focus of this chapter, is how different scaffolding strategies interact with these archetypal profiles, and which configurations of support are most effective for developing each type of entrepreneurial mindset.

To address this gap, this chapter investigates two central research questions: (1) *How do scaffolding strategies interact with learners of different entrepreneurial mindset archetypes in experiential learning environments?* (2) *What configurations of support foster the development of an entrepreneurial mindset across these diverse learner profiles?* In essence, the aim is to determine *which scaffolding approaches work best for which archetypes*, and how educators can adapt their teaching to support each profile’s growth. By empirically examining these questions, we seek to move beyond generic interventions toward a learner-centered, adaptive pedagogy in entrepreneurship education. Throughout this chapter, these archetypes are treated as developmental and context-sensitive configurations rather than fixed categories of learners.

This study adopts a mixed-methods approach to map scaffolding effectiveness across the archetypes. First, a quantitative survey (the Entrepreneurial Mindset Profile, EMP) was used to identify and cluster student archetypes. Building on that, we implemented a series of qualitative and experimental methods: reflective diaries, classroom experiments, and focus group interviews. Reflective diaries captured students’ day-to-day learning experiences and their reactions to instructor support in real time, providing rich insight into how scaffolding was perceived and what impact it had.

Controlled classroom experiments allowed us to systematically vary group composition (homogeneous vs. heterogeneous archetype teams) and observe the effects of different scaffolding conditions on engagement and performance. Finally, focus group discussions with students offered deeper qualitative understanding of *why* certain scaffolding worked or failed

from the learner's perspective, and enabled participant reflection on the archetypes themselves.

By triangulating these data sources – surveys, diaries, experiments, and focus groups – the study generates a comprehensive view of scaffold–profile interactions. We examine six evidence-based scaffolding techniques drawn from educational literature (instructing, explaining, modeling, questioning, feedback, and hinting), analyzing which of these are most or least effective for each archetype. The outcome of this chapter is a nuanced understanding of adaptive scaffolding configurations: which supports are universally beneficial, which are profile-specific, and which may be counterproductive if misapplied.

In the sections that follow, we outline the study's methodology, present the key findings, and then discuss their implications. The Methodology section describes the research design, including participant grouping, diary coding, and experimental setup. The Findings section reports how each archetype responded to various scaffolding strategies, highlighting patterns (e.g. which archetypes thrive under certain supports and struggle under others) and includes tables and models that illustrate these relationships. In the Discussion, we interpret the results considering pedagogical theory and prior research – connecting back to concepts like Vygotsky's ZPD, effectuation theory, and Illeris's learning model – and explore practical applications for entrepreneurship educators.

The chapter concludes by summarizing how tailored scaffolding can foster more inclusive and effective entrepreneurial learning, acknowledge limitations of the study and point to future research directions. Overall, this inquiry bridges the gap between recognizing learner diversity and acting on it: it offers empirical evidence that differentiated scaffolding – intentionally tuned to entrepreneurial mindset archetypes – can significantly enhance student development, thereby advancing the practice of entrepreneurship education toward greater adaptivity and impact.

The central contribution of this chapter is the development of the Adaptive Entrepreneurial Development Framework (AEDF), which integrates archetype-specific learning needs with evidence-based scaffolding strategies.”

Literature Review

Scaffolding describes the dynamic process by which teachers or peers provide tailored, temporary support to extend learners' performance beyond what they can achieve independently (Wood, Bruner, & Ross, 1976; Vygotsky, 1978). Its defining properties—contingency, fading, and transfer of responsibility—make it particularly suited to contexts where learners face open-ended and uncertain challenges (Van de Pol, Volman, & Beishuizen, 2010; Belland, 2017). Contemporary studies of adaptive instruction emphasize that scaffolding effectiveness depends on moment-to-moment diagnosis of learner need and on the timely adjustment of guidance intensity (Van de Pol, Mercer, & Volman, 2019; Hmelo-Silver, Duncan, & Chinn, 2007).

While scaffolding has been extensively studied in domains such as STEM and problem-based learning, its potential for entrepreneurship education (EE) remains underdeveloped. EE is characterized by ill-structured problems, high uncertainty, and the need for iterative sense-making—conditions under which generic scaffolding models often falter (Fayolle, 2013; Neck & Corbett, 2018). A growing body of research argues that scaffolds must be adaptive, aligning support to the learner's current reasoning mode, tolerance for ambiguity, and developmental readiness (Pittaway & Cope, 2007; Lackéus, 2020).

Entrepreneurial learning is fundamentally developmental, combining cognitive, affective, and social dimensions that evolve over time (Cope, 2005; Dimov, 2010). Learners begin from diverse “entry points” shaped by prior experience, motivation, and self-efficacy (Bandura, 1997; Gibb, 2002), which in turn influence how they engage with uncertainty and feedback. Meta-analyses consistently show that entrepreneurship programs yield highly variable outcomes depending on learner characteristics and pedagogical alignment (Nabi et al., 2017). Consequently, differentiated and experiential pedagogies are increasingly recommended to match students’ developmental needs (Morris et al., 2013; Rae, 2020).

Effectuation theory offers a particularly relevant lens for differentiating support. Sarasvathy (2001) distinguishes between causal reasoning—goal-driven prediction and planning—and effectual reasoning, which emphasizes action with available means, partnership formation, and leveraging contingencies. Novice entrepreneurs tend to default to causal logic, while expert entrepreneurs act effectually under uncertainty (Read, Sarasvathy, Dew, & Wiltbank, 2009). This novice–expert continuum implies that scaffolding should enable movement between reasoning modes: structure and feedback for novices, open-ended questioning and reflection for more expert learners (Fayolle & Gailly, 2008).

Entrepreneurial learning mobilizes cognitive, emotional, and social processes that must be simultaneously supported for growth to occur. Illeris (2003, 2007) conceptualizes learning as the integration of content (cognitive mastery), incentive (motivation and emotion), and interaction (social relations). Within EE, this means that scaffolding extends beyond cognitive aids such as templates or models—it must also provide emotional reassurance (normalizing failure, reinforcing agency) and social structure (peer or mentor feedback) (Edmondson, 1999; Cope, 2011; Nabi et al., 2017). A lack of attention to emotional or social scaffolds can lead to disengagement, even when cognitive scaffolds are well designed (Belland, 2017).

Furthermore, scaffolding misalignment has psychological costs. Over-structuring limits ownership and exploration; under-structuring produces confusion or paralysis (Hammond & Gibbons, 2005; Puntambekar & Hubscher, 2005). In entrepreneurial contexts—where ambiguity is inherent, such mismatches may reinforce *learned helplessness*, reducing perceived control and self-efficacy (Seligman, 1972; Skinner, Kindermann, & Furrer, 2008). These risks emphasize the need for contingent scaffolds calibrated to both the learner’s confidence and the task’s uncertainty.

Although EE scholars acknowledge learner diversity, pedagogical responses have often remained broad or descriptive rather than empirically differentiated. Profiling tools such as the Entrepreneurial Mindset Profile (EMP) offer a promising basis for adaptive instruction by mapping students’ cognitive and motivational orientations (Davis, Hall, & Mayer, 2016). Yet few studies link such profiles to specific scaffolding strategies or examine how combinations of supports affect learning processes.

Recent conceptual work (Hattenberg, Reijnders, Groen, & Kraaijenbrink, 2021; Loef & Groen, 2025, in press) proposes that entrepreneurial mindsets can be modeled as dynamic configurations of *ability* and *willingness*—traits that activate differently across contexts. This framing suggests that each learner’s archetype may require a distinctive balance of structure and autonomy. For example, ideation-driven learners may benefit from feedback and modeling that translate vision into executable action, whereas analytically oriented learners may need questioning and reflective prompts to tolerate ambiguity.

Across educational, psychological, and entrepreneurial literatures, a consensus emerges: scaffolding must be adaptive, developmental, and multidimensional. Yet empirical evidence on *how* to operationalize this adaptivity in entrepreneurship education remains scarce. Specifically, few studies test whether certain scaffolding mixes (e.g., instructing + feedback, modeling + questioning) better support distinct learner types or how group composition moderates these effects.

This study addresses that gap by empirically examining the interaction between entrepreneurial mindset archetypes and scaffolding strategies in experiential learning settings. It extends scaffolding theory by introducing *archetype-contingent scaffolding* as a new application of contingency, and it operationalizes adaptive pedagogy in entrepreneurship education through the Adaptive Entrepreneurial Development Framework (AEDF).

Methodology

The EMP dataset used in this chapter is the same dataset of N = 834 students across three Dutch Universities of Applied Sciences analysed in Chapter 4. Chapter 5 does not introduce a new survey sample or independently derive a new set of archetypes. Instead, it builds on the five-archetype solution established in Chapter 4. The EMP-based archetype classifications are carried forward as a profiling mechanism through which students participating in the subsequent diary, experimental, and focus-group phases can be related to the previously established mindset configurations.

Research Design

We adopted a sequential mixed methods design with four interconnected phases (survey, diaries, experiments, focus groups). This design allowed us to capture broad patterns at scale and then delve deeper into qualitative nuances, aligning with best practices for investigating complex, context-dependent phenomena. By integrating quantitative and qualitative strands iteratively, each phase informed the sampling and analysis of subsequent phases, strengthening inference through methodological triangulation (multiple converging evidence). Table 13 provides an overview of the research phases:

Phase	Method	Purpose	Key References
1. Quantitative Profiling	Survey (EMP) + Cluster Analysis	Profile students' entrepreneurial mindsets; derive archetypes for sampling in later phases.	Davis et al. (2016); Kaufman & Rousseeuw (2005)
2. Qualitative Diaries	Reflective Diary Study	Capture day-to-day learning experiences and scaffolding perceptions (within-person insights, across archetypes).	Bolger et al. (2003)
3. Classroom Experiments	In-class Design-Based Experiments	Observe scaffolded learning processes in real time under authentic course conditions (manipulating task structure & team composition).	Design-Based Research Collective (2003); McKenney & Reeves (2019)
4. Focus Groups	Post-hoc Group Interviews	Member-check and validate findings; enrich interpretation through group dialogue and reflection.	Krueger & Casey (2015)

Table 13. Overview of Research Design Phases

The empirical phases followed a connected sequence. The EMP survey provided the initial quantitative profiles and archetype classifications. These classifications subsequently informed the selection and analysis of participants in the diary study and the composition of teams in the classroom experiments.

The diary studies, experiments, and classroom observations were conducted partly in parallel because they were embedded within the scheduling of the participating educational programmes. Focus groups were conducted subsequently to deepen, challenge, and validate interpretations emerging from the preceding phases. The resulting evidence was then triangulated to examine relationships between learner archetype, scaffolding strategy, and learner response.

This phased design ensured integration throughout rather than only at the end. Insights from Phase 1 guided the selection of participants and conditions in Phases 2–4. Quantitative archetype profiles were used diagnostically to sort diary entries by profile, characterise the archetype composition of existing teams in the classroom experiments, and recruit a balanced mix of students for focus groups.

In analysis, we used joint displays (e.g. scaffold-by-archetype matrices) to compare data across methods, and triangulated results from surveys, observations, and interviews to seek convergence (or explain divergence) in findings. This approach increases the validity and coherence of our conclusions (convergent validity) by showing consistent patterns across independent data sources (Denzin, 1978; Jick, 1979).

Throughout, we adhered to ethical and quality standards. All participants gave informed consent, and data were anonymized under GDPR guidelines (Israel, 2014). An audit trail was maintained linking raw data to interpretations, and we conducted peer debriefings and member checks (via focus groups) to verify the accuracy of our interpretations (Miles, Huberman & Saldaña, 2019; Nowell et al., 2017). These steps enhance the trustworthiness of the study, ensuring that findings are credible and dependable (Tracy, 2020).

Participants and Archetype Identification (Phase 1)

At the start of the program, we administered the Entrepreneurial Mindset Profile (EMP) survey (Davis, Hall, & Mayer, 2016) to $N = 834$ undergraduate students across three Dutch universities of applied sciences. The EMP measures 14 dimensions of entrepreneurial mindset (7 personality traits and 7 skills) on Likert-type scales. All subscales showed good internal consistency (Cronbach's $\alpha > 0.78$). We first verified the construct structure of the EMP via confirmatory factor analysis (CFA), which indicated acceptable fit (CFI > 0.90 , RMSEA < 0.08) for the theorized dimensions (Kline, 2016; DeVellis, 2016).

Using these survey data, we performed cluster analysis to identify distinct mindset profiles ("archetypes") among the students. Following established practices, we standardized all EMP subscale scores and explored initial groupings with hierarchical clustering and k -means (Thorndike, 1953; Rousseeuw, 1987). This suggested a potential range of 4–6 clusters. We then applied a more rigorous latent profile analysis (LPA) with Gaussian mixture models to allow clusters of unequal shape/variance.

Competing models with 2 through 6 classes were estimated and compared primarily by Bayesian Information Criterion (BIC), alongside entropy and interpretability (Kaufman & Rousseeuw, 2005; Pastor et al., 2007). The model with five profiles emerged as optimal – it had the lowest BIC and high entropy (~ 0.78), indicating well-separated clusters.

We validated this five-cluster solution via a 70/30 split-sample cross-validation (the five profiles replicated in both subsamples better than alternative solutions) and bootstrapped stability checks (Adjusted Rand Indices > 0.8 between bootstrapped solutions). A multivariate ANOVA (MANOVA) confirmed that the five groups were statistically distinct in their EMP score patterns

(Wilks' λ significant, $p < .001$), and follow-up ANOVAs on each dimension with post-hoc tests showed each profile had a unique signature (Tabachnick & Fidell, 2019; Field, 2017).

Each student was assigned to one of the five archetypes based on their highest posterior probability in the LPA (average assignment probability ≥ 0.80 , indicating confident classification). These archetypes formed the basis for purposeful sampling in subsequent qualitative phases.

The five profiles are introduced in the Results section, where we describe their characteristics in detail. In brief, they correspond to those identified in Chapter 4 (the earlier quantitative analysis) and capture diverse entrepreneurial “starting points” in terms of attitude and skill mixes. By identifying these profiles quantitatively first, we set the stage to examine how different types of students respond to educational scaffolding in the next phases.

Reflective Diaries (Phase 2)

In Phase 2, we used a reflective diary method to collect fine-grained, longitudinal data on students' daily learning experiences. A subset of the survey participants (approximately 150 students who were enrolled in a 4-week entrepreneurship module) were asked to complete brief end-of-day diary entries throughout the module. We aimed for each student to provide 15–20 entries over 4 weeks.

The diary corpus analysed in this chapter originates from the same approximately 150 students whose reflective diaries contributed to the qualitative strand reported in Chapter 4. The chapters use this shared dataset for different analytical purposes. In Chapter 4, diary accounts contributed to the identification and interpretation of recurring learner patterns and their relationship with EMP-derived archetypes. In the present chapter, the diary corpus is re-examined specifically to investigate reported scaffolding interactions and differences in scaffold response across archetypes.

Approximately 2,800 diary entries constituted the complete corpus. For the scaffolding analysis reported here, 347 entries were retained because they contained sufficiently clear and interpretable descriptions of educator support relevant to the research question. Entries that were incomplete, illegible, overly general, or did not contain an identifiable scaffolding interaction were excluded from this specific analysis. The 347 entries therefore represent an analytical subset of the shared diary corpus rather than a separate dataset.

The diary prompts encouraged students to record: (a) their emotional state and mindset that day, (b) any salient learning events or “aha” moments, (c) interactions with instructors or peers that felt supportive or unsupportive, and (d) any obstacles or frustrations encountered. Diaries were submitted via a secure online platform, with entries linked to each student's archetype profile via an anonymous code (to enable later comparison by profile without revealing identity). This method captured experiences in real-time, minimizing hindsight bias and memory distortion (Bolger, Davis, & Rafaeli, 2003).

All diary participants gave informed consent for their reflections to be used in research, with assurances of confidentiality and no impact on course grading (diary completion was a course requirement for credit, but content was not graded).

We analyzed the diary data using a blend of deductive coding (based on predefined categories of scaffolding support) and inductive thematic analysis for emergent patterns. First, we conducted a directed content analysis (Hsieh & Shannon, 2005) anchored in classic scaffolding

literature. We defined six codes corresponding to common scaffolding strategies identified in educational research: *instructing*, *explaining*, *modeling*, *questioning*, *feedback*, and *hinting*. These were drawn from the foundational work of Wood, Bruner, & Ross (1976) and contemporary scaffolding frameworks (Van de Pol, Volman, & Beishuizen, 2010; Van de Pol, Mercer, & Volman, 2019).

Each time a diary entry mentioned a teacher's supportive action (or lack thereof), we coded it with one of these types. We also noted the valence of each scaffold mention – whether the student described it as *helpful/positive* or *unhelpful/negative*. This allowed us to not only tally how often each type of support was present but also gauge its perceived effectiveness from the student's perspective.

In parallel, we used an inductive approach to capture emergent themes regarding students' feelings and peer interactions. Two researchers read through the entries and noted recurring motifs (e.g., anxiety about ambiguity, confidence gained from small wins, reliance on peer help, frustration with group dynamics). This exploratory memoing was consistent with an abductive analysis process (Timmermans & Tavory, 2012), where we iteratively refined our understanding by moving between our theoretical scaffolding framework and the unexpected patterns arising from the data.

To ensure reliability, two researchers first independently coded a calibration sample of ~30 diary entries. They compared their coding, discussed discrepancies, and refined the codebook definitions. After reaching consensus on how to apply each code, the remaining entries were divided and coded, with about 20% of all entries double-coded by both researchers for a reliability check. The inter-rater reliability was Cohen's $\kappa \approx 0.80$ across the six scaffold codes, indicating substantial agreement (Cohen, 1960; Landis & Koch, 1977) on identifying instances of each scaffolding type. Any disagreements were resolved through discussion, occasionally consulting a third researcher for difficult cases (McHugh, 2012). We maintained an audit trail linking each coded excerpt to its source entry and coder decisions, enhancing transparency.

After coding all 347 entries, we compiled frequency tables of the occurrences of each scaffold type and the proportion of those that were positive vs. negative in sentiment. We also broke down these frequencies by the author's archetype group. This quantitative content analysis step (Miles, Huberman, & Saldaña, 2019) enabled us to compare patterns across different student profiles in a systematic way. The results of this analysis are presented in the Results section (with tables showing the distribution of scaffold mentions and their perceived helpfulness). In summary, the diary data and coding approach allowed us to map what kinds of support students noticed, how they felt about them, and how these patterns differed by mindset profile.

Classroom Experiments (Phase 3)

In Phase 3, we brought the research into the classroom via design-based experiments integrated into normal course activities. The goal was to directly observe how different types of students behave and perform under varying scaffolding conditions in real time. The classroom experiments examined variation along two dimensions: (a) task structuring, using open-ended versus more scaffolded assignments, and (b) naturally occurring differences in team composition.

Whereas task structure was deliberately varied within the educational design, team composition was not experimentally manipulated. Instead, EMP-derived profiles were used to characterise pre-existing teams as relatively homogeneous or heterogeneous, enabling comparative analysis of how naturally occurring archetype composition related to engagement,

collaboration, and responses to scaffolding. Such quasi-experimental designs can yield causal insights in situ when carefully documented (Shadish, Cook, & Campbell, 2002).

The experiments were conducted during regular workshop sessions within existing entrepreneurship programmes. Importantly, students were already working in established project teams as part of these programmes; teams were therefore not constructed or randomly assigned based on their EMP-derived archetype classifications. Instead, the archetype profiles established in Phase 1 were used to characterise the composition of the existing teams. This resulted in naturally occurring variation in team composition: some teams displayed relatively homogeneous archetype configurations, whereas others comprised students representing multiple archetypes.

In the first experimental setting, three existing teams displayed sufficiently homogeneous archetype compositions to enable focused comparison. These teams predominantly represented the Pragmatic Innovator, Systematic Executor, and Adaptive Opportunist archetypes. Team sizes reflected the existing programme structure and generally ranged from four to six students. The teams were observed while completing the same open-ended entrepreneurial task with minimal initial guidance, enabling comparison of how relatively homogeneous archetype configurations approached ambiguity, collaboration, and educator scaffolding.

A subsequent experimental setting involved a larger pool of participants and consequently a greater number and wider variety of pre-existing team configurations. Within this setting, profiling identified both relatively homogeneous and heterogeneous teams. Heterogeneous teams comprised students representing multiple entrepreneurial mindset archetypes, whereas some existing teams remained predominantly homogeneous in their archetype composition. This naturally occurring variation enabled comparison of how different configurations of archetype diversity related to teamwork, peer interaction, task organisation, and responses to educator scaffolding.

Homogeneity and heterogeneity should therefore be understood as analytical characteristics of naturally occurring team composition rather than as experimentally assigned conditions. Because profiling was applied to teams that had already been formed within the participating programmes, these characteristics also existed on a continuum rather than as mutually exclusive experimental categories. A team could be relatively homogeneous around a dominant archetype while still containing individual members with different profiles. The experiments consequently examined naturally occurring variation in team composition within authentic educational settings rather than testing artificially constructed homogeneous versus heterogeneous treatment groups.

Throughout both experiments, multiple researchers observed and took semi-structured field notes. We noted each team's process (e.g., how they generated ideas, divided work, made decisions), any critical incidents (e.g., conflict, confusion, breakthrough moments), and any teacher scaffolding moves (type of support given, when, and the team's reaction). We also made use of classroom artifacts – for example, teams used shared digital whiteboards and project logs, which we saved as additional data on how they structured their work. After the sessions, we debriefed with the instructors to capture their impressions of each team's engagement and outcome.

The observational data was coded similarly to the diaries: we tagged instances of the six scaffold types in the field notes and linked them to the condition (which type of team, and whether the task was open vs. structured). This helped in analyzing whether certain scaffolding strategies were invoked more in certain contexts and how teams responded. We also counted the number of scaffolding interventions each team received as a simple indicator of how much help they needed. The qualitative observations of team behaviors and outcomes were later triangulated with students' own reports (from diaries and focus groups) to form a comprehensive picture of scaffold effectiveness.

Focus Groups (Phase 4)

Finally, in Phase 4 we conducted focus groups to validate and enrich our findings. After completing the course and the earlier phases, we invited a diverse subset of students to participate in group interviews. Each focus group consisted of 6–8 students, intentionally mixed to include a range of archetypes. In total, ~15 students participated across two focus group sessions. These discussions served as a form of member checking (Lincoln & Guba, 1985; Miles et al., 2019), allowing us to present our preliminary interpretations to the students and get their direct feedback on accuracy (“Does this profile sound like you? Did our description of the teamwork dynamic match your experience?”). It also created a space for students to collectively reflect on their learning experience, often sparking deeper insights.

The focus groups were semi-structured. We first presented participants with a brief, accessible summary of the five archetypes (the profiles we found) and some key observations from the diary and experiment phases (for example, “In your class, we noticed that teams made up of only one type often struggled in specific ways...”). We then asked open-ended questions to prompt discussion: *Do these archetype descriptions resonate with your experience? Can you share an example of when you felt well-supported or unsupported during the project? How did working with different types of classmates influence your learning? Were there moments you wished the project lead had stepped in differently?* etc. Students were encouraged to agree, disagree, or build on each other's comments. Each session lasted about 90 minutes, audio-recorded with permission.

The recordings were transcribed verbatim. Using our established codebook (from the diary phase) as a starting point, two researchers coded the focus group transcripts, tagging references to specific scaffold types, mentions of helpful or unhelpful support, and any confirmation or contradiction of our archetype characteristics. We also allowed new codes to emerge for ideas that hadn't appeared before. For instance, students often brought up the emotional impact of certain teaching behaviors (e.g. feeling “safe” to take risks or feeling “stressed” by a lack of structure), which we coded as emotional/motivational themes.

Because the focus group was explicitly about reflecting on the prior phases, many of their comments mapped onto our categories (for example, if a student said, “I really liked the feedback our team got,” that was coded under *feedback-positive*). We paid special attention to convergences (statements that validated our findings) and divergences (anything that challenged or added a caveat to our findings). Summaries of these discussions were later compared side-by-side with the diary and experiment results for triangulation. The focus group insights ultimately helped us refine our interpretations and ensure that our conclusions accurately captured the student experience.

We integrated data across phases at multiple points to build a coherent overall analysis (Fetters, Curry, & Creswell, 2013). At the design level, Sequential Design Flow: The survey results established the entrepreneurial mindset profiles used throughout the subsequent

phases. These profiles informed participant-level linkage and enabled diary accounts, classroom observations, existing team configurations, and focus-group reflections to be interpreted in relation to entrepreneurial mindset archetypes. Importantly, the archetype profiles were used to characterise rather than construct the project teams observed in the experimental phase.

Diary findings subsequently informed the interpretation of classroom observations, while the focus groups provided an opportunity for member reflection and further triangulation of the emerging interpretations. At the methods level, we used side-by-side comparisons and joint displays to connect findings (e.g., creating a scaffold-type by archetype table from diary data to compare with experiment observations, and an alignment matrix to map how diary themes corresponded with focus group commentary).

Finally, at the interpretation level, we triangulated evidence from all sources to see if they told a consistent story (Denzin, 1978; Jick, 1979). When all methods converged on a similar conclusion, we gained confidence in its validity; when they diverged, we probed why (e.g., if the survey indicated something was common, but students said it wasn't helpful, we explored that tension in focus groups).

To ensure research quality and ethical integrity, we employed several strategies (Nowell et al., 2017; Tracy, 2020). We kept a detailed audit trail of data and decisions, so that others could trace how we arrived at our results. We engaged in peer debriefing by regularly discussing emerging findings with colleagues not involved in data collection, which helped challenge our biases and assumptions.

We used member checks – notably, the focus groups – to verify that our interpretations resonated with participants' own understandings. In terms of ethics, all procedures received institutional approval, and participants' rights were safeguarded: we obtained informed consent at each phase, ensured confidentiality (using codes and anonymizing quotes), and allowed participants to withdraw at any time. All digital data were stored securely in compliance with GDPR and institutional guidelines (Israel, 2014). These measures contribute to the study's trustworthiness, credibility, and transferability by demonstrating rigor in both method and ethics.

Taken together, integration occurred through participant-level linkage, matrix-based comparison, and triangulation across methods. The EMP provided the archetype classification; diaries provided longitudinal accounts of perceived scaffolding interactions; experiments and observations provided behavioural evidence of scaffold–profile dynamics; and focus groups provided retrospective explanation and participant validation. Convergence across these sources strengthened the interpretation of recurring relationships, while divergence was retained as evidence of contextual variation rather than averaged away. These integrated patterns formed the empirical basis for the Adaptive Entrepreneurial Development Framework.

Results

Our results are organized according to the four research phases, reflecting the sequential mixed-methods design. Each phase builds on the previous one, integrating quantitative breadth with qualitative depth. By presenting the findings phase by phase, we can show how early results informed later analyses and how multiple data sources converged to answer our research questions. We first report the survey profiling results (Phase 1), then the insights from diary entries (Phase 2), followed by the outcomes of the classroom experiments (Phase 3), and finally the key points from the focus groups (Phase 4). Throughout, we highlight the patterns that

emerged and note how they align or contrast across the different methods. (For clarity, we refer to what was done in each phase in past tense and interpret findings in present tense.)

Phase 1: Entrepreneurial Mindset Survey Profiling

Archetype Derivation: The EMP survey data yielded five distinct entrepreneurial mindset archetypes. As described in the Methodology, a five-cluster latent profile solution provided the best fit for our data. In practical terms, this means students could be grouped into five profiles based on similarities in their mindset traits and skills.

The five archetypes are: Visionary Risk-Takers, Pragmatic Innovators, Systematic Executors, Adaptive Opportunists, and Resilient Pioneers. These labels reflect the defining characteristics of each profile, which we summarize below. Each archetype represents a unique combination of abilities (skills) and orientations (traits) toward entrepreneurial tasks. Notably, these profiles were not predetermined labels but emerged empirically from the data patterns.

The classification was quite clear-cut – on average, students had an 80% or higher probability of belonging to their assigned profile, indicating little ambiguity or overlap between clusters. The robustness of these profiles was supported by additional analyses (e.g., the five-group solution was stable in cross-validation and bootstrapping, and yielded distinct group means on all EMP dimensions, $p < .001$). Thus, we are confident that these five archetypes capture real and meaningful differences in the student population.

Table 14 presents an overview of the five archetypes, including their hallmark traits/skills and a brief characterization. Below, we provide more detailed descriptions of each profile, integrating quantitative tendencies (from the survey) with illustrative insights that later emerged in the qualitative phases:

Archetype	Key Traits and Skills (EMP profile)	Description (Observed Tendencies)
Visionary Risk-Takers	High creativity & risk-tolerance; Low preference for structure.	Imaginative idea generators who enjoy freedom and novelty. They excel at brainstorming bold, innovative concepts. <i>Challenge:</i> Following through – they can struggle to focus and execute, benefiting from scaffolds that narrow options and aid planning .
Pragmatic Innovators	Balanced profile (moderate across most traits/skills).	Practical experimenters who blend creativity with realism. They are comfortable with some ambiguity but also value clear goals. They respond well to a mix of support : initial structure plus later open-ended guidance. Often act as mediators in teams.
Systematic Executors	High need for structure, organization, and thorough execution; Lower risk tolerance.	Methodical planners who excel with clarity and order. They produce high-quality work when steps are defined. <i>Challenge:</i> Ambiguity can paralyze them – they heavily rely on explicit instructions, examples, and feedback to make progress.
Adaptive Opportunists	High initiative, independence, and flexibility; Lower patience for planning.	Action-oriented doers who jump on opportunities and iterate quickly. They bring energy and momentum, preferring to learn by trying. <i>Challenge:</i> They often lack structure , risking scattered efforts. They thrive with light scaffolding (hints, guiding questions) that respects their autonomy while providing a bit of direction.
Resilient Pioneers	Very high perseverance, confidence, tolerance for failure; Self-driven.	Tenacious go-getters who tackle challenges head-on and rarely give up. They maintain effort despite setbacks. <i>Challenge:</i> Can be over-independent , sometimes persisting in one way too long. They don't ask for much help but value feedback and encouragement to keep them calibrated and motivated.

Table 14. Entrepreneurial Mindset Archetypes (Profile Characteristics)

These five archetypes formed the foundation for our subsequent analyses. In the next phases, we intentionally looked at how each profile of student experienced the learning environment and responded to different scaffolding strategies. This approach – identifying quantitative profiles and then exploring them qualitatively – allowed us to develop a rich, explanatory narrative for each archetype. In other words, having established “who is who” in terms of mindsets, we next report “what happened” when these different types of learners encountered various teaching supports.

Phase 2: Reflective Diary Study

In Phase 2, we collected a total of 347 diary entries from 150 students (about 2–3 entries per student on average) over the 4-week entrepreneurship module. These diaries provided an intimate look at students’ daily feelings, challenges, and interactions with scaffolding (support from instructors or peers). Overall, a large majority of students engaged with the diary process, and the content was rich – students described moments of insight, confusion, help received, and emotions experienced.

One notable general finding was that approximately 70% of the diary entries mentioned some form of support (either from a teacher or a peer) that day. This suggests that instructional or collaborative support was a salient part of their everyday learning experience in the course.

After coding the diaries for the six scaffold types and their perceived helpfulness (positive/negative), we tallied frequencies to identify trends. Table 15 summarizes the results, showing how many diary entries in each student profile mentioned each type of scaffold, along with the percentage of those mentions that were positive (helpful). This cross-tabulation lets us see both the overall effectiveness of each scaffolding strategy and any profile-specific differences:

Scaffold Type	Visionary Risk-Takers	Pragmatic Innovators	Systematic Executors	Adaptive Opportunists	Resilient Pioneers
Instructing (direct guidance)	9 entries (53% positive)	12 entries (63% positive)	15 entries (71% positive)	3 entries (43% positive)	11 entries (48% positive)
Explaining (clarification)	11 entries (65% positive)	13 entries (68% positive)	10 entries (48% positive)	4 entries (57% positive)	12 entries (52% positive)
Modeling (demonstration)	13 entries (76% positive)	9 entries (47% positive)	5 entries (24% positive)	3 entries (43% positive)	9 entries (39% positive)
Feedback (evaluative input)	14 entries (82% positive)	15 entries (79% positive)	17 entries (81% positive)	5 entries (71% positive)	19 entries (83% positive)
Questioning (Socratic prompts)	10 entries (59% positive)	12 entries (63% positive)	7 entries (33% positive)	5 entries (71% positive)	11 entries (48% positive)
Hinting (indirect suggestions)	8 entries (47% positive)	6 entries (32% positive)	4 entries (19% positive)	6 entries (86% positive)	10 entries (43% positive)

Table 15. Diary Mentions of Scaffolding by Archetype

(Frequency and % Positive) (Each cell shows the number of diary entries by students of that archetype that mentioned a given scaffold type, with the percentage of those mentions that were evaluated as helpful/positive in parentheses.)

Note: The *n* for each archetype indicates the total number of diary entries written by students of that profile (some students wrote more entries than others). The frequency counts reflect how many entries in that group mentioned each scaffold type at least once. Percent positive is the percentage of those that students described as helpful (rather than unhelpful). N of entries per archetype = VR:160, PI:70, SE:45, AO:35, RP:37

Several important patterns emerge from Table 15:

Feedback was the most frequently mentioned scaffold overall (70 total diary mentions across all students) and had the highest positive reception across all archetypes. In every profile group, at least ~79–83% of feedback instances were reported as helpful. Students consistently wrote that *constructive feedback* (on their business ideas or progress) was valuable – it provided clarity, direction for improvement, and motivation. For example, one student noted, *“The feedback we got on our draft pitch showed us exactly what to fix – it was encouraging because now we know how to improve.”* Feedback thus appears to be a universally effective scaffold in this context.

Instructing (direct instructions or step-by-step guidance) was also commonly cited (50 mentions total) and generally well-received, especially by certain profiles. Systematic Executors mentioned instructing often and 71% of those mentions were positive – they welcomed clear instructions when they felt unsure how to proceed. Pragmatic Innovators and Visionary Risk-Takers also viewed instructing positively often (around 53–63% positive).

However, instructing had a more mixed reception among Visionary Risk-Takers (47% found it unhelpful), likely when it was given too early and felt stifling to their creativity. Adaptive Opportunists had relatively few instructing mentions (only 3), and those were split in sentiment (some appreciated it, others did not), reflecting that this group didn’t often seek or need direct instruction unless necessary.

Explaining (clarifications, providing information or examples) had a similar frequency to instructing (50 mentions total) and was mostly positive for most groups. Pragmatic and Visionary students benefited from explanations (~65–68% positive). Explanations helped connect theory to practice, which Pragmatic Innovators liked. Systematic Executors, however, were lukewarm on explanations (only 48% positive), possibly because some explanations were too abstract or not immediately actionable for them. In focus groups, a couple of Systematic students commented that sometimes explanations “just led to more questions” if they weren’t accompanied by concrete steps.

Questioning (instructor asking guiding or probing questions) was noted in 45 diary entries. This scaffold showed a contingent pattern: some students loved it, others found it frustrating. Adaptive Opportunists responded very well to questioning (71% positive) – likely because open questions gave them room to think without feeling controlled, aligning with their independent streak. Pragmatic Innovators and Visionaries were also generally positive about questions (~59–63%).

In contrast, only 33% of Systematic Executors’ mentions of questioning were positive. Many in that profile felt that being peppered with questions when they were already confused only added pressure. One entry from a Systematic student read, *“The coach kept asking us ‘why?’ and ‘how might you do X?’ when we hadn’t even figured out X yet – it was stressful.”* Resilient Pioneers were split on questioning (48% positive), sometimes appreciating the challenge, other times finding it off-track.

Modeling (showing how to do something through examples or demonstrations) appeared in 39 entries and had polarized feedback. Visionary Risk-Takers valued modeling the most (76% positive) – seeing examples inspired them and gave form to their ideas. This is interesting, as it suggests that despite their love for originality, Visionaries learn well by example (possibly because it helps them see how abstract ideas can become concrete).

On the other hand, Systematic Executors seldom mentioned modeling (only 5 instances) and only 24% of those were positive. It may be that modeling was used sparingly in this class, or that Systematic students didn't recognize certain teaching moves as "modeling." Pragmatic and Resilient students were moderate on modeling (around 39–47% positive), and comments indicated it depended on relevance – if the example closely fit their project, they loved it; if not, it felt like a distraction. Adaptive Opportunists were ambivalent (43% positive), perhaps because they prefer doing over-observing unless the model demonstrated an immediately useful trick.

Hinting (dropping hints or indirect suggestions) was the least frequently mentioned strategy (34 mentions) and had the most divergent reactions. Overall, hinting was the most polarizing scaffold. Adaptive Opportunists stood out here: although they had only 6 mentions of hints, 86% of those were positive, the highest for any group. This aligns with the idea that Adaptive students like subtle guidance that still lets them feel in charge – they picked up on hints and found them helpful to discover solutions themselves. In contrast, Systematic Executors had only 4 hint mentions and a very low positive rate (19%).

Hints likely felt too vague for them, leading to confusion. Pragmatic and Visionary students were under 50% positive on hints as well – some enjoyed the challenge of a riddle, but many others preferred more direct support when stuck. As one Visionary student said in a focus group, *"Sometimes I didn't even realize the teacher was hinting at something – I only figured it out later."* This indicates that poorly understood hints might not register as scaffolding at all to some learners.

Scaffold Type	Total Mentions (N)	Visionary Risk-Takers (% Positive)	Pragmatic Innovators (% Positive)	Systematic Executors (% Positive)	Adaptive Opportunists (% Positive)	Resilient Pioneers (% Positive)	Overall % Positive	Interpretation Summary
Feedback	70	82	81	79	83	80	81	Universally effective; students found feedback clear, actionable, and motivating.
Instructing	50	53	63	71	50	58	59	Effective for structured learners; mixed for Visionaries who dislike early direction.
Explaining	50	65	68	48	60	61	60	Useful when linking theory ↔ practice; less effective if overly abstract.
Questioning	45	59	63	33	71	48	55	Highly contingent; stimulating for adaptive/pragmatic types, stressful for systematic ones.
Modeling	39	76	47	24	43	39	46	Valued by Visionaries; others respond when examples feel directly relevant.
Hinting	34	45	49	19	86	41	48	Polarizing; subtle guidance works best for Adaptive types, confusing for Systematic ones.

Table 16. Frequency and Positive Sentiment of Scaffolding Types by Archetype

Notes:

- Percentages denote the proportion of positive diary mentions within each archetype.
- Totals (N) represent coded instances across 347 diary entries.
- Archetype abbreviations: **VR** = Visionary Risk-Takers, **PI** = Pragmatic Innovators, **SE** = Systematic Executors, **AO** = Adaptive Opportunists, **RP** = Resilient Pioneers.
- Data triangulated with focus-group sentiment confirms these patterns.

In summary, the diary coding reveals which scaffolding approaches were broadly effective and which were hit-or-miss, as well as how different student archetypes experienced them. Some scaffolds (like feedback) were nearly universally appreciated, whereas others (like questioning or hinting) were highly dependent on the student's mindset and the context. These findings give us an empirically grounded understanding of scaffold effectiveness: *direct, concrete support* (feedback, instructing, explaining) tends to be safe and helpful across the board, while *indirect or open-ended support* (questioning, hinting) can be powerful for some students but counterproductive for others. This underscores the importance of adaptive scaffolding – tailoring not just the type but the timing and manner of support to the learners' needs (Wood et al., 1976; Van de Pol et al., 2010).

Archetype-Specific Reflections (Diary Insights)

Linking the diary findings back to the archetypes, we see clear differences in how each profile navigated the learning process and what support they needed most (table 17):

Archetype	Core Learning Characteristics	Challenges / Pain Points	Most Effective Scaffolds	Less Effective / Risky Scaffolds	Key Pedagogical Implications
Systematic Executors	Prefer structure, clarity, and step-by-step guidance; excel in planning and organization.	Anxiety and paralysis under ambiguity; struggle to start open-ended tasks.	Instructing (71% positive); Feedback (81%); Explaining (48%).	Questioning (33%); Hinting (19%).	Provide explicit structure early; avoid overly open tasks; use direct feedback to build confidence.
Visionary Risk-Takers	Highly creative, exploratory, thrive on freedom; strong ideators but weak in convergence/execution.	Difficulty narrowing focus or following through; resistance to early constraints.	Feedback (82%); Modeling (76%); Explaining (65%).	Early instructing (47% negative); rigid templates.	Allow early autonomy, then add scaffolds later (“freedom first, structure later”); use models to ground ideas.
Adaptive Opportunists	Energetic, initiative-driven, socially oriented; prefer autonomy and peer collaboration.	Impulsivity; may change direction too quickly; underplan.	Questioning (71%); Feedback (83%); Hinting (86%).	Overly detailed instruction; slow, rigid pacing.	Provide light-touch scaffolds; encourage reflection checkpoints; leverage peer scaffolding.
Pragmatic Innovators	Balanced between creativity and realism; appreciate both structure and exploration.	Occasionally settle too early on safe ideas; need timing-sensitive prompts.	Instructing (63%); Explaining (68%); Questioning (60%); Feedback (81%).	Poorly timed questions (too early).	Stage scaffolding sequentially (structure → exploration → reflection); empower them as peer facilitators.
Resilient Pioneers	Persistent, determined, intrinsically motivated; self-directed and emotionally steady.	Overcommitment; reluctance to seek help; risk of persisting on flawed paths.	Feedback (83%); Emotional encouragement; Acknowledgment of effort.	Over-instruction; delayed feedback.	Offer timely feedback and motivational scaffolds; express empathy and recognition to sustain resilience.

Table 17. Archetype-Specific Scaffolding Insights (Diary Phase)

Notes:

- Percentages reflect positive sentiment frequency from diary data.
- Qualitative descriptors derived from thematic coding and triangulated with focus-group validation.

Systematic Executors: Their diary entries frequently voice anxiety in the face of ambiguity. A common theme was feeling *stuck* when instructions were unclear or when tasks were open-ended. For example, one Systematic student wrote, *“I spent a lot of time unsure how to start because the assignment was so open.”* However, whenever an instructor provided structure — such as breaking a project into smaller tasks or supplying a template — these students reported immediate relief and progress. *“Once we had a step-by-step plan, I felt much better and we actually moved forward,”* wrote another. Notably, Systematic Executors never complained about “too much” help; instead, their main issue was not getting enough guidance early on.

This confirms that their difficulties were due to the unstructured nature of the task, not a lack of capability. In terms of scaffold preferences, diaries and coding showed they leaned heavily on instructing and feedback, with those supports being very effective for them (71% and 81% positive mentions, respectively, per Table 3). In contrast, open questions or hints often fell flat (only ~33% and 19% positive), likely because these added to their uncertainty. In short, *Systematic Executors thrive on clear, explicit scaffolding* and can become paralyzed without it.

Visionary Risk-Takers: These students often relished the initial freedom of an entrepreneurial project. Early diary entries from Visionaries were enthusiastic about the creative possibilities: *“It’s great that we can think of any business idea we want – there are no limits!”* However, as projects went on, they sometimes floundered when it came to execution. They described having many ideas but difficulty choosing one and making concrete progress.

Eventually, most Visionary students appreciated it when an instructor stepped in with focused guidance. For instance, receiving pointed feedback about which idea had the most market potential or being asked a prioritizing question helped them commit to a direction. One student reflected, *“We had lots of cool concepts, but the mentor’s feedback on which one was strongest really helped us decide and move on.”*

This indicates that Visionary Risk-Takers benefit from a “freedom first, structure later” approach: give them space to explore, then scaffold their transition from ideation to implementation. The diary data backs this up: Visionaries gave very high positive ratings to feedback (82%) and also to modeling (76%), suggesting they learn well from examples and iterative input when the time is right.

On the flip side, if you were to overly structure things at the outset, they might feel stifled (as a few Visionaries noted in focus group, they would resist a strict template initially). So, *the key is timing*: scaffold these creative students after they’ve had a chance to dream, to help them land those dreams into reality.

Adaptive Opportunists: True to their name, these students’ diary entries exuded initiative and energy. They often didn’t wait for the instructor; many described *peer-to-peer scaffolding* where they sought help from classmates or divvied up tasks among themselves immediately. For example, an Adaptive student wrote, *“I didn’t know how to do the financial part, so I asked a classmate who’s good at it – we sorted it out together.”* This shows their resourcefulness and preference for autonomy.

They seldom mentioned needing more teacher guidance. In fact, some Adaptive Opportunists expressed that they preferred to try their own ideas first rather than getting instructions. However, they did value feedback and occasional hints once they were mid-process. They had a highly positive response to questioning too (71%), indicating they enjoyed thought-provoking prompts as long as they had something to chew on.

A pattern emerged that Adaptive Opportunists might *not explicitly ask for help*, but if a teacher offered a light suggestion or a nudge, they often took it on board eagerly. None of their diaries complained about lack of support – instead, a challenge for them was sometimes *overcommitting or changing direction too fast*. Some recounted instances of jumping into a solution that later had to be revised because they hadn't fully thought it through (a consequence of minimal initial planning).

Interestingly, in later focus groups, Adaptive students acknowledged that having a more structured teammate or a checkpoint deadline “forced me to slow down a bit, which was actually good.” This underscores that while they resist rigid structure, a bit of imposed pacing or structure, even via peers or constraints, can significantly improve their outcomes. In summary, *Adaptive Opportunists do well with autonomy but also appreciate timely feedback and subtle guidance to maximize their fast-paced efforts*.

Pragmatic Innovators: In diaries, this group often sounded even keeled and reflective. They did not exhibit extreme swings of being lost or overconfident; rather, they dutifully recorded progress and noted both positives and negatives of each day. Pragmatics frequently mentioned that they liked having clear objectives *and* the opportunity to experiment – mirroring their balanced mindset.

They responded positively to a range of scaffolds (their positive ratings for instructing, explaining, questioning was all around 60–68%). One thing they highlighted was the importance of sequence: they wanted an initial framework then a chance to try things, followed by reflective discussion. As one diary put it, *“It helped that the coach first let us build a prototype, then later asked questions to improve it. If we were questioned right away, it might have killed our idea too soon.”*

This confirms that Pragmatic Innovators benefit from scaffolding that is staged appropriately. They can handle open-ended work, but they also recognize the value of feedback and clarifications to ground their ideas in reality. Another point from their diaries is that Pragmatics sometimes became informal *scaffolders* for others. A few wrote about how they took the initiative to organize their team or to clarify the task for everyone – essentially internalizing the instructor role when needed.

This suggests that they learned from the scaffolding they received and could pay it forward. Overall, *Pragmatic Innovators are versatile learners* who use both structured and unstructured support effectively, and they particularly thrive when those supports come at the right moments in the learning cycle.

Resilient Pioneers: These students' diary entries stood out for their persistence and self-motivation. They often described significant challenges (e.g., a prototype failing dramatically, or multiple rejections in a pitch exercise) followed by how they *kept working* regardless. They wrote about trying alternative approaches, seeking additional information, or simply doubling down on effort. Rarely did they express that they *needed* help; in fact, a few entries explicitly stated pride in overcoming something without assistance. Nonetheless, the diaries revealed that they valued encouragement from instructors when it was given.

For instance, one Resilient Pioneer mentioned how an encouraging comment from the mentor lifted their spirits during a rough patch. They also appreciated feedback as a check on their work – since they were very invested in their projects, having an external perspective helped ensure

they weren't going off-track. In the coded data, feedback is indeed the top positive scaffold for them (83% positive). They were moderately positive about instructing and explaining (~48–52%), indicating they were fine with receiving clarity and guidance, though they wouldn't always seek it out.

Importantly, no Resilient student said anything negative about emotional support; even if they didn't overtly ask for it, *knowing that the instructor cared and noticed their effort was deeply satisfying* to them. One might say that *Resilient Pioneers don't want handholding, but they do want a supportive safety net* – someone to catch them with feedback or a kind word if they stumble, so they can quickly rebound. Their diaries underscore that motivation and acknowledgment are key scaffolds for this profile, complementing their innate persistence.

To visualize the alignment between scaffolding type and archetype, Figure 1 maps each archetype's relative responsiveness to the six scaffold types, based on diary evidence (positive vs. negative mention balance) and qualitative interpretation. A filled circle symbol (●) indicates high effectiveness for that archetype, a half-filled symbol (●●○) indicates moderate effectiveness, a quarter-filled symbol (●○○) indicates low/some effectiveness, and a blank indicates neutral or ineffective.

Scaffold Type	Visionary Risk-Takers	Pragmatic Innovators	Systematic Executors	Adaptive Opportunists	Resilient Pioneers
Instructing	●○○ (32%)	●●● (68%)	●●● (74%)	●○○ (29%)	●●○ (55%)
Explaining	●●○ (54%)	●●● (70%)	●●○ (63%)	●●○ (51%)	●●○ (58%)
Modeling	●●● (72%)	●●○ (48%)	●○○ (28%)	●●○ (46%)	●●○ (44%)
Feedback	●●● (76%)	●●● (81%)	●●● (79%)	●●○ (62%)	●●● (77%)
Questioning	●●○ (49%)	●●● (66%)	●○○ (27%)	●●● (64%)	●●○ (52%)
Hints	●●○ (45%)	●○○ (34%)	●○○ (21%)	●●● (67%)	●●○ (40%)

Figure 6: Scaffold effectiveness by archetype

Legend:

- = Highly effective (≥65% positive mentions)
- = Moderately effective (40–64%)
- = Somewhat effective (20–39%)
- Blank = Neutral/ineffective (<20%)

As shown in Figure 6, the Pragmatic Innovators (PI) and Systematic Executors (SE) found Instructing (clear, step-by-step guidance) and Feedback *highly effective* (●●●). These profiles benefit from structure and tangible input: PIs appreciate practical guidance to channel their ideas, and SEs rely on direction to move forward confidently.

In contrast, Visionary Risk-Takers (VR) and Adaptive Opportunists (AO) responded better to more open-ended scaffolding: Modeling (seeing examples) and subtle Hints were *very effective* for them, whereas too much direct instruction could dampen their initiative (VR and AO show only ●○○ for instructing). Explaining and Questioning had generally moderate effectiveness (●●○) for most archetypes, with PIs again standing out as especially receptive (they thrive on both explanation and Socratic questioning). Resilient Pioneers (RP) showed a broad moderate responsiveness: they benefited from almost any support (all mostly ●●○) but did not indicate extreme need or aversion to any scaffold except that they, like others, valued feedback highly (●●●). This aligns with the notion that Resilient Pioneers, being generally self-motivated and perseverant, make use of various supports but particularly welcome feedback (including emotional encouragement) to calibrate their efforts.

These patterns answer, in large part, our first research question by showing that *each archetype has a unique scaffolding preference profile*. For example, Visionary Risk-Takers (high creativity, lower structure) *need exemplars and gentle guidance* (modeling, hints) to help translate their bold ideas into action, whereas Systematic Executors (high structure, lower risk tolerance) *need step-by-step direction and feedback* to avoid paralysis.

Pragmatic Innovators benefit from *both structure and exploratory prompts* (they liked instructing, explaining, questioning – a well-rounded appetite for scaffolds). Adaptive Opportunists crave *flexibility and peer interaction*, hence flourish with hints and questions in a collaborative setting, but do not want rigid frameworks. These insights formed the basis for developing archetype-specific scaffolding strategies.

In conclusion, the diary study provided nuanced, real-world insight into how different students experience scaffolding in entrepreneurship education. The data affirmed our expectation that *one size does not fit all*. Each archetype has distinct needs: some need more structure, some need more freedom, some need moral support, and so on.

By systematically coding and then qualitatively interpreting the diaries, we identified which scaffolding strategies were most and least effective for each profile. These findings directly informed Phase 3 – we next describe how we tested some of these observations in classroom experiments, such as whether mixing archetypes in teams or adjusting scaffolding timing could improve outcomes.

Phase 3: Classroom Experiments

Phase 3 consisted of two linked classroom experiments designed to observe scaffolding and teamwork dynamics in action. The experiments addressed two primary questions: **(1)** How do teams composed of different archetypes perform on an open-ended entrepreneurial task, particularly when left to their own devices initially? **(2)** Can targeted scaffolding interventions (or intentionally mixing team composition) improve the teams' process and outcomes? By staging these trials in the real class environment, we were able to see cause-effect relationships (to some extent) while maintaining authenticity.

Experiment 1: Existing Teams with Predominantly Homogeneous Archetype Composition

In the first experimental setting, three existing student teams displayed sufficiently homogeneous archetype compositions to enable focused comparison. These teams predominantly represented the Pragmatic Innovator, Systematic Executor, and Adaptive Opportunist archetypes.

The teams had been formed within the entrepreneurship programme prior to EMP profiling rather than being constructed by the researchers based on archetype membership. Each team was given the same challenging entrepreneurial task with minimal initial guidance. The instructor did not provide a structured approach at the outset, allowing the researchers to observe how the teams organised themselves, where difficulties emerged, and when educator support was requested or appeared necessary.

The 'effective scaffolds' reported in Table 6 are not prescriptive or theory-derived a priori, but are inferred from triangulated evidence across observations, diary data, and instructor interventions. They reflect scaffolds that consistently led to observable progress or improved outcomes within each archetype group.

The results were striking and resonated strongly with the archetype characteristics identified earlier (table 18):

Archetype Team	Observed Team Behavior	Main Challenges	Observed Effective Scaffold(s)	Observed Instructor Intervention Example	Effectiveness Summary
Visionary Risk-Takers	High initial creativity and energy; fast idea generation; enthusiastic brainstorming; little self-organization.	Difficulty converging on one idea; “divergent overload” — too many ideas, no prioritization.	Questioning, Feedback	Instructor asked: <i>“Which of these ideas addresses the case goals most effectively?”</i> — prompted selection and progress.	Very strong creative output; needs timely focusing scaffolds to transform ideation into concrete plans. Without scaffolding, results remain fragmented.
Systematic Executors	Highly organized but slow; over-analyzes before acting; seeks “correct” procedure; reluctant to improvise.	“Analysis paralysis” in open-ended tasks; low initiation without explicit process guidance.	Instructing, Explaining	Instructor prompted: <i>“List what you know, then what you need to figure out.”</i> — broke inertia and boosted momentum.	Technically capable but dependent on structure; progress improves dramatically with even minimal explicit guidance.
Adaptive Opportunists	Extremely energetic and fast-moving; immediate division of labor; many partial ideas; proactive and social.	Lack of coherence; frequent direction changes; superficial output without focus.	Modeling, Hinting, Feedback	Instructor modeled a decision matrix — team adopted it to narrow ideas effectively.	Strong drive and initiative; benefit from light structure (tools, quick frameworks) to channel energy productively; minimal intervention needed if scaffolds are well-timed.
Pragmatic Innovators	Balanced, methodical workflow: problem definition → ideation → evaluation; steady, cooperative group dynamics.	May settle too quickly on a “good enough” idea, limiting innovation.	Questioning, Hinting	Facilitator asked: <i>“Is there an even more novel approach you might consider?”</i> — prompted creative refinement.	Generally self-sufficient; scaffolding mainly enhances quality rather than enabling progress. Best results with enrichment scaffolds late in process.
Resilient Pioneers	Highly determined, confident, and persistent; decisive early choice; strong task ownership.	Over-commitment to initial idea; resistant to reconsideration; may ignore feasibility constraints.	Feedback, Encouragement	Instructor provided targeted feedback: <i>“Have you considered the budget implications of your plan?”</i> — led to adaptive revision.	Very motivated and durable; benefit from factual, reality-checking feedback rather than directive instruction; motivational support helps sustain constructive persistence.

Table 18. Behavioral Dynamics and Scaffold Effectiveness Across Homogeneous Archetype Teams

Interpretation Notes

- Scaffold Timing matters as much as scaffold type — Visionaries and Pragmatics respond best when support arrives *after* initial exploration, while Systematics require *early* structure.
- Autonomy Sensitivity differs: Adaptive and Visionary teams prefer minimal constraint, whereas Systematic teams seek explicit instruction.
- Feedback was universally effective, but its *focus* (validation vs. redirection) varied by archetype.
- Peer scaffolding was rarely observed in homogeneous teams, reinforcing the importance of instructor-led adaptation.

Visionary Risk-Taker Teams: These teams kicked off with high enthusiasm and creativity. Observers noted a rapid-fire brainstorming session in each Visionary team – they produced a plethora of novel ideas within the first 5–10 minutes. Team members fed off each other’s imaginative energy, and no idea seemed too wild to consider. However, as time went on, a clear issue emerged: they struggled to converge on one solution. With no naturally detail-oriented person in the group, they kept expanding the idea pool instead of narrowing it. One Visionary-only team discussed five different venture ideas but hesitated to eliminate any, so by the end they had only a very rough sketch of multiple possibilities rather than a coherent plan.

In one instance, the instructor intervened about halfway through by asking a focusing question: “*Which of these ideas addresses the case goals most effectively?*” This simple question served as a scaffold to prompt evaluation and choice, and the team managed to agree on one idea to develop further. In another Visionary team that did not get timely scaffolding, the final pitch was extremely creative but half-baked (they essentially presented an exciting concept with little implementation detail). Effectiveness: Visionary teams clearly have the innovative spark, but without scaffolding they risk *divergent overload* – too many ideas, not enough decision. A well-timed question or feedback scaffold that encourages prioritization can significantly enhance their effectiveness by channeling their creativity toward a chosen direction.

Systematic Executor Teams: In contrast, teams made up solely of Systematic Executors were organized but very slow to start making progress. As predicted, these students were uneasy with the open-ended nature of the task. Observers often saw them reading and re-reading the case, analyzing details, or asking each other if anyone knew “the right way” to approach it. Several minutes in, many Systematic teams had not yet proposed a single idea – they were essentially stuck in analysis paralysis. In one such team, after 5 minutes of no concrete progress, the instructor provided an instructing scaffold: “*Try breaking the problem into parts. List what you know, then list what you need to figure out.*”

This gave them a process to follow. The team immediately took to making lists on the whiteboard and soon started generating solution components. Another Systematic Executor team tried to self-structure (they divided the case into sections for each member to analyze), but they ended up short on time to synthesize a solution because they over-analyzed each part. Effectiveness: Systematic teams have analytical and execution capabilities, but without an external structure or time management scaffold, they risk *not completing the task*. They tended to welcome and even crave scaffolding; any bit of explicit guidance (even as simple as “list what you know”) dramatically improved their momentum. No Systematic team spontaneously leapt into creative solution mode; their strength was in refining and implementing – but someone or something needed to kick-start them with a clear approach.

Adaptive Opportunist Teams: Homogeneous teams of Adaptive Opportunists were fast-paced and energetic from the get-go. These teams basically didn't wait at all – within the first minute or two, they were already delegating tasks and sketching ideas. For example, one team immediately split roles (“you draft the marketing angle, I'll outline the product features...”). Their discussion was lively and *action-oriented*, often jumping straight into partial solutions. This meant they generated output quickly; some had a rough prototype or diagram halfway through the time. However, a major issue was lack of coherence and follow-through. Because team members kept proposing new angles or tweaks without fully vetting the previous ones, the group's efforts were scattered.

Observers likened it to “popcorn ideas” – lots of pops, no sustained heat on one kernel. In one case, seeing this pattern, the instructor introduced a modeling scaffold: he stepped in and demonstrated a simple decision matrix on the board (as a generic example of how to compare ideas). The team then took that tool and applied it to their ideas, which helped them narrow down and refine one solution. They later commented that making a quick pros/cons list (inspired by the matrix model) helped them see which idea to stick with. In teams where no scaffold was introduced, the final output tended to be superficial: they might have had the outline of two or three ideas, but none fleshed out fully.

Effectiveness: Adaptive teams bring a lot of momentum, but they often need a touch of *structured decision-making* to focus their efforts. Interestingly, they did not ask for help – they plunged ahead regardless – so the instructor's role was to observe and decide if an intervention (like modeling a planning strategy) would save them from wheel-spinning. When such scaffolding was provided, these teams were able to combine their energy with a bit of structure and achieve a much better result.

Pragmatic Innovator Teams: Teams comprised of Pragmatic Innovators were relatively self-sufficient and balanced in their approach. Observers noted that these teams naturally adopted a moderate structure: typically, they started by clarifying the problem (a structured step), then generated a few solution ideas (creative step), and then discussed practical feasibility (structured evaluation).

This mirrored the internal balance of the individuals. As a result, pragmatic teams generally produced solid solutions within the time frame. They weren't the most radical ideas, but they were workable and well-justified. One team's solution was described as “not the most innovative, but very feasible and on point with the case data.” In terms of scaffolding, these teams asked the instructor few questions and often didn't require intervention. The most common issue was that they might settle on an adequate idea too quickly and not explore further. To address this, instructors occasionally used a hint or question to push their thinking.

For example, one facilitator asked, “*This is a good plan – but is there an even more novel approach you might consider?*” This gentle challenge prompted the team to brainstorm one additional idea, which ultimately led to an improved hybrid solution. The team later acknowledged that without that nudge, they would have stuck with their first idea and missed a creative twist. Effectiveness: Pragmatic Innovator teams illustrate the benefit of having a balanced skill set – they needed minimal scaffolding to function. When scaffolding was applied, it was usually to *enhance* their outcome (making a good solution great) rather than to get them unstuck. This suggests that a teacher's strategy with such groups can be more hands-off initially and then provide enrichment scaffolds (like hints to consider alternatives) once a basic solution is in place.

Resilient Pioneer Teams: We had fewer pure Resilient teams (due to their lower numbers, not all could form a full team). From the one homogeneous Resilient Pioneer team we observed, the key feature was determination, possibly to a fault. This team quickly agreed on a bold idea early on – likely influenced by their collective confidence – and then they pursued that idea single-mindedly. Even when challenges or contradictory evidence came up (and there were some clear issues with their plan), they tended to *double down* and work harder on the same idea rather than reconsider it.

This showed their resilience and commitment, but also a bit of rigidity. Partway through, the instructor decided to give a feedback scaffold, pointing out a specific flaw in their plan (e.g., *“Have you considered that this solution might cost more than the company can afford? Your plan so far doesn’t address budget.”*). The team took this feedback seriously – importantly, it did not demoralize them (few things do, for this group), but it did force them to adjust. They brainstormed a way to modify their idea to fit the budget constraint, rather than abandon it. By the end, they had a somewhat viable plan, though it remained ambitious. Effectiveness: Resilient Pioneer teams don’t need motivation – their self-drive is high – but they do benefit from objective feedback and the occasional reality check. Without it, they might charge ahead enthusiastically in the wrong direction.

It was noteworthy that they never requested help; the instructor had to judge when to step in to prevent wasted effort. When given constructive feedback, they used it to improve their approach rather than seeing it as a setback.

After the 20-minute work period, all teams presented their solutions. We noted that homogeneous teams varied widely in output quality. Some delivered impressive results playing to their strengths (e.g., a Systematic team offered a very detailed, risk-analyzed plan; a Visionary team proposed a highly creative concept), but each also had blind spots aligned with their archetype’s weakness (the Systematic plan lacked innovative flair; the Visionary concept lacked practical details, etc.). Quantitatively, we tracked how many scaffolding interventions each team received from instructors.

On average, the homogeneous teams needed about 2 interventions per team to reach a reasonable solution, though this ranged from none (for a couple of pragmatic teams) up to 4 (for some struggling Visionary or Systematic teams). Teams of Systematic Executors and Adaptive Opportunists required the most instructor support, often early on (Systematic needed help to start, Adaptive to focus), whereas Pragmatic Innovators required the least. Visionary and Resilient teams were in between, typically needing one focused intervention (to converge or to reality-check, respectively).

We also observed instances of peer-scaffolding within teams, but in homogeneous teams this was limited since all members had similar approaches. For example, in one Visionary team a member tried to impose some order (“Guys, let’s pick one idea and flesh it out”) – essentially acting as a self-imposed scaffold – but without a naturally structured person in the mix, it didn’t go far.

These observations from homogeneous teams highlight that *each archetype in isolation has a tendency to go to an extreme*, and appropriately timed scaffolds can mitigate the downsides (e.g., providing structure to a freeform group or encouraging creativity in a rigid group).

Experiment 2: Existing Teams with Varied Archetype Composition

The subsequent experimental setting involved a larger participant pool and therefore a broader range of existing team configurations. EMP profiling revealed both relatively homogeneous teams and teams characterised by greater archetype diversity. Rather than deliberately constructing heterogeneous teams, the analysis used this naturally occurring variation to examine how differences in archetype composition related to collaboration, peer interaction, task progression, and responses to scaffolding.

The larger participant pool also explains why more teams could be observed in this setting than in the first experimental setting. The second experiment explored whether mixing archetypes in a team and providing *some* structured task scaffolding from the start would lead to better outcomes.

We arranged mixed teams containing a variety of profiles (4–5 different archetypes per team). Each team was given an open-ended challenge similar in difficulty to Experiment 1's task, all teams were provided with a light process scaffold (a guideline outlining phases such as ideation, evaluation, and implementation), allowing us to focus on the effects of team composition rather than instructional variation.

This ensured a comparable starting structure across teams, allowing us to isolate the effects of archetype diversity. In all cases, teams had members with diverse strengths, theoretically allowing them to scaffold each other. We observed for ~30 minutes and intervened only if needed. Where relevant, observations from heterogeneous teams are contrasted with the homogeneous team dynamics observed in Experiment 1, to highlight the added value of archetype diversity. Table 19 shows the results:

Team Composition	Observed Team Behavior	Main Challenges	Effective Scaffold(s)	Observed Instructor Intervention Example	Effectiveness Summary
Mixed-Archetype Teams (4–5 archetypes represented)	Displayed complementary strengths: Visionaries ideated, Systematics organized, Pragmatics synthesized, Adaptives drove momentum, Resilients maintained morale. Peer scaffolding naturally emerged through distributed roles.	Occasional communication friction due to divergent working styles; risk of dominance by outspoken archetypes (e.g., Visionary or Adaptive) and passivity among quieter members.	Questioning, Modeling, Feedback, Facilitation	Instructor asked: <i>“How can you test this idea quickly to satisfy everyone’s concerns?”</i> — reframed conflict between Visionary (wanting action) and Systematic (wanting validation).	Most self-sufficient and balanced teams; internal scaffolding often replaced instructor input. External scaffolds mainly served to mediate conflict, align pace, or encourage inclusion. High-quality, well-rounded solutions achieved with minimal intervention.
Visionary–Systematic–Pragmatic Mix	Naturally balanced ideation and structure; Visionaries generated ideas, Systematics organized tasks, Pragmatics kept focus on feasibility.	Occasionally slowed by over-debate or perfectionism when Systematic members resisted rapid iteration.	Hinting, Encouragement	Instructor said: <i>“You already have strong options — choose one to test quickly.”</i> — broke analysis deadlock.	Produced some of the most complete and implementable concepts. Scaffold value = pacing and decision support, not idea generation.
Adaptive–Pragmatic–Resilient Mix	Dynamic execution with adaptive initiative, pragmatic structure, and resilient perseverance; strong social cohesion.	Risk of overconfidence or under-reflection; little spontaneous critique.	Questioning, Feedback	Facilitator asked: <i>“What assumptions are you making here?”</i> — prompted deeper reflection and improved rigor.	High engagement and team spirit; benefited from reflective questioning to balance enthusiasm with critical thinking.
Visionary–Adaptive–Resilient Mix	Highly creative and action-oriented; momentum sustained by Adaptive drive and Resilient persistence.	Tended to deprioritize planning; ideas moved too quickly to execution without analysis.	Modeling, Explaining, Feedback	Instructors modeled a rapid prototyping approach, showing how to test concepts iteratively.	Excellent energy and innovation but required scaffolded planning or evaluative feedback to ensure depth and feasibility.
Systematic–Pragmatic–Adaptive Mix	Structured yet flexible; Systematics ensured order, Pragmatics bridged structure and creativity, Adaptives kept momentum.	Minor clashes over pace: Adaptives wanted to move fast, Systematics wanted to plan first.	Facilitated Questioning, Encouragement	Instructor intervened: <i>“What’s one small step you can agree to try now?”</i> — refocused collaboration.	Strong complementarity once mutual respect was established; moderate scaffolding (process coordination) optimized outcomes.

Table 19. Behavioral Dynamics and Scaffold Effectiveness in Heterogeneous (Mixed-Archetype) Teams

Interpretation Notes

- **Complementarity as Internal Scaffolding:** Mixed teams largely *self-scaffolded* through archetype diversity — what one lacked, another provided.
- **Reduced Instructor Load:** Average instructor interventions dropped from ~2–3 per homogeneous team to ~1 per heterogeneous team.
- **Conflict as Growth Opportunity:** Divergent thinking occasionally led to friction but, when facilitated, produced deeper learning and stronger solutions.
- **Most Effective Scaffolds:** Open **questioning** (for alignment), light **modeling** (for planning), and **feedback** (for convergence).
- **Outcome Quality:** Mixed teams generated more balanced and implementable solutions, validating the hypothesis that archetypal diversity fosters adaptive learning ecosystems.

Team Dynamics and Internal Scaffolding: The heterogeneous teams generally outperformed the homogeneous teams in both process and final solutions. With diversity in the room, we witnessed students naturally taking on complementary roles. For example, in one mixed team, the Visionary member spearheaded the brainstorming of an out-of-the-box idea, the Systematic member then outlined a step-by-step plan to implement that idea, and a pragmatic member helped refine the plan to make it realistic. Meanwhile, an Adaptive member kept the energy high by quickly sketching a prototype, and the Resilient member encouraged everyone to keep pushing when they hit a snag. It was almost as if each archetype's inclination filled a particular niche: creativity, organization, practicality, momentum, perseverance – all were present.

We often observed instances of peer scaffolding in these teams, such as: a Systematic student teaching others a simple project management tool (“Let’s make a quick timeline; I can draw it out for us”), or an Adaptive student suggesting a quick experiment to test an idea (bringing action to a debate), or a Resilient student cheering, “*We’ve got this, let’s not give up!*” when the team got frustrated. These are analogous to instructor scaffolds (instructing, modeling, and emotional support, respectively), but here they came from peers. This peer-to-peer support was a unique strength of heterogeneous teams – often they resolved issues internally before an instructor needed to step in.

That said, diversity also brought some challenges in communication and decision-making. We noted a few moments where differences in working style led to friction. For instance, in one team the Systematic person wanted to analyze data longer before deciding, while the Visionary person grew impatient to choose an idea and move forward – this led to tension and a standstill. In such cases, the instructor provided a mediating scaffold. In that scenario, the teacher posed a bridging question to the team: “*How might you test one of the ideas quickly to get data that satisfies everyone?*”

This prompted the team to run a quick thought experiment on the Visionary’s idea, which gave the Systematic member some data to analyze. Essentially, the question scaffold helped the team find a compromise between action and analysis. In another case, a team had a dominant Pragmatic Innovator who favored a “safe” solution and was discouraging the Visionary’s more radical idea early on.

The instructor noticed the Visionary becoming quiet (possibly feeling shut down) and intervened with a hint to the group: “*Sometimes the first idea is not the most innovative – perhaps consider a very different angle before deciding.*” This hint reopened the discussion and allowed the Visionary student to propose her idea, which the team eventually incorporated for a more

creative outcome. These examples show that instructors still played a role in facilitating balanced contributions and preventing any single perspective from dominating. However, the nature of scaffolds needed in mixed teams was often about *process and team dynamics* (e.g., resolving conflicts, ensuring inclusion) rather than basic task guidance.

Some mixed teams received a scaffolded brief (process guidelines) at the outset, whereas others did not. We observed that teams with the initial process scaffold got organized a bit faster – they had a common approach to follow and thus wasted less time figuring out *how* to collaborate. For example, one such team immediately followed the given steps: they brainstormed for a set time, then voted on ideas, then fleshed out the top idea. Teams without the initial scaffold had to negotiate their process on the fly, which in a couple of cases led to slight early confusion (e.g., they spent more time discussing *how* to proceed).

However, because of their diverse composition, most still managed to self-organize reasonably well (often a Systematic or Pragmatic member would naturally suggest a way to proceed). The difference wasn't stark, but the teams with a provided structure tended to be more efficient and had fewer instructor interventions regarding process. On the other hand, one could argue the teams without a given structure engaged in a valuable negotiation process that might aid learning (this is more a pedagogical note). For the purposes of results, what's clear is that a *light initial scaffold* (like a process outline) can be helpful even for diverse teams, though their internal resources allow them to cope without it too.

At the end of Experiment 2, the quality of solutions from heterogeneous teams was generally higher than that of the homogeneous teams. Their pitches were more comprehensive – typically combining a creative idea with a solid execution plan and risk considerations. We didn't assign formal grades, but informally, instructors agreed that most mixed teams produced what would be "A" or "B" level project ideas, whereas the homogeneous teams' outputs ranged more widely (some A-level, some C-level due to lopsidedness).

The diversity in teams clearly led to more balanced outcomes. For instance, one mixed team's solution for the sustainable transport challenge was praised as both imaginative *and* feasible: the Visionary element made it innovative (they proposed using an unconventional energy source), the Systematic element ensured there was a budget and timeline, and the Pragmatic element kept everything realistic for the local context. The team also demonstrated learning from each other – e.g., the Adaptive member mentioned in the presentation how the Systematic planning helped them foresee pitfalls they would have otherwise overlooked.

Quantitatively, the heterogeneous teams required far fewer instructor scaffolds during their work time. On average, mixed teams had about 1 or fewer interventions per team, often none at all until perhaps feedback at the end. This is a significant reduction compared to homogeneous teams' ~2–3 interventions. Essentially, the students scaffolded each other, reducing reliance on the teacher. This finding supports the idea that constructing teams with complementary strengths can be a form of "built-in" scaffolding in educational design. The instructor could step back more with these teams, stepping in primarily to fine-tune or facilitate when the group's internal differences caused a lock-up.

In summary, Experiment 2 demonstrated the practical benefits of adaptive scaffolding strategies suggested by our earlier findings. When we allowed or introduced adaptive mixes – such as combining archetypes in teams or adding scaffolding only when needed – student groups achieved better balance in their learning process. Homogeneous teams highlighted each profile's natural tendencies, often to an extreme, confirming many of the challenges we

anticipated (e.g., Visionaries diverging, Systematics stalling). Heterogeneous teams showed how those extremes can be moderated through diversity: one type's weakness is offset by another's strength.

Moreover, the experiment underscored that scaffolding is most effective when it targets the specific gap an archetype has. The same scaffold can have different values in different contexts: for instance, asking a big open question was hugely helpful to a Visionary-only team (it prompted decision), but might have further paralyzed a Systematic-only team. Similarly, a structured checklist was a lifeline for a Systematic team but would have been redundant in a pragmatic team that self-structured. These insights give concrete evidence that *effective scaffolding in entrepreneurship education must be contingent* (Wood et al., 1976) – both on the learner's profile and on the team makeup.

Finally, these experiments also fed back into our understanding of the archetypes. Seeing how each type behaved under pressure and with others fleshed out the profiles. For example, we learned that Adaptive Opportunists, despite being independent, could become even more effective when paired with a structured partner – something we might not have gleaned from diaries alone. We also saw that Resilient Pioneers' leadership can shine in a team context (they often kept morale high). All these observations were invaluable in interpreting our focus group discussions and in formulating the final framework for adaptive scaffolding.

Phase 4: Focus Groups

In the final phase of data collection, we held focus groups to validate our findings and capture students' perspectives on the entire experience. These discussions provided a member-driven "reality check" and added depth to our interpretations, particularly regarding *why* certain scaffolding worked or not from the learner's point of view.

One of the first things we did in the focus groups was describe the five archetypes to the participants (who had all taken the survey and were informed of their own profile by this point). The reaction was very telling – students largely recognized themselves and their peers in these descriptions. For example, a student we had profiled as a Systematic Executor laughed and said, *"Oh, that's me. I totally freeze if I don't have a plan."* She went on to recount how at the beginning of the project she felt overwhelmed until the instructor gave the team a template, exactly as our analysis predicted.

A Visionary Risk-Taker in the group nodded vigorously during the description of that archetype and added, *"I was glad we didn't have a strict template at first – it let us be creative – but it helped so much when [another student] started organizing our ideas later."* This comment perfectly encapsulates the freedom-then-focus scaffolding sequence we found effective for Visionaries. Hearing it confirmed in a student's own words was powerful validation for us.

Many students mentioned that learning about the archetypes explicitly in this session gave them a new framework to understand team dynamics. An Adaptive Opportunist student remarked that initially he thought a more methodical classmate was "too slow or hesitant," but he realized that classmate was just a *Systematic type processing information*.

Likewise, a Resilient Pioneer student said she now understood why she tends to take charge in group tasks – *"I guess I trust myself to get it done because I've always been persistent. But I see now not everyone works that way."* These reflections suggest that making such profiles explicit could actually improve empathy and collaboration among students (an interesting implication we note for educators).

When discussing various types of support they received, students across archetypes generally agreed on certain points: feedback was unanimously praised as the most helpful form of support. One quote that stands out is, *“Getting feedback on our draft was the turning point – it showed us what to improve.”* This echoes the diary data where feedback had the highest positive ratings. Students valued that feedback was specific and actionable, and it showed that the instructor was engaged with their work.

Explanations and instructing (more direct guidance) were also appreciated, especially by those who felt lost. A Systematic Executor student said, *“Sometimes just a little instruction like ‘try this’ saved us hours of confusion.”* Even a Visionary student chimed in that having some instructions about halfway through the project was crucial: *“If they had just told us exactly how to do it from the start, we wouldn’t have learned as much – but I’m glad they did give us some steps later on, otherwise we might never have finished.”* This reinforces the idea that timing matters – initial excessive instruction would have undercut learning for some, but well-timed instruction later was beneficial.

Reactions to the more indirect scaffolds were mixed, as expected. Many students chuckled about the hinting strategy – one said, *“Sometimes I didn’t even realize the teacher was hinting; I thought they were just making a comment!”* (This suggests subtle hints can be *too* subtle.) However, another student (Adaptive profile) said he *loved* when the instructor dropped a clue instead of giving an answer directly: *“It’s like a puzzle – it made us think and when we solved it, it felt awesome.”* The group consensus was that hints are enjoyable and effective for some students (often the more independent ones), but others would prefer a straight answer if truly stuck.

As for instructor questioning, a Pragmatic Innovator echoed what we saw in diaries: *“I liked when we got asked questions, but only after we had something to show. Early on, questions without context just made us feel like we were being tested.”* Others nodded at this. So, the takeaway was that open questioning is great for reflection *at the right stage*, but can be counterproductive if students are too green in a task. This aligns with scaffolding literature on contingent questioning (i.e., diagnosing when a learner is ready for a Socratic prompt).

A major theme that emerged was timing – students were very aware of *when* help was given or withheld. They generally approved of the instructors’ approach to let them grapple first and then intervene: *“It was frustrating at first when we were all lost, but looking back, we learned a lot by struggling, and then the help came at the perfect time,”* said one student. Another added, *“We were about to hit a wall and give up when the teacher stepped in – it was like they knew when we had had enough.”* These statements confirm that our decision to fade in scaffolding (holding back initially, observing, then providing support when needed) was noticed and appreciated.

Of course, not every student felt the timing was perfect – a couple of Systematic students humorously said they would have liked the help “just a little sooner, please,” whereas a Visionary student joked she could have used even *less* guidance early on. But these were expressed with understanding that a balance had to be struck. The focus group moderator probed whether anyone felt completely unsupported or, conversely, smothered. No one said they felt smothered; a few said there were moments of feeling unsupported (especially early confusion), but they quickly added that they now see why the instructors did that (to encourage learning).

This reflection is a nice affirmation of the “optimal challenge” principle: students recognize in hindsight that a certain amount of struggle was beneficial, as long as support wasn’t too far away.

An insight strongly voiced in the focus groups was the role of emotional support and classroom atmosphere. Students mentioned that *knowing the instructor cared for* and *feeling safe to share ideas* were important. A Resilient Pioneer gave a touching example: “*At one point I was really stuck and frustrated, but when the lecturer told me, ‘I know this is hard, and I see you’re working so hard,’ it just made me feel seen. That gave me the boost to keep going.*” This highlights how what we might call motivational scaffolding (encouragement, empathy, praise) had real impact.

Other students agreed that things like the instructor’s tone, approachability, and acknowledgment of difficulties created an environment where they felt more comfortable taking risks or persisting. We realized that while our formal scaffolding taxonomy focused on cognitive support, the emotional dimension was a crucial underlying factor. Indeed, scaffolding theory (e.g., Van de Pol et al., 2010) acknowledges affective support as a key part of contingent teaching – our focus group data strongly support that. One student said, “*When our group was really confused, the fact that the coach didn’t get mad but instead joked that ‘this is the messy part of entrepreneurship’ made us laugh and relax. We realized it’s okay to be messy.*” That kind of normalization of struggle is an emotional scaffold that kept them engaged rather than discouraged.

Perhaps most importantly, the focus group conversations confirmed the archetype-specific scaffold strategies we had inferred from earlier phases. We directly asked if they felt certain approaches worked better for certain people. Table 20 shows a summary of how students responded (with archetype identities confirmed through their survey results):

Archetype	Key Reflections and Representative Quotes	Preferred Scaffolds / Supports	Less Effective / Unhelpful Scaffolds	Interpretation
Systematic Executors	Students openly acknowledged their reliance on structure: <i>“If we didn’t get those guidelines and check-ins, I’d still be sitting there planning instead of doing.”</i> They valued explicit instructions, stepwise breakdowns, and consistent feedback.	Instructing, Explaining, Frequent Feedback, Templates/Check-ins	Open Questioning, Hinting – seen as confusing or stress-inducing under ambiguity.	Thrive under high structure and predictability. Explicit, sequential scaffolding maintains momentum and confidence; lack of early guidance can cause paralysis.
Visionary Risk-Takers	Enjoyed initial creative freedom but admitted to needing later focus: <i>“It was a relief that someone could put some order to our crazy ideas.”</i> Welcomed structured teammates or targeted feedback later in the process.	Feedback, Questioning for Prioritization, Modeling, Structured Peer Input	Early Over-Structuring – perceived as stifling or limiting creativity.	Benefit from a <i>freedom-first, focus-later</i> sequence: autonomy early, converging scaffolds (feedback/questions) during implementation.
Adaptive Opportunists	Valued autonomy: <i>“I’d rather try it and maybe fail than follow a script.”</i> Yet appreciated subtle support like hints, deadlines, and social comparison: <i>“Seeing others present kept us on track.”</i>	Hints, Deadlines/Checkpoints, Challenge Questions, Autonomy-Supportive Feedback	Rigid Step-by-Step Instruction, Heavy Structure – demotivating and restrictive.	Thrive with autonomy reinforced by light, well-timed nudges that maintain momentum without reducing ownership.
Pragmatic Innovators	Reported satisfaction with pacing and sequencing: <i>“It was important the teacher didn’t interfere too soon... then they helped us see how to make it better.”</i> Often acted as peer-supporters.	Sequential Scaffolding (structure → trial → reflection), Feedback, Reflective Questioning, Peer Collaboration	Premature Intervention, Unstructured Reflection Too Early	Balanced learners who respond best to well-timed, staged scaffolding; capable of internalizing scaffolds and redistributing them in teams.
Resilient Pioneers	Emphasized perseverance and moral support: <i>“When our first idea failed, the teacher’s positive spin made us want to try again.”</i> Appreciated encouragement and constructive feedback that affirmed competence.	Encouragement, High-Level Feedback, Acknowledgment of Effort, Autonomy-Respecting Support	Overly Directive Guidance, Detailed Hand-Holding – felt patronizing or unnecessary.	Prefer motivational and affirmational scaffolds that sustain confidence; value recognition over detailed instruction.

Table 20. Focus Group Reflections on Scaffolding Effectiveness by Entrepreneurial Mindset Archetype

Interpretive Summary

- Across groups, *feedback* emerged as universally valuable, though its tone and timing mattered.
- Emotional scaffolding (encouragement, acknowledgment) was emphasized by Resilient and Visionary students, linking affect to persistence.
- Timing remained the decisive factor for effectiveness — early autonomy, mid-phase structure, and late-phase reflection constituted the optimal pattern across archetypes.

The focus group not only confirmed our earlier analysis but also added a layer of rationale – we got to hear *why* students felt a certain way about the scaffolding. We also gained some new insights, such as the suggestion from students that introducing these archetype concepts to the class could itself be helpful. They felt it would have been beneficial to know that “not everyone thinks like you” from the start, perhaps easing frustrations in teamwork. This is a valuable practical insight for educators (one we consider in our Discussion).

In conclusion, the focus group phase served as a triangulation and validation of our findings. The students’ reflections strongly aligned with the patterns we observed in the diaries and experiments: feedback was king, scaffolding needed to be timed right, different people needed different kinds of help, and emotional support mattered a lot. No major contradictions arose – rather, the students nuanced the findings with personal anecdotes and emphasized certain points (especially about timing and emotional tone). This convergence across methods (survey → diaries → experiments → focus groups) boosts our confidence in the robustness of the results (Jick, 1979). We have quantitatively and qualitatively cross-checked how entrepreneurial students with varying mindsets experience learning and scaffolding.

Collectively, these results paint a coherent picture and answer our core research question: Entrepreneurial learning can be significantly enhanced by tailoring scaffolding to student archetypes. Each archetype thrives with a different mix of support, and adaptive, well-timed scaffolding prevents the common pitfalls (like Visionaries floundering or Systematics freezing). In the final section, we will synthesize these insights into an Adaptive Entrepreneurial Development Framework (AEDF), discuss theoretical implications (e.g., how this informs effectuation and experiential learning theories), and offer practical recommendations for educators on implementing differentiated scaffolding in entrepreneurship education.

Discussion

The identification of five entrepreneurial mindset archetypes – Visionary Risktakers, Pragmatic Innovators, Systemic Executors, Adaptive Opportunists, and Resilient Pioneers – provides a nuanced framework for understanding why students in the same entrepreneurship course can respond so differently to identical learning experiences. These archetypes were derived through a mixed-methods approach: statistical clustering of Entrepreneurial Mindset Profile (EMP) survey data, combined with ethnographic observations of classroom dynamics and thematic analysis of student diaries. This dual grounding means the archetypes are both psychometrically robust and educationally meaningful.

In contrast to earlier typologies of entrepreneurial students, which were often abstract or one-dimensional, our archetypes capture how different configurations of ability (skills, knowledge) and willingness (motivation, attitude) shape learners’ engagement with entrepreneurial tasks. In doing so, the framework extends existing theories of entrepreneurial cognition by demonstrating that *the same scaffolding practices are received in radically different ways depending on a learner’s mindset profile*. Below, we discuss the implications of these findings for theory, pedagogy, and policy in entrepreneurship education.

Building on the empirical findings, we synthesize an Adaptive Entrepreneurial Development Framework (AEDF) that links entrepreneurial mindset archetypes to tailored scaffolding strategies and pedagogical design principles.

Theoretical Implications

Extending Entrepreneurial Cognition Theory. The archetypes offer important theoretical insights by illuminating how initial mindset configurations influence entrepreneurial reasoning and development. Notably, our results suggest that novice entrepreneurs are not a homogeneous group: some lean naturally toward *effectual* logic while others favor *causal* logic, aligning with Sarasvathy's (2001) theory of effectuation. For example, the Visionary Risktaker archetype – high in creativity and risk-taking but lower in planning and persistence – gravitated toward effectual reasoning (embracing uncertainty, leveraging means at hand, improvising new ideas).

In contrast, the Systemic Executor – structured, methodical, and risk-averse – exemplified a more casual approach (preferring careful planning, analysis, and predictability). Rather than a binary novice/expert divided in decision logic, these findings show a *continuum of entrepreneurial logics mediated by individual mindset**. This extends effectuation theory by indicating that the adoption of effectual vs. causal strategies is not only a function of expertise or experience but is also shaped by an entrepreneur's initial mindset profile.

It reinforces recent arguments that entrepreneurial cognition is *developmental and context-dependent* rather than universally uniform (Shepherd & Patzelt, 2018). By situating effectual and causal tendencies within specific archetypes, the study provides a more granular view of how different students enter the entrepreneurial process with distinct cognitive orientations.

Our data-driven archetypes also serve to bridge and operationalize existing conceptual frameworks in entrepreneurship literature. Hattenberg et al. (2022) proposed that entrepreneurial mindset diversity can be mapped along dimensions of ability (skills, knowledge) and willingness (motivation, attitude), but their categories remained theoretical.

This study moves beyond that abstraction by inductively deriving five concrete archetypes that map onto combinations of ability and willingness observed in real students. In essence, we translated an analytical framework into *pedagogically actionable learner types*. Each archetype represents a distinct “starting point” in terms of what a student *can do* (ability) and *wants to do* (willingness) in entrepreneurial learning. By empirically validating these categories, we extend Hattenberg et al.'s lens in a way that is directly applicable to classroom practice.

Furthermore, the archetypes integrate multiple theoretical perspectives on the entrepreneurial journey. When we overlay the archetypes onto Dimov's (2007; 2010) model of the nascent entrepreneurial process, we see evidence of developmental plurality: different students enact different stages or pathways of venture development. For instance, an Adaptive Opportunist (independent and future-focused but low in persistence) may oscillate between exploring potential opportunities and launching nascent projects, pivoting repeatedly in response to feedback. A Resilient Pioneer (high in perseverance and optimism) embodies what Shepherd et al. (2010) describe as an entrepreneurial *learning spiral* – an iterative cycle of trying, learning from setbacks, and trying again – progressing incrementally despite failures or obstacles.

These patterns underscore that entrepreneurial expertise does not follow a single linear path from novice to expert; rather, it unfolds along multiple pathways that are archetype-specific. This finding aligns with contemporary views of entrepreneurship as an iterative, non-linear

learning process (Politis, 2005; Shepherd & Patzelt, 2018). It also contributes to bridging the gap between individual-centric and opportunity-centric perspectives in entrepreneurship research. By showing how an individual's mindset influences their approach to recognizing and exploiting opportunities, the archetype framework offers a more holistic view of the entrepreneurial process that links personal cognitive dispositions with external opportunity development (Shane & Venkataraman, 2000).

Beyond theoretical contributions, our findings carry significant implications for entrepreneurship pedagogy, especially the design of scaffolding (supportive teaching interventions) that is sensitive to learner differences. A clear lesson is that *one-size-fits-all teaching strategies are inadequate in entrepreneurship education*. The ethnographic data revealed how the same instructional scaffold could be embraced by some students but resisted by others, depending on their archetype. For example, one creatively driven student (a Visionary Risktaker) in our study described a structured business planning template as “stifling” to her idea flow, whereas a more methodical student (a Systemic Executor) found the same template “indispensable” for providing clarity and direction.

Such divergent responses to identical support tools illustrate that educators must tailor their facilitation to the learner's zone of proximal development, in Vygotsky's (1978) sense. A scaffold that is helpful for a student at one developmental stage or mindset configuration may fall outside the optimal support range for another student. This underscores the need for *adaptive scaffolding*: instructors should calibrate the level and type of support to each learner's current abilities and needs, and then gradually adjust that support as the learner grows more competent (Wood, Bruner, & Ross, 1976).

Our archetypes provide practical guidance for enacting this adaptive, differentiated pedagogy. In particular, each archetype corresponds to a distinct pattern of strengths and growth areas, implying different optimal scaffolding strategies (table 21):

Archetype	Core Learning Challenge	Primary Scaffolding Focus	Effective Scaffolding Examples / Pedagogical Interventions	Intended Developmental Outcome
Visionary Risk-Takers	Difficulty translating abundant creative ideas into concrete action; risk of idea overload and lack of execution discipline.	Channel creativity into structured action without constraining imagination.	• Scaffolded project management templates • Milestone-based progress trackers • Prioritization frameworks (“must-do vs. nice-to-do”) • Focused feedback sessions linking creativity to feasibility	Balanced creative ideation with strategic execution; improved follow-through while maintaining originality.
Systematic Executors	Overdependence on structure; discomfort with ambiguity; slow to initiate creative exploration.	Stretch comfort zone through controlled uncertainty and open-ended problem solving.	• Ill-defined case challenges • “What-if” scenario explorations • Ambiguity-tolerant design tasks • Reflective discussions on learning from uncertainty	Increased tolerance for ambiguity; development of adaptive, exploratory thinking.
Pragmatic Innovators	Risk of over-stabilizing ideas too early; need to integrate creativity with practicality.	Link structured execution to iterative experimentation.	• Rapid prototyping cycles • Continuous improvement tasks • Iterative feedback loops • Short design sprints tied to reflection sessions	Enhanced creative adaptability and iterative learning within practical constraints.
Adaptive Opportunists	High flexibility and idea generation, but prone to distraction and lack of sustained commitment.	Foster accountability and sustained focus through interpersonal scaffolds.	• Individual mentoring or coaching • SMART goal setting and regular check-ins • Peer accountability groups • Progress reflection milestones	Greater project commitment and disciplined follow-through without loss of autonomy.
Resilient Pioneers	Exceptional persistence that can become rigidity; risk of persisting with failing ideas.	Encourage reflective recalibration and strategic adaptation.	• Guided reflection journals • Structured post-failure debriefs • Critical feedback discussions • Self-assessment tools for decision revision	Improved strategic flexibility; ability to learn from setbacks and redirect effort effectively.

Table 21. Scaffolding Entrepreneurial Mindset Profiles

By aligning pedagogical support with each archetype's tendencies, educators can more effectively bridge the gap between a student's current capacity and their next stage of development. In essence, adaptive scaffolding grounded in archetype-specific needs enables every student to progress along their own optimal learning pathway. This approach resonates with calls in the education literature for more personalized and learner-centered teaching in entrepreneurship.

Rather than treating a class of aspiring entrepreneurs as a uniform cohort, instructors can use archetype insights to "meet students where they are," much as differentiated instruction advocates in general education have recommended tailoring learning experiences to individual readiness and style (Blenker et al., 2012). Recent work on entrepreneurship education similarly emphasizes shifting from teacher-led, universal models to more *idiosyncratic, student-centered approaches* that accommodate differences in learners' backgrounds and motivations (Robinson et al., 2016). Our findings provide a concrete method for such personalization.

Notably, many entrepreneurship educators already view their role less as transmitters of content and more as facilitators or coaches guiding individual development (Wraae & Walmsley, 2020). The archetype framework gives this facilitative teaching philosophy a research-based structure: it equips educators with a diagnostic tool to identify student needs and a menu of scaffolding techniques likely to be effective for each profile. In practical terms, curriculum designers could develop modular course components corresponding to each archetype (for instance, alternative assignments or project tracks), and instructors could dynamically assign or suggest different modules depending on student archetype, creating a more inclusive and responsive learning environment.

At a higher level, embracing entrepreneurial mindset archetypes can drive innovation in curriculum design, educator training, and education policy. From a curriculum perspective, our results suggest that entrepreneurship programs should build in flexibility. Educators and program directors might incorporate modular scaffolding strategies and elective learning pathways that can be tailored to different student archetypes. For example, within one course, a toolkit of activities could be prepared for each archetype (creative brainstorming workshops for Visionary Risktakers, structured planning labs for Systemic Executors, etc.), with students engaging in those that match their learning profile.

Ensuring that these pedagogical modules draw on ethnographic insights – i.e. they reflect students' lived experiences and challenges – will make them more resonant and effective. On the faculty development side, the archetype framework could inform professional development for entrepreneurship educators. Training programs for new entrepreneurship instructors might include learning to recognize common archetype traits in the classroom and practicing adaptive teaching techniques. By sensitizing educators to the diversity of entrepreneurial learner profiles, such training can improve their ability to scaffold learning contingently (Florian & Black-Hawkins, 2011) and to avoid bias toward one "ideal" student type. Additionally, at the institutional and policy level, our findings encourage a shift toward more inclusive and context-sensitive measures of educational success.

Accreditation bodies and education policymakers often seek standardized outcomes for entrepreneurship education (e.g. uniformly increasing all students' business plan skills or venture creation rates). Our study, however, indicates that students vary widely in their entrepreneurial trajectories, and each archetype may achieve different kinds of outcomes (one may start ventures, another might excel in innovative problem-solving within existing organizations, etc.). Recognizing this, policy could move away from a *one-size-fits-all* evaluation

of entrepreneurship programs and instead promote diverse metrics of success that map onto different developmental pathways.

Likewise, support infrastructures like incubators and accelerators could use the archetype concept to tailor their services – for instance, offering varied tracks or mentorship styles that align with entrepreneurs' mindset profiles – thereby improving inclusivity for a broader range of entrepreneur types. In summary, adopting an archetype-informed approach stands to benefit not only individual learners and teachers, but also the broader educational ecosystem, by valuing and leveraging the *plurality of entrepreneurial mindsets*.

Limitations and Future Research

While this study yields novel insights, it is important to acknowledge its limitations and the avenues they suggest for future research. First, the research was conducted with a relatively small, localized sample – undergraduate students in a single entrepreneurship program in the Netherlands. This homogeneous context limits the generalizability of our archetypes. Cultural factors, institutional environments, and regional entrepreneurial ecosystems might influence which archetypes appear or how they manifest.

For example, cultural differences in attitudes toward risk-taking, autonomy, and entrepreneurial career paths (Cui, Sun, & Bell, 2021) could mean that students in other countries or educational settings do not fit neatly into the five archetypes identified here, or that additional archetypes exist. Future research should therefore validate and refine the entrepreneurial mindset archetypes in diverse contexts.

Cross-cultural studies, for instance, could examine whether the same five archetypes emerge among students in Asia, North America, or other regions, and whether the distribution of archetype prevalence differs by cultural context or education system. Even within Europe, comparing students from multiple institutions or countries could highlight contextual moderating factors (such as national culture or university teaching style) that shape entrepreneurial mindsets.

Broadening the sample in these ways would help determine how universally applicable the five archetypes are and might reveal new variations or sub-types, thereby strengthening the external validity of the framework.

Second, there are methodological limitations related to our data and analysis that future studies could address. The qualitative component of this research – including the coding of student diaries and interpretation of classroom observations – involved a degree of subjectivity. Although we triangulated qualitative findings with quantitative cluster results to increase robustness, the process of categorizing diary excerpts into themes and mapping them to archetypes required researcher judgment. It is possible that different researchers or alternate qualitative approaches might have identified somewhat different archetypal narratives.

To bolster the reliability and objectivity of archetype identification, future studies should consider implementing measures such as intercoder reliability checks and independent coding teams for qualitative data. This would help verify that the archetypes are not an artifact of one analyst's perspective. In addition, further validation could be pursued by correlating archetypes with established constructs in the entrepreneurship literature. For example, future research might use alternative instruments like the Entrepreneurial Orientation scale (Lumpkin & Dess, 1996) or measures of entrepreneurial *bricolage* (Baker & Nelson, 2005) to see if certain archetypes correspond to distinctive patterns on those scales.

If a given archetype consistently aligns with a particular profile of entrepreneurial orientation (e.g. high innovation, high proactiveness, low risk aversion) or a particular approach to resource bricolage, it will provide convergent validity evidence for the archetype construct. Similarly, deploying longitudinal qualitative methods – such as long-term ethnographic observation or repeated in-depth interviews with the same students – could capture whether and how individuals transition from one archetype to another over time.

Our study used primarily cross-sectional data (a one-semester snapshot), which could not fully capture developmental shifts. A longitudinal design might reveal, for example, if an initially Adaptive Opportunist student evolves into a Pragmatic Innovator after a year of training, or under what conditions such transformations occur. Capturing these dynamics would deepen our understanding of entrepreneurial mindset development as a process, not just a static categorization.

Third, and relatedly, we did not directly measure the impact of archetypes on entrepreneurial outcomes, nor did we test the efficacy of archetype-tailored interventions within the scope of this study. While we argue that different archetypes may benefit from different scaffolding approaches, it remains an open question whether adapting education to these archetypes actually improves students' entrepreneurial competencies or real-world venture performance.

Future research should examine the predictive power and practical utility of the archetypes. One direction is to explore whether a student's archetype is associated with observable behaviors and outcomes *beyond the classroom*. Do certain archetypes correlate with higher rates of venture creation, innovation output, or entrepreneurial career entry after graduation? For instance, perhaps Resilient Pioneers are more likely to persist in founding a startup, whereas Visionary Risktakers may generate more novel business ideas (but possibly struggle to execute them).

Understanding such relationships would validate the pragmatic significance of the archetypes in forecasting entrepreneurial activity. Additionally, research can extend to the team level: entrepreneurship often involves founding teams, and it would be valuable to investigate how combinations of different archetypes within a team influence team dynamics, creativity, and venture success. For example, a team comprising a Visionary Risktaker and a Systemic Executor might balance creative vision with operational discipline – is this mix more effective than a team of two Visionary Risktakers or two Systemic Executors? Investigating these questions would bridge our individual-level archetype model with the literature on team heterogeneity and performance.

Beyond observational studies, experimental and intervention-based research is a fruitful avenue to build on our findings. Future educators or researchers could design pilot programs where entrepreneurship courses explicitly incorporate archetype-based personalization: for example, diagnosing students' archetypes at the start and then tailoring certain activities or mentorship pairings accordingly. By comparing such an adaptive approach to a control group with a standard curriculum, researchers could rigorously test whether *adaptive scaffolding based on archetypes* leads to better learning outcomes, higher engagement, or greater entrepreneurial self-efficacy in students.

This would answer the practical question educators often have: does customizing pedagogy to learner archetypes measurably enhance the effectiveness of entrepreneurship education? Such studies would also respond to recent calls for more evidence-based insight into what works in entrepreneurship education (Nabi, Liñán, Fayolle, Krueger, & Walmsley, 2017). In summary,

while this thesis has charted new territory by identifying entrepreneurial mindset archetypes and suggesting their educational utility, much work remains to test and refine these concepts. Ongoing research across varied contexts, using longitudinal and experimental designs, will be crucial to fully realize an adaptive, evidence-driven approach to entrepreneurship education.

Contributions and Conclusion

This research makes several contributions to the study and practice of entrepreneurship education. *Theoretically*, it advances our understanding of entrepreneurial cognition and learning by uncovering how diverse mindset profiles shape the entrepreneurial journey. Prior work often treated the entrepreneurial mindset as a somewhat uniform construct or focused on averages across students; in contrast, we demonstrate that entrepreneurial development begins from markedly different starting configurations. By empirically identifying five distinct mindset archetypes, our study extends foundational theories of entrepreneurship.

This study moves adaptive scaffolding from a general pedagogical principle to a diagnostically actionable approach, by linking specific learner profiles to empirically grounded scaffolding strategies.

For instance, we show that whether a novice entrepreneur leans toward effectuation or causation is partly a function of their initial mindset predispositions – a novel insight that adds nuance to effectuation theory (Sarasvathy, 2001) and to models of entrepreneurial decision-making. Our findings also enrich the concept of the entrepreneurial journey as an iterative, personalized process rather than a one-path-fits-all progression. This supports and illustrates recent perspectives that highlight the *non-linear and dynamic nature* of entrepreneurial learning (Shepherd & Patzelt, 2018). Moreover, by linking individual-level differences to entrepreneurial outcomes (e.g. how an archetype influences opportunity recognition or venture persistence), we help bridge the long-standing divide between person-centric and opportunity-centric views of entrepreneurship (Shane & Venkataraman, 2000).

In doing so, the research offers a more holistic theoretical framework: one that integrates individual cognitive traits, developmental processes, and external opportunity engagement into a unified perspective. Finally, our archetype framework operationalizes and builds upon recent conceptual models of entrepreneurial mindset diversity (Hattenberg et al., 2022). We translate the abstract dimensions of “ability and willingness” into concrete, observable profiles that educators and researchers can recognize. This translational step contributes to theory by grounding it in empirical reality and making it more testable and applicable.

Methodologically, the study contributes by exemplifying a rigorous mixed-methods approach in entrepreneurship education research. We combined quantitative latent class analysis (Gaussian mixture modeling of survey data) with qualitative analysis (thematic coding of diaries and observations) to derive and validate the archetypes. This approach demonstrates how data triangulation can be used to capture the richness of educational phenomena without sacrificing analytical rigor. Quantitatively, the five-cluster solution distilled a complex dataset into a parsimonious structure, but by itself would have been limited to trait scores. Qualitatively, the ethnographic insights gave life and context to those clusters, revealing *how* and *why* students with certain trait patterns behaved as they did in the classroom.

By iterating between these methods, we were able to ensure the clusters were not statistical artifacts but reflected meaningful differences in learner experience – an approach that can be emulated in future research. The study thus offers a template for mixed-method research in this domain, highlighting that entrepreneurship education can benefit from blending psychometric

and interpretive techniques. In practical terms, our methodology underscores the value of collecting multiple forms of data (e.g. surveys, diaries, interviews, observations) to understand complex educational constructs. For scholars, it provides a roadmap to achieve both breadth and depth: large-sample generalizability combined with deep contextual understanding. This contributes to the methodological literature by illustrating how to navigate and integrate disparate data sources in a coherent analysis (Creswell & Plano Clark, 2018).

We also took steps to enhance reliability (such as triangulation and validation checks), which we document for transparency and as guidance for other researchers. In a field that often calls for more robust evidence, this study's methodological design stands as an example of how to balance analytical rigor with ecological validity, potentially inspiring more studies that break free from siloed quantitative or qualitative approaches.

Practically, this work has direct implications for improving entrepreneurship, education and training, encapsulated in what we might term an Adaptive Entrepreneurial Development Framework. In identifying recognizable archetypes of entrepreneurial learners, we provide educators with a diagnostic toolkit to tailor their teaching. The archetypes are not just theoretical constructs; thanks to the rich qualitative descriptions, they correspond to “real-world” student personas that teachers will find familiar in their classrooms (e.g. the idea-rich but execution-poor dreamer, the diligent planner who avoids risk, etc.).

By naming and describing these archetypes, the study makes it easier for practitioners to discuss student differences and strategize responses. One key practical contribution is offering targeted scaffolding strategies for each archetype, as discussed in the previous section. Educators can use these insights to design curriculum elements and learning interventions that resonate with different student needs – thereby potentially increasing student engagement and learning effectiveness. This personalized approach moves away from the historical one-size-fits-all entrepreneurship course and towards a learner-centered pedagogy that could accommodate a wider range of students. Such an approach is likely to enhance the impact of entrepreneurship programs; as Neck and Greene (2011) argued, entrepreneurship education is most effective when it moves beyond traditional lectures to more tailored, experience-based methods.

Our findings concretely inform what those tailored methods might look like for different learner types. In addition, the research has utility for those outside traditional academia: for entrepreneurship incubators, accelerators, and mentors who work with aspiring entrepreneurs. Knowing an individual's archetype could help mentors personalize their advice (for example, being more structure-providing for a Visionary Risktaker or more challenge-inducing for a Systemic Executor). Organizations that support entrepreneurs might incorporate archetype assessment into their onboarding, allowing them to offer differentiated coaching programs.

At the policy level, the insights guide educational policymakers and program designers toward more inclusive and adaptive frameworks for building entrepreneurial capacity. Rather than mandating a fixed curriculum presumed to work for all, policymakers can encourage institutions to adopt flexible pathways and multiple definitions of success (e.g. innovation skills, self-efficacy growth, venture creation, etc.), recognizing that students have varied entrepreneurial strengths. Ultimately, by informing curriculum design, teacher training, and support services, the practical contribution of this research is to pave the way for *evidence-based personalization* in entrepreneurship education – helping a diverse array of learners develop their entrepreneurial potential in ways best suited to them.

In conclusion, this thesis significantly advances our understanding of how entrepreneurial mindsets develop and how education can better nurture entrepreneurial talent. We began with a fundamental puzzle: Why do students exposed to the same entrepreneurship course diverge so dramatically in their learning outcomes and experiences? Our answer is that learners are *not* blank slates entering the classroom – they arrive with different configurations of skills, dispositions, and motivations that profoundly influence how they engage with entrepreneurial learning. By empirically uncovering five archetypal mindset profiles, we have shown that what might appear as idiosyncratic individual differences are actually patterned and predictable.

Recognizing these patterns allows us to interpret classroom divergence not as a failure of teaching or a problem to be eliminated, but as evidence of valuable diversity among learners. Each archetype represents a unique pathway through which entrepreneurial expertise can unfold. Thus, a core insight of this work is that there are *multiple equally valid routes* to becoming entrepreneurial – some students will do so through bold experimentation and visionary ideation, others through careful planning and steady execution, others through adaptive opportunity-seeking, and so on. Embracing this diversity can transform entrepreneurship education into an *adaptive practice of guided development* rather than a uniform transfer of content. If educators adjust their scaffolding to support each student's journey, the classroom becomes a space where different kinds of entrepreneurial talent are cultivated and allowed to flourish.

Looking ahead, we encourage continued research to build on and refine the archetype framework. It will be important to examine these archetypes in other educational settings and cultures, and to track how individuals may evolve over time – for example, do today's Visionary Risktakers become tomorrow's Pragmatic Innovators after gaining experience, or do they forge a distinct path? It will also be fruitful to explore team dynamics, asking how diverse archetypes in a startup team complement or conflict with each other. By extending the inquiry in these ways, scholars can contribute to a more dynamic, nuanced theory of the entrepreneurial mindset.

From a practical standpoint, the ultimate measure of this work's impact will be whether it can help educators and mentors foster more successful and inclusive entrepreneurial outcomes. We are optimistic that the insights from this study will inspire pedagogy and programs that not only acknowledge the varied starting points of aspiring entrepreneurs but actively leverage those differences. As the world continues to grapple with economic uncertainty and seeks more entrepreneurial problem-solvers, an education system that can adapt to multiple entrepreneurial archetypes will be better equipped to unlock the potential of all students. In sum, by turning the challenge of learner heterogeneity into an opportunity for tailored development, we can cultivate entrepreneurial capacity in its many forms and better prepare the next generation of entrepreneurs to navigate and shape an uncertain future.

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6

Conclusions

6.1 Revisiting the Vision: From Question to Emergent Understanding

This dissertation began, as so many journeys do, with a deceptively simple question born from the lived realities of the classroom: *How can entrepreneurship education be tailored to diverse learner profiles through adaptive scaffolding and educator responsiveness?* This inquiry invited a deeper exploration into the unseen structures and human connections that sustain learning and growth.

From the outset, my conviction was that entrepreneurship education (EE) is not merely the transmission of business knowledge or the cultivation of future founders. Rather, EE is a developmental process—a co-creative journey in which learners’ abilities and willingness evolve through cycles of challenge, reflection, and support. This perspective required a departure from linear, outcome-centric models of education and called for a more nuanced, relational approach: one that recognizes the dynamic interplay between cognitive, emotional, and social dimensions of learning (Illeris, 2007; Vygotsky, 1978).

As the research unfolded, it became increasingly clear that the diversity observed among students—their varied responses to risk, ambiguity, and feedback—was not a problem to be solved, but a reality to be embraced. The identification of five entrepreneurial mindset archetypes, grounded in empirical analysis of 834 student profiles across three Dutch Universities of Applied Sciences, revealed recurring configurations of ability and willingness that illuminate meaningful differences in learners’ developmental starting points (Hattenberg et al., 2019; Fayolle et al., 2017).

The process of inquiry was itself iterative and emergent, mirroring the entrepreneurial learning it sought to understand. Insights from classroom interventions, educator interviews, and student reflections converged to challenge initial assumptions and open new avenues of understanding. The Adaptive Entrepreneurial Development Framework (AEDF) emerged not as a prescriptive model, but as a living scaffold—a synthesis of lived experience, theoretical integration, and practical experimentation. This framework stands as both a product of research and a scaffold for future practice: a flexible model designed to support educators in meeting learners where they are, and in guiding them toward greater autonomy and confidence.

Crucially, this research affirmed that effective EE hinges on more than curriculum design or assessment rubrics. It depends on the tacit expertise of educators—their capacity for improvisation, emotional attunement, and adaptive questioning (Polman, 2000; Sarasvathy, 2001). In classrooms where psychological safety was prioritized, students learned to reframe failure as iterative insight rather than defeat, aligning with Kolb’s experiential learning cycle (Kolb, 1984). Educators who asked, “What would make this risk feel manageable?” rather than prescribing solutions, unlocked deeper reflection and agency—a relational approach echoing Illeris’ triadic model, where cognitive, emotional, and social dimensions converge.

In revisiting the vision that animated this work, it is evident that the central contribution of this dissertation lies not only in its models or findings, but in its affirmation of entrepreneurship education as a fundamentally human endeavour. It is in the relationships between educators and learners, in the willingness to adapt and respond, that the true potential for entrepreneurial growth resides. When education is approached as a process of shared discovery, it becomes possible to unlock the latent capacities of all learners—not just the most confident or prepared, but also those whose journeys begin with uncertainty and doubt.

Ultimately, this work reframes entrepreneurship education not as the delivery of predefined content, but as a co-creative process of identity development, confidence-building, and transformative learning. The metaphorical scaffolds that hold up our educational “buildings” are not static structures, but living, adaptive supports-adjusted in real time by those who care enough to meet learners where they are. In this, we find the true “gift of confidence”: the belief that, together, we can build what none of us could construct alone.

6.2 Synthesis of Main Findings

This section weaves together the core discoveries of this dissertation, each arising from a dedicated sub-question that probes a distinct layer of entrepreneurial learning: pedagogical approaches, educator responsiveness, learner diversity, and adaptive scaffolding strategies. Guided by the conviction that entrepreneurship education (EE) is fundamentally relational and developmental, the findings presented here move beyond the static, outcome-centric models that have long dominated the field (Fayolle & Gailly, 2008; Pittaway & Cope, 2007). Instead, they illuminate the nuanced, dynamic interplay between learners and educators—a space where mindset development is not prescribed but co-constructed through responsive teaching and adaptive support (Illeris, 2018b; Hattenberg, 2022).

Across these strands, the research demonstrates that unlocking entrepreneurial growth requires more than the transmission of knowledge or the replication of best practices. It demands a pedagogy attuned to context, capable of recognizing and responding to the diversity of learner profiles, and grounded in the tacit, improvisational expertise of educators (Polman, 2000; Nonaka & Takeuchi, 1995). The synthesis that follows integrates insights from literature review, empirical profiling, and classroom experimentation, ultimately culminating in the Adaptive Entrepreneurial Development Framework (AEDF). This framework offers a holistic response to the central challenge of EE: how to scaffold entrepreneurial mindsets in a way that is inclusive, developmental, and attuned to the realities of both learners and teachers.

In the sections that follow, each sub-question is addressed in turn, tracing the evolution from established pedagogical models to the emergent, relational practices that underpin effective entrepreneurship education. Together, these findings reveal that the heart of entrepreneurial learning lies not in rigid curricula, but in the subtle, ongoing negotiation between educator and learner—a negotiation that, when skilfully scaffolded, becomes the true engine of transformation.

6.2.1 What pedagogical and didactic approaches are currently used in entrepreneurship education, and how are they theorized?

The literature review undertaken in this thesis reveals a field of entrepreneurship education (EE) that is at once vibrant and deeply unsettled in its pedagogical foundations. Despite decades of innovation, most programs remain anchored in linear, output-oriented models—business plan competitions, pitch events, and standardized venture creation modules—that prioritize measurable deliverables over the developmental journey of the learner (Gibb, 2002; Pittaway & Cope, 2007; Honig, 2004). These approaches, while offering clear frameworks and tangible outcomes, often fail to capture the emergent, iterative, and identity-forming nature of entrepreneurial learning (Neck & Corbett, 2018; Fayolle & Gailly, 2008).

A closer examination of the literature shows that even as experiential and action-based learning methods gain traction—such as design thinking, simulations, and project-based ventures—their implementation is frequently standardized and insufficiently responsive to the diversity of learner backgrounds, motivations, and developmental readiness (Baggen et al., 2021; Neck &

Greene, 2011; Pittaway & Cope, 2007). Programs that teach “about” entrepreneurship often confine students to low-autonomy, theory-driven curricula, while “through” and “for” entrepreneurship approaches, which emphasize active participation and real-world engagement, are still too often delivered as one-size-fits-all experiences (Moberg et al., 2015; Lackéus, 2015).

This outcome-centric bias is reinforced by evaluation practices that privilege short-term outputs-such as entrepreneurial intentions or new venture creation-over the cultivation of deeper competencies like resilience, adaptability, and reflective capacity (Rideout & Gray, 2013; Walter & Block, 2016). As a result, the “black box” of teaching-the dynamic, relational space where learning is constructed-remains largely unexplored (Hattenberg, 2022; Pittaway & Cope, 2007). The literature is replete with calls for more nuanced, process-oriented pedagogies that acknowledge the heterogeneity of learners and the contingent, improvisational nature of entrepreneurial teaching (Neck & Corbett, 2018; Blenker et al., 2012).

Recent studies emphasize that what differentiates effective EE is not the adoption of any model or method, but rather the educator’s capacity to flexibly interpret and adapt these frameworks in response to the evolving group dynamic (Baggen et al., 2021; Polman, 2000; Van de Pol et al., 2010). The most impactful educators act as coaches and facilitators, providing scaffolding that is sensitive to both cognitive and emotional needs-fostering psychological safety, normalizing failure, and encouraging reflective risk-taking (Edmondson, 1999; Kolb & Kolb, 2018). Yet, the field still lacks robust theoretical and empirical accounts of how these adaptive teaching practices unfold in real classrooms, and how they interact with the personal-professional knowledge and experience of educators (Hattenberg, 2022; Clandinin & Connelly, 1996).

In sum, the current landscape of entrepreneurship education is characterized by a persistent tension between the clarity of standardized, output-driven pedagogies and the complexity of process-oriented, student-centered approaches. The literature confirms that the “how” of entrepreneurship education-how educators teach, scaffold, and adapt to their students-remains an open question, and one that is central to the evolution of the field (Fayolle et al., 2017; Blenker et al., 2012; Pittaway & Cope, 2007). This thesis thus positions itself within a growing movement to open the black box of teaching in EE, advocating for research and practice that foregrounds relational, adaptive, and inclusive pedagogies as the foundation for meaningful entrepreneurial learning.

6.2.2 Bridging Theory and Practice: Educator Adaptability as the Linchpin of Entrepreneurial Learning

If the first research question illuminated what is missing in entrepreneurship education (EE), the exploration of educator adaptability reveals why this gap matters and how it can be bridged. This thesis demonstrates that the effectiveness of EE does not rest on the adoption of any pedagogical model, but rather on the educator’s capacity for adaptability, emotional attunement, and the externalization of tacit entrepreneurial knowledge (Hattenberg, 2022; Polman, 2000; Nonaka & Takeuchi, 1995).

The literature and empirical findings show that educators who draw upon their own entrepreneurial experiences-sharing stories of failure, resilience, and creative problem-solving-are uniquely positioned to model effectual reasoning and iterative learning for students (Sarasvathy, 2001; Nonaka & Takeuchi, 1995). In the “How to Run a Student Company” interventions, for example, educators who openly discussed their own setbacks and pivots provided students with more than technical knowledge: they offered a lived sense of what it means to navigate uncertainty in entrepreneurial practice.

This process aligns with the SECI model of knowledge creation, in which tacit knowledge is made explicit through socialization and externalization (Nonaka & Takeuchi, 1995).

The Adaptive Entrepreneurial Development Framework (AEDF) developed in this research further reveals that educator adaptability is the decisive factor in effective scaffolding. Rather than adhering rigidly to lesson plans or standardized milestones, adaptive educators respond to the evolving needs and archetypes of their learners-providing, for example, shifting to reflective questioning and autonomy for “Adaptive Opportunists” (Hattenberg, 2022; Van de Pol et al., 2010; Edmondson, 1999). This approach extends Vygotsky’s (1978) Zone of Proximal Development by highlighting the importance of an “emotional ZPD,” in which learners’ willingness to take risks and embrace ambiguity grows through trust and relational support.

Empirical findings highlight the dual role of the educator as both architect and choreographer. As architects, educators design learning journeys that mirror the iterative, uncertain nature of entrepreneurship-encouraging students to experiment, reflect, and adapt (Neck & Greene, 2011; Kolb, 1984). As choreographers, they improvise in response to classroom dynamics, mediating conflict, reframing setbacks, and nurturing the “gift of confidence” that underpins entrepreneurial growth (Vygotsky, 1978; Hattenberg, 2022). The most effective educators are those who can fluidly move between these roles, calibrating their support to both group and individual needs while maintaining a focus on fostering autonomy and resilience.

These insights challenge institutions to rethink how they recruit, develop, and evaluate entrepreneurship educators. There is a clear imperative to value tacit entrepreneurial experience in hiring and promotion, to invest in professional development that cultivates emotional scaffolding and reflective practice, and to measure success not only by venture outputs but by the depth of mentoring relationships and the frequency of meaningful failure reflection (Edmondson, 1999; Day & Gu, 2020; Hattenberg, 2022).

Looking ahead, while digital tools and AI-driven feedback systems may offer new ways to scale adaptive teaching, the findings of this thesis caution against losing sight of the human connections that are foundational to entrepreneurial learning (Illeris, 2018b; Derre, 2023). The challenge for the future will be to design hybrid models in which technology amplifies, rather than replaces, the educator’s tacit wisdom and relational presence.

In sum, this work affirms that the transformative potential of entrepreneurship education lies not in what is taught, but in how educators humanize the learning journey-turning theory into lived wisdom through adaptability, empathy, and the courage to scaffold emergence (Hattenberg, 2022; Polman, 2000; Sarasvathy, 2001; Vygotsky, 1978).

6.2.3 Learner Archetypes and Entrepreneurial Mindsets

A key contribution of this dissertation is the empirical identification and conceptualization of five entrepreneurial mindset archetypes among learners, grounded in a robust cluster analysis of 834 student profiles (Hattenberg, Groen, & Belousova, 2019; Hattenberg, 2022). This approach moves decisively beyond the simplistic binary of “entrepreneurial” versus “not entrepreneurial,” illuminating a nuanced landscape of learner diversity rooted in the dynamic interplay between perceived ability and willingness.

These archetypes offer educators a practical vocabulary and actionable framework for recognizing, understanding, and responding to the rich variety of mindsets present in entrepreneurship education.

The five archetypes identified in this research are: Visionary Risk-Takers, Pragmatic Innovators, Systematic Executors, Adaptive Opportunists, and Resilient Pioneers. Each archetype represents a distinct configuration of ability and willingness, as well as characteristic strengths and support needs.

Archetype	Perceived Ability	Willingness	Key Characteristics
Visionary Risk-Taker	Low	High	Creative, bold, high-risk tolerance, but may lack follow-through
Pragmatic Innovator	Low/ Moderate	Moderate	Strong execution and planning, risk averse, excels in structured tasks
Systematic Executor	High	Low	Methodical, prefers structure, low ambiguity tolerance
Adaptive Opportunist	Moderate	Moderate/ High	Flexible, opportunity-focused, energetic, but may struggle with follow-through
Resilient Pioneer	Moderate/ High	Moderate/ High	Persistent, optimistic, resilient, but less focused on radical innovation

Table 22: Entrepreneurial Mindset Archetypes

This archetype-based framework reframes entrepreneurial mindset development as a process of meeting learners where they are-cognitively, emotionally, and motivationally. Entrepreneurial mindset is not static; learners evolve across archetypes through experience, reflection, and adaptive support. This fluidity underscores the importance of **diagnostic scaffolding**-educators must continually assess learners' readiness and adjust support mechanisms accordingly.

The Adaptive Entrepreneurial Development Framework (AEDF), grounded in these insights, empowers educators to:

1. **Diagnose archetypes** using cluster-based assessments.
2. **Align scaffolding strategies** (e.g., feedback, modeling) with learners' developmental needs.
3. **Foster progression** by creating environments where ability and willingness co-evolve through challenge and support.

For example, Visionary Risk-Takers bring high enthusiasm and creativity but may require structured support to translate ideas into action, while Systematic Executors possess strong skills but may need confidence-building and opportunities for safe experimentation to increase their willingness to embrace uncertainty.

Pragmatic Innovators excel in planning and execution but can benefit from encouragement to take calculated risks, whereas Adaptive Opportunists thrive in dynamic environments yet may need scaffolding to sustain momentum and follow through on opportunities. Resilient Pioneers, meanwhile, demonstrate persistence and optimism, making them well-suited to overcome setbacks, though they may require support to channel their resilience toward innovative outcomes.

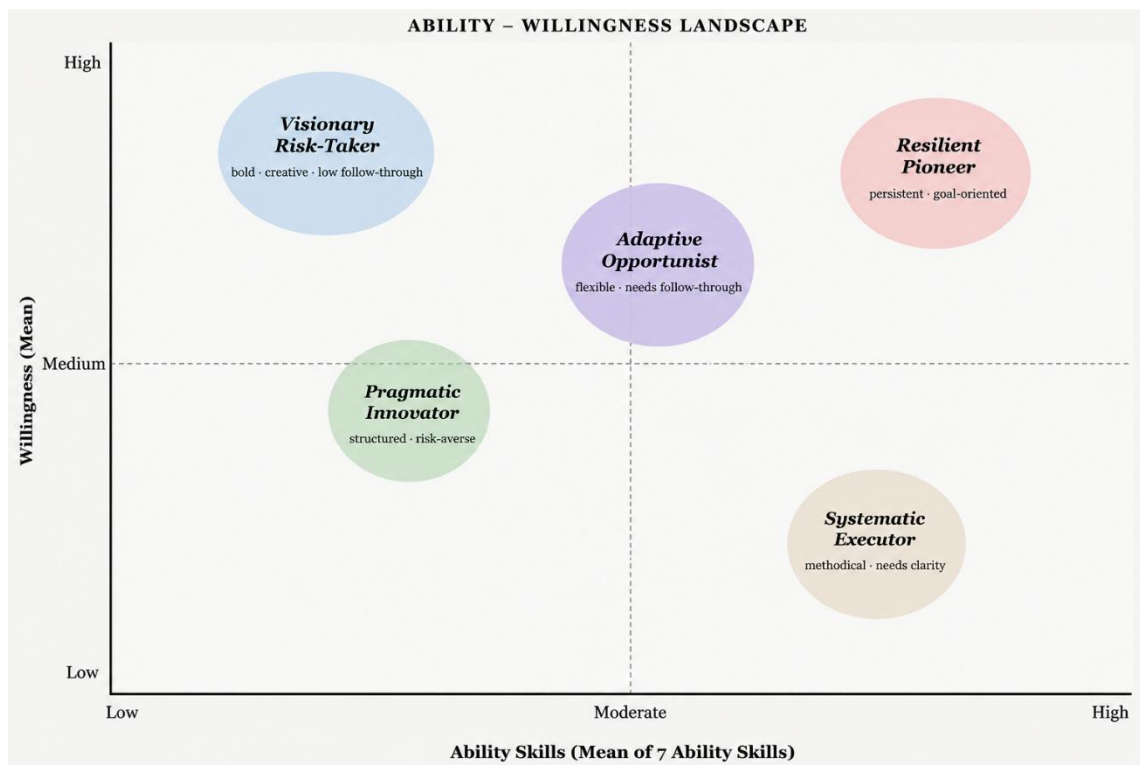


Figure 7: Mapping Entrepreneurial Mindset Archetypes

By mapping learners to these archetypes, educators are empowered to move beyond uniform pedagogical strategies and instead tailor scaffolding—such as feedback, modelling, and reflective questioning—to the specific readiness and needs of each profile (Wood, Bruner, & Ross, 1976; Van de Pol et al., 2010). For instance, Adaptive Opportunists may thrive with opportunities for peer collaboration and real-world experimentation, while Systematic Executors benefit from clear guidelines and incremental challenges that gradually increase ambiguity.

Importantly, the AEDF conceptualizes entrepreneurial mindset archetypes as dynamic learner configurations rather than fixed personality categories. While the present study does not longitudinally examine movement between archetypes, developmental learning theory suggests that learners' perceived ability and willingness may evolve over time through experience, reflection, and adaptive educational support (Hattenberg, 2022; Illeris, 2018b). By aligning scaffolding strategies with archetypal learner profiles, educators can create more inclusive and developmentally responsive learning environments.

In summary, the identification and operationalization of entrepreneurial mindset archetypes represent a substantial step forward in entrepreneurship education. This approach affirms that entrepreneurial potential is not fixed but can be scaffolded and grown when educators are equipped to recognize where each learner stands—and to offer the right support at the right moment. By moving beyond one-size-fits-all pedagogies, this archetype framework affirms that entrepreneurial potential is not fixed but can be cultivated through context-sensitive, human-centered education. It challenges institutions to embrace relational metrics (e.g., reflective depth, mentoring dynamics) over standardized outputs, ensuring EE becomes a transformative journey for all learners—regardless of their starting point.

6.2.4 Scaffolding Strategies Aligned with Learner Diversity

A defining contribution of this dissertation is the systematic exploration of how scaffolding strategies-cognitive, emotional, and procedural-can be attuned to the nuanced diversity of entrepreneurial mindsets revealed through robust mixed-methods research. By weaving together quantitative cluster analysis of 834 student profiles with rich qualitative insights from reflective diaries and educator interviews, this research not only mapped recurring learner archetypes but also illuminated the lived, shifting realities of entrepreneurial learning (Hattenberg, 2022; Creswell & Plano Clark, 2017). The Adaptive Entrepreneurial Development Framework (AEDF) that emerged from this methodological synergy positions scaffolding not as a static intervention, but as a dynamic, relational process-responsive to learners' evolving positions on the axes of ability and willingness (Hattenberg, Groen, & Belousova, 2019).

Crucially, this research affirms that a learner's profile is not a fixed identity, but a moment-in-time configuration-a developmental snapshot rather than a verdict. As McBride and Wuebker (2013) and Shepherd et al. (2010) note, entrepreneurial mindset is best understood as a starting point on a developmental continuum. Thus, the archetype a learner fits at the time of assessment is a compass for growth, offering direction for tailored support rather than a label to be worn (Illeris, 2018b).

Testing scaffolding strategies in alignment with these archetypes, the study found that responsiveness-support attuned to a learner's current developmental position-unlocked higher engagement, autonomy, and confidence than any universal or prescriptive approach. For example, learners with lower confidence or willingness, such as Systematic Executors, consistently benefited from emotional scaffolding: reassurance, shared narratives of overcoming failure, and the creation of psychologically safe spaces (Edmondson, 1999; Kolb & Kolb, 2018).

In contrast, ambiguity-tolerant learners, such as Visionary Risk-Takers and Adaptive Opportunists, progressed most when challenged with cognitive scaffolding-problem reframing, peer critique, and opportunities for reflective experimentation (Sarasvathy, 2001; Van de Pol et al., 2010). Pragmatic Innovators, meanwhile, thrived when procedural scaffolding provided structure and clarity, while Resilient Pioneers benefited from a blend of feedback and modeling to sustain motivation in the face of setbacks.

Figure 8 synthesizes these findings, illustrating the nuanced interplay between scaffolding types and learner archetypes.

Effectiveness of Scaffolding Types Across Entrepreneurial Mindset Archetypes

Scaffold Type	Entrepreneurial Mindset Archetypes				
	 Visionary Risk-Takers	 Pragmatic Innovators	 Systematic Executors	 Adaptive Opportunists	 Resilient Pioneers
 Instructing	● ○ ○	● ● ●	● ● ●	● ○ ○	● ● ○
 Explaining	● ● ○	● ● ●	● ● ○	● ● ○	● ● ○
 Modeling	● ● ●	● ● ○	● ○ ○	● ● ○	● ● ○
 Feedback	● ● ●	● ● ●	● ● ●	● ● ○	● ● ●
 Questioning	● ● ○	● ● ●	● ○ ○	● ● ●	● ● ○
 Giving hints	● ● ○	● ○ ○	● ○ ○	● ● ●	● ● ○

Legend: ● ● ● = Highly effective ● ● ○ = Moderately effective ● ○ ○ = Somewhat effective (blank) = Neutral/ineffective

(Based on positive/negative diary mentions and qualitative analysis.)

Figure 8: Entrepreneurial Mindset Profiles & Effective Scaffolds

The heatmap makes clear that no single scaffolding strategy is universally effective; rather, the power of scaffolding lies in its contextual fit. Rigid templates or one-size-fits-all feedback often stifled creativity or confidence, while adaptive, relational approaches enabled learners to move beyond their current archetype, developing both ability and willingness in tandem (Vygotsky, 1978; Illeris, 2007). In practice, this meant that educators who could read the room and flexibly combine instructing, modeling, and questioning-sometimes within the same session-were most successful in fostering both engagement and growth.

The mixed-methods design was instrumental in surfacing this complexity. Quantitative data provided a map of recurring learner configurations, while qualitative diaries and interviews revealed the fluidity and emotional texture of learning journeys-how a student might oscillate between archetypes as they encounter new challenges or supports (Braun & Clarke, 2006; Hattenberg, 2022). This dual lens affirms that “you are not your profile,” but rather, at any given moment, you inhabit a dynamic position that can enlighten and give direction to your learning and development.

In conclusion, the findings of Chapter 5 reinforce that entrepreneurship education is not about transmitting content, but about scaffolding emergence through relational pedagogy (table 23). Mindset is a developmental process, flourishing in trust-rich, flexible environments where educators cultivate tacit, responsive practices that transcend static models (Illeris, 2018b; Casulli et al., 2022). The AEDF stands as a practical and theoretically grounded model for orchestrating this process-reminding us that the true art of entrepreneurship education lies in meeting learners where they are and supporting them as they become who they can be.

Profile	Characteristics	Strengths	Average	Weaknesses	Primary	Secondary	Tertiary
Pragmatic Innovator	Structured thinkers, operate within strategic planning, problem-solving	Pragmatic problem-solving, complex planning	Idea generation, task-oriented thinking	Risk-avoidant, prefers conventional methods	Instructing, Feedback	Allowing space, Asking questions	Modeling, Giving hints
Visionary Risk-Taker	Big-picture thinkers, driven by ideas and possibilities	High non-conformity, risk tolerance	Passive, idea generation	Difficulty with structure and organization	Feedback	Asking questions	Giving hints
Systematic Executor	Focused on implementation, detail-oriented, structured working	Systematic execution, efficiency, planning	Risk-averse, dependent, needs clarity	Limited innovation, struggles with adaptation	Advanced questioning	Challenging feedback	Instructing
Adaptive Opportunist	Flexible, responsive to opportunities, situational thinkers	Adaptive capacity, contextual awareness	Independent, present-focused	Lack of structured planning	Adaptive feedback	Exercises for opportunity recognition	Explaining
Resilient Pioneer	Persistent, driven, entrepreneurial in execution	Perseverance, goal orientation, performance-focused	Independent risk-taking, future-oriented	Limited innovation, may lack intrinsic motivation	Performance coaching	Building resilience	Feedback

Table 23: Entrepreneurial Mindset Profiles & Effective Scaffolds

6.3 Theoretical Contributions

This dissertation advances the theoretical landscape of entrepreneurship education (EE) by challenging entrenched paradigms, integrating learning theories across disciplinary boundaries, and offering new conceptual tools rooted in the realities of classroom practice. At its core, this work seeks not only to add to what is known about entrepreneurial learning, but to fundamentally reframe how its development and facilitation are understood.

First, the research directly confronts the dominant outcome-centric models that have long shaped EE. Traditional frameworks, often grounded in economic or psychological theories (Schumpeter, 1934; McClelland, 1961), tend to emphasize measurable outputs-such as venture creation or entrepreneurial intentions-while overlooking the complex, processual, and relational nature of entrepreneurial learning (Fayolle & Gailly, 2008; Neck & Corbett, 2018). By foregrounding the "black box" of teaching and the lived experience of both educators and learners, this dissertation responds to calls for a more nuanced, process-oriented understanding of how entrepreneurial mindsets actually develop (Hattenberg, 2022; Pittaway & Cope, 2007).

Second, the study integrates and extends foundational learning theories within the context of EE. Drawing on Vygotsky's Zone of Proximal Development (1978), Illeris' triadic model of learning (2007, 2018b), Nonaka and Takeuchi's SECI model of knowledge creation (1995), and Sarasvathy's theory of effectuation (2001), the research demonstrates that entrepreneurial learning is emergent, relational, and deeply contextual. The Adaptive Entrepreneurial Development Framework (AEDF) synthesizes these perspectives, illustrating how scaffolding can be both principled and flexible-responsive to the dynamic interplay of ability, willingness, and educator presence. This theoretical integration moves EE beyond static, one-size-fits-all models and toward a developmental paradigm that honors diversity, improvisation, and the co-construction of knowledge (Gibb, 2002; Van de Pol et al., 2010).

Third, the dissertation introduces empirically grounded conceptual tools-most notably, the entrepreneurial mindset archetypes and the AEDF-that bridge theory and practice. The archetype model challenges binary notions of "entrepreneurial" versus "non-entrepreneurial" learners, instead mapping a spectrum of developmental positions that educators can use to tailor support. The AEDF, in turn, operationalizes this insight, providing a framework for adaptive, context-sensitive scaffolding that is both evidence-based and attuned to the realities of classroom dynamics.

Finally, this work contributes to a broader theoretical reorientation in EE: from adaptation to existing schemes toward exploration, critical reflection, and the democratization of entrepreneurial learning (Blenker et al., 2012). By legitimizing tacit knowledge, emotional attunement, and educator improvisation as central to effective practice, the dissertation opens new avenues for research and practice-inviting scholars and practitioners alike to view entrepreneurship education as a dynamic, co-creative process shaped by values, context, and ongoing negotiation.

6.3.1 Reframing the Entrepreneurial Mindset as Developmental

For decades, the field of entrepreneurship education has been shaped by the assumption that the entrepreneurial mindset is either an innate trait or a fixed outcome-something one either possesses or acquires through a prescribed sequence of skill-building exercises (Gibb, 2002; Krueger, 2007). This dissertation challenges that orthodoxy by proposing a fundamentally different perspective: the entrepreneurial mindset is not a static attribute, but an emergent,

developmental process shaped by the ongoing interplay of ability and willingness within relational, emotional, and contextual milieus.

Drawing on Illeris' (2009, 2018b) triadic model of learning, this work positions mindset not as a destination, but as a journey—one that unfolds through the dynamic integration of cognitive, emotional, and social dimensions. The research demonstrates that learners do not simply “become” entrepreneurial by accumulating knowledge or ticking off competencies. Instead, their mindset evolves in response to the scaffolding they receive, the risks they are encouraged to take, and the confidence they build in the safety of supportive educational relationships (Vygotsky, 1978; Edmondson, 1999).

Empirical findings from this study reveal that mindset is best understood as a momentary configuration—a snapshot of perceived ability and willingness that is sensitive to experience, feedback, and context (Hattenberg, 2022; Shepherd, Patzelt, & Wolfe, 2010). The archetypes identified through cluster analysis, such as Visionary Risk-Takers and Systematic Executors, are not rigid categories but developmental waypoints. Learners move between these positions as they encounter new challenges, reflect on setbacks, and internalize new practices through cycles of action and reflection (Illeris, 2018b; Sarasvathy, 2001).

This developmental interpretation builds directly on, but makes a distinct empirical and pedagogical contribution beyond, the Ability × Willingness perspective developed by Hattenberg and colleagues (Hattenberg et al., 2019; Hattenberg, 2022). Their work provides the conceptual basis for understanding entrepreneurial mindset as a dynamic configuration of perceived ability and willingness rather than as a fixed individual attribute.

The present dissertation takes this conceptual starting point into the educational interaction itself. Rather than treating Ability × Willingness configurations as predefined learner categories, the empirical studies identify recurring entrepreneurial mindset configurations through person-centred quantitative analysis, interpret their educational meaning through qualitative evidence, and subsequently examine how different forms of scaffolding interact with these developmental starting points.

The contribution is therefore not an alternative conceptualisation of Ability × Willingness, but its empirical and pedagogical extension: from understanding heterogeneity in entrepreneurial mindset to examining how educators can recognise and respond to that heterogeneity through adaptive scaffolding. The AEDF operationalises this extension by connecting learner configurations, contextual demands, and educator responsiveness within a recursive developmental process.

This reframing has profound implications for both theory and practice. It calls for a shift from static assessment to ongoing, formative diagnosis—recognizing that a learner's mindset profile is not a verdict, but a compass for tailored support and growth. The Adaptive Entrepreneurial Development Framework (AEDF) operationalizes this insight, enabling educators to scaffold mindset development responsively, with strategies that evolve alongside the learner's journey (Hattenberg, Groen, & Belousova, 2019). In this model, emotional scaffolding—normalizing failure, fostering psychological safety, and celebrating small wins—emerges as just as vital as cognitive or procedural support (Edmondson, 1999; Kolb & Kolb, 2018).

Ultimately, this developmental perspective democratizes entrepreneurship education. It recognizes that entrepreneurial potential is not reserved for a select few but can be cultivated in all learners when educators are attuned to their readiness, motivations, and evolving needs. By reframing the entrepreneurial mindset as a process rather than a product, this dissertation invites a more inclusive, humane, and effective approach to supporting entrepreneurial growth—one that honours the complexity of becoming, rather than the illusion of being.

6.3.2 Synthesizing Learning Theories into a Holistic Lens

Entrepreneurial learning is not a linear process but a dynamic interplay of cognitive, emotional, and social transformations. This research synthesizes four pivotal theories—Vygotsky’s Zone of Proximal Development (ZPD), Illeris’ triadic learning model, Nonaka and Takeuchi’s SECI knowledge creation cycle, and Sarasvathy’s effectuation theory—into a cohesive framework that captures the multidimensional nature of entrepreneurial mindset development. Together, these theories illuminate how learners navigate uncertainty, internalize tacit knowledge, and evolve through relational scaffolding.

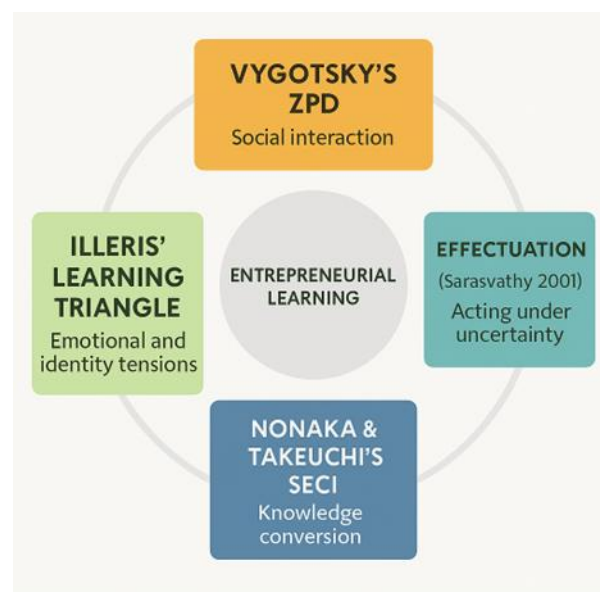


Figure 9: Focusing the Lens

Vygotsky’s ZPD: Scaffolding Emergence

Vygotsky’s ZPD (1978) anchors entrepreneurial learning in social interaction, positing that growth occurs when educators and peers provide *just-in-time* support to bridge the gap between current and potential capabilities. In EE classrooms, this manifests as adaptive scaffolding: educators diagnose learners’ readiness (e.g., ability-willingness archetypes) and adjust feedback, modelling, or questioning to propel progress. For example, a student hesitant to pivot a failing venture might receive targeted prompts (“*What resources do you already have to test a new approach?*”) rather than prescriptive solutions, fostering autonomy while maintaining support.

Illeris’ Triadic Learning: Cognitive-Emotional-Social Convergence

Illeris’ model (2007, 2018b) expands the ZPD by framing learning as a triadic process where cognitive acquisition (e.g., effectual reasoning), emotional engagement (e.g., resilience), and social interaction (e.g., peer collaboration) intersect. Entrepreneurial learning often triggers identity conflicts—such as reconciling failure with self-perception—that demand emotional scaffolding. Educators who normalize setbacks (“My first venture collapsed, but here’s how I

regrouped...”) create psychological safety, enabling learners to reframe challenges as iterative insight (Edmondson, 1999). This emotional layer is critical for sustaining motivation amid ambiguity.

SECI Model: Tacit Knowledge in Action

Nonaka and Takeuchi’s SECI cycle (1995) elucidates how entrepreneurial knowledge is co-created through four modes: *Socialization* (shared experiences), *Externalization* (articulating tacit insights), *Combination* (systematizing ideas), and *Internalization* (applying knowledge). In EE, educators externalize tacit expertise through storytelling (“*Here’s how I negotiated my first investor pitch...*”), while students internalize these lessons through ventures, transforming abstract concepts into lived practice. This cycle mirrors Kolb’s experiential learning (1984), where concrete experience and reflective observation drive entrepreneurial growth.

Effectuation: Navigating Uncertainty as a Pedagogical Principle

Sarasvathy’s effectuation theory (2001) reframes entrepreneurship as a process of “non-predictive control,” where goals emerge through action rather than predefined plans. This aligns with adaptive teaching: educators act as co-learners, embracing uncertainty by asking, “*What can we do with what we have?*” instead of adhering to rigid curricula. For instance, when a student venture faces market shifts, educators might guide teams to leverage existing networks (Crazy Quilt Principle) or limit risks (Affordable Loss Principle), modelling effectual logic in real time.

Synthesis: A Framework of Possibility

By integrating these theories (Figure 2), this research offers a lens that transcends reductionist paradigms. The framework acknowledges:

1. **Learning as Relational:** Progress hinges on educator-learner and peer interactions (ZPD + SECI).
2. **Emotion as Catalyst:** Psychological safety and identity work (Illeris) enable risk-taking.
3. **Knowledge as Dynamic:** Tacit insights become actionable through cycles of externalization and internalization.
4. **Uncertainty as Opportunity:** Effectuation principles guide both teaching and learning in ambiguous contexts.

This synthesis does not prescribe a universal method but empowers educators to *improvise* within complexity. For example, a teacher might combine ZPD-aligned feedback with effectual questioning (“*Who in your network could help prototype this idea?*”) while addressing emotional barriers through shared narratives.

Implications for Practice

The framework challenges institutions to move beyond competency checklists and embrace *relational metrics*-tracking mentoring depth, reflective journals, and adaptive pivots. It also validates the role of educators’ tacit expertise, urging professional development programs to prioritize storytelling, emotional attunement, and effectual reasoning. In sum, this multidimensional lens reframes entrepreneurial education not as knowledge transfer but as a co-creative journey-one where educators and learners alike navigate uncertainty, scaffold emergence, and transform possibility into practice.

6.3.3 Valuing Tacit Knowledge as Pedagogical Expertise

One of the most significant theoretical contributions of this dissertation is the elevation of tacit knowledge as a core dimension of pedagogical expertise in entrepreneurship education (EE). In

a field that has long privileged explicit content knowledge, standardized curricula, and measurable outcomes, this research shines a light on the often invisible, yet essential, artistry of teaching: the intuition, timing, and emotional attunement that enable educators to meet learners where they are and guide them toward growth (Nonaka & Takeuchi, 1995; Hattenberg, 2022).

Throughout this study, it became clear that effective entrepreneurship educators do not simply “deliver” content or follow predetermined scripts. Instead, they draw deeply on their own lived experiences as entrepreneurs and educators, weaving together stories, reflective questions, and real-time adjustments to scaffold learning in ways that are responsive to the moment and the individual (Clandinin & Connelly, 1996; Polman, 2000). Tacit knowledge, in this context, is not just an internal resource but a relational force-surfacing in the subtle choices an educator makes when sensing a student’s hesitation, reframing a failure as a learning opportunity, or calibrating the level of challenge to match a group’s readiness (Edmondson, 1999; Schön, 1983).

This perspective is powerfully aligned with emergent thinking in inclusive education, where the ability to flexibly adapt to learner diversity is recognized as a hallmark of teaching excellence (Florian & Black-Hawkins, 2011). It also echoes contemporary scholarship on professional learning, which emphasizes that expertise is forged not through compliance with checklists, but through sustained reflection, dialogue, and the negotiation of meaning in practice (Gibbs & Coffey, 2004; Day & Gu, 2020). In the context of EE, this means that the “best” educators are not necessarily those with the most business experience or the deepest theoretical knowledge, but those who can fluidly combine both-translating entrepreneurial insight into pedagogical action, and vice versa.

The findings from the “How to Run a Student Company” program vividly illustrate this point. Educators who were able to externalize their tacit knowledge-by sharing personal stories of failure and resilience, modelling adaptive thinking, or inviting students into reflective dialogue-created environments where psychological safety and experimentation flourished. These teachers were not merely transmitters of information, but co-creators of learning journeys, able to improvise and respond to the unpredictable rhythms of entrepreneurial development (Nonaka & Takeuchi, 1995; Edmondson, 1999; Schön, 1983). Their expertise was not always easy to articulate-even for themselves-but it was unmistakably felt by students, who described these educators as “present,” “trustworthy,” and “inspiring.”

By foregrounding tacit knowledge as pedagogical expertise, this dissertation invites a redefinition of teaching excellence in entrepreneurship education. It challenges institutions to move beyond narrow metrics of success-such as venture creation rates or exam scores-and to recognize the value of educator adaptability, empathy, and reflective practice. Professional development, in this light, should prioritize opportunities for educators to share narratives, engage in peer dialogue, and reflect on their own growth as both teachers and learners (Gibbs & Coffey, 2004; Schön, 1983). Communities of practice, mentorship, and collaborative inquiry become vital spaces for surfacing and cultivating the tacit dimensions of expertise that underpin responsive, inclusive, and transformative EE (Clandinin & Connelly, 1996; Florian & Black-Hawkins, 2011).

Ultimately, valuing tacit knowledge is not just a theoretical proposition, but a call to action. It is an invitation to honor the complexity and humanity of teaching, to trust in the wisdom that emerges through practice, and to create educational ecosystems where both educators and learners can thrive through connection, reflection, and shared discovery. In the words of one

participating educator, “It’s not about having all the answers—it’s about being willing to learn alongside your students, and to give them the confidence to try, fail, and try again.” In this sense, the true gift of confidence in entrepreneurship education is not delivered but co-created emerging in the spaces where tacit knowledge meets the unfolding journey of learning.

6.3.4 The Adaptive Entrepreneurial Development Framework (AEDF)

The AEDF makes one central claim: entrepreneurial mindset development is not a linear progression through fixed stages, but a dynamic trajectory across a landscape of developmental positions — and the educator's primary task is to read where a learner currently stands, then adjust scaffolding accordingly, continuously.

The framework integrates four theoretical traditions — Vygotsky's Zone of Proximal Development, Illeris' triadic learning model, Nonaka and Takeuchi's SECI cycle, and Sarasvathy's effectuation theory — each contributing a distinct and non-redundant layer. Vygotsky specifies the operating zone (growth requires calibrated challenge, neither comfort nor overwhelm).

Illeris defines the conditions under which learning occurs (cognitive, emotional, and social dimensions must all engage simultaneously). The SECI model describes the process through which tacit educator knowledge is made actionable for learners (socialization → externalization → combination → internalization).

Effectuation provides the epistemological stance: both educators and learners navigate uncertainty by working with available means rather than toward fixed plans. Together, these layers constitute the theoretical core of the framework (Figure 9).

The empirical foundation is the identification of five entrepreneurial mindset archetypes through cluster analysis of 834 student profiles. The archetypes — Visionary Risk-Takers, Pragmatic Innovators, Systematic Executors, Adaptive Opportunists, and Resilient Pioneers — are defined by the intersection of two dimensions: perceived ability (what a learner believes they can do) and willingness (their readiness to act under uncertainty).

Critically, these are not fixed categories or diagnostic labels. They are developmental snapshots — a learner's position in the ability–willingness landscape at a given moment, shaped by context, experience, and emotional state (Hattenberg et al., 2019; Illeris, 2018b). A Systematic Executor today may become an Adaptive Opportunist tomorrow, if the scaffolding they receive appropriately builds both confidence and tolerance for ambiguity.

The AEDF operationalises this through five recursive components (Figure 10), each feeding into the next in a continuous loop:



Figure 10. The Adaptive Entrepreneurial Development Framework

1. Mindset Profiling

The educator diagnoses the learner's current archetype using formative observation, reflective prompts, or the cluster-based assessment instrument. The result is not a verdict but a compass: it tells the educator where in the ability–willingness landscape this learner currently stands, and therefore what kind of scaffolding is most likely to move them forward.

2. Context Typing

No learner exists in isolation. Context Typing extends the diagnosis to the broader learning ecology — group composition, task structure, emotional climate, and institutional constraints. A Visionary Risk-Taker in a psychologically safe cohort needs different support than the same archetype in a group where failure carries social stigma. This component embeds Illeris' social dimension directly into the diagnostic step.

3. Scaffold Matching

Based on the learner's archetype and the contextual reading, the educator selects the most effective scaffolding mode. The empirically derived scaffold-matching matrix (Table 1) shows how six scaffolding types — instructing, explaining, modeling, feedback, questioning, and giving hints — vary in effectiveness across archetypes. The pattern is consistent: no single strategy is universally effective. Visionary Risk-Takers respond most strongly to feedback and modeling; Systematic Executors require advanced questioning and structured challenge rather than direct instruction; Adaptive Opportunists benefit from hints and opportunity-recognition exercises that leverage their contextual agility.

4. Developmental Monitoring

The AEDF treats the ZPD not as a fixed target but as a moving one. This component tracks shifts in the learner's configuration through ongoing observation: changes in risk-taking behaviour, reflective depth in diaries, emotional responses to setbacks, and peer interactions. When signals indicate that a learner is approaching the boundary of their current archetype — gaining confidence, taking more initiative, or conversely withdrawing — the monitoring step feeds back into Mindset Profiling and restarts the cycle.

5. Adaptive Adjustment

The final component of the AEDF concerns adaptive adjustment: the educator's ongoing recalibration of support in response to learners' developmental signals. Based on observations of learner engagement, confidence, reflection, participation, and response to challenge, educators continuously adapt the form and intensity of scaffolding. This may involve shifting instructional modes, increasing structure during periods of uncertainty, gradually fading support as autonomy develops, or strengthening emotional and relational support when learners encounter identity-related tension or reduce confidence.

Rather than viewing scaffolding as a fixed intervention, the AEDF conceptualizes it as a dynamic and responsive process. Educators move fluidly between roles such as instructor, coach, facilitator, and co-learner, depending on the learner's evolving needs and the demands of the context. This adaptive capacity reflects the SECI perspective on knowledge creation, in which professional expertise is continuously externalized, reflected upon, refined, and re-internalized through practice (Nonaka & Takeuchi, 1995). In this sense, entrepreneurship educators do not merely apply pedagogical strategies; they develop situated judgment through iterative interaction with learners and learning environments.

Importantly, the AEDF does not conceptualize entrepreneurial development as a fixed sequence of stages or as a linear progression toward a single "ideal" archetype. The archetypes identified in this dissertation are best understood as conceptual learner configurations derived from empirical clustering of perceived ability and willingness profiles at a particular moment in time. They provide educators with a vocabulary for recognizing learner diversity, not a deterministic developmental pathway.

Within the framework, learners may shift between archetypical configurations depending on context, prior experience, emotional state, social environment, and changing perceptions of competence. Development may therefore involve periods of advancement, stabilization, uncertainty, or temporary regression. For example, learners who initially display high confidence may experience a decline in perceived ability as they become more aware of the complexity and ambiguity inherent in entrepreneurial practice. Such movement does not necessarily indicate failure; rather, it may reflect increasing reflective awareness and developmental maturation.

Figure 11 therefore presents conceptual and illustrative developmental dynamics within the AEDF rather than empirically validated transition pathways. The figure visualizes how movement across the ability-willingness landscape may occur under varying conditions of support, experience, and challenge. Importantly, movement is represented as multidirectional and non-linear: learners may progress, plateau, regress temporarily, or shift differently across the two dimensions. No single trajectory is assumed, and no archetype is presented as a universal endpoint.

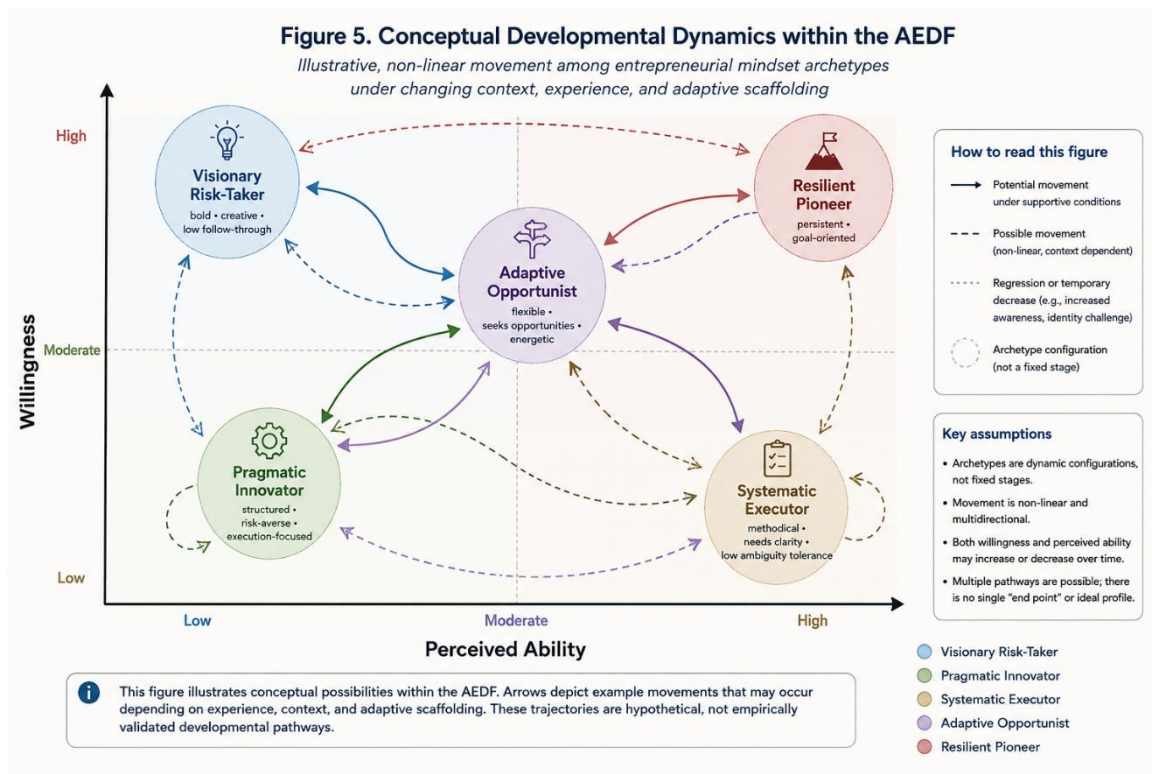


Figure 11. Illustrative, non-linear movement among entrepreneurial mindset archetypes under changing context, experience, and adaptive scaffolding.

The AEDF contributes to entrepreneurship education by integrating developmental learning theory, learner heterogeneity, and adaptive pedagogy into a coherent conceptual framework. It synthesizes four complementary theoretical traditions — Vygotsky’s sociocultural learning theory, Illeris’ triadic model of learning, Nonaka and Takeuchi’s SECI model, and Sarasvathy’s effectuation theory — into a developmental ecology for entrepreneurship education. Within this ecology, the archetypes function as diagnostic entry points for understanding learner configurations; Illeris’ dimensions describe the cognitive, motivational, and social conditions of learning; the SECI cycle explains how entrepreneurial knowledge is transformed through experience; and scaffolding strategies provide the pedagogical mechanism through which educators support development.

Unlike static competency models or standardized curricular approaches, the AEDF explicitly embraces the contextual and developmental nature of entrepreneurial learning. Entrepreneurship education is therefore reframed not as the transmission of predefined content or the achievement of uniform outcomes, but as the facilitation of adaptive developmental journeys that differ across learners and contexts. This perspective aligns with contemporary conceptualizations of entrepreneurship as a process of becoming rather than the acquisition of a fixed set of competencies (Dimov, 2020; Rae, 2006).

Accordingly, the AEDF represents a shift from educator-centered standardization toward learner-following educational design. It positions entrepreneurship education as a relational, developmental, and context-sensitive practice in which support, challenge, and autonomy are continuously balanced in response to learner development.

6.4 Practical Implications

The findings of this dissertation converge toward a central proposition: entrepreneurship education (EE) must be reconceptualized as an adaptive, developmental process that connects the individual learner to society through responsive scaffolding. The Adaptive Entrepreneurial Development Framework (AEDF) crystallizes as the synthesis of multiple theoretical perspectives—Illeris' comprehensive theory of learning, Vygotsky's Zone of Proximal Development (ZPD), and Nonaka and Takeuchi's SECI model of knowledge creation—each of which highlights a distinct but interdependent dimension of entrepreneurial development.

Illeris (2007, 2018b) emphasizes that learning in working life involves not only the cognitive acquisition of skills but also the development of identity and the capacity to find one's place in society. In this perspective, entrepreneurial ability and willingness are inseparable from the broader structures and cultures that enable or constrain participation. Vygotsky (1978) complements this view by introducing the ZPD, which delineates the developmental space between the learner's comfort zone and the "danger zone" of overwhelming demands.

Effective scaffolding occurs within this liminal zone, where carefully calibrated support allows learners to stretch their abilities and gradually internalize new competencies. In entrepreneurship education, this means adapting the program to the learner rather than demanding that the learner adapt prematurely to the program. Educators, therefore, act as responsive mediators of this zone, creating psychologically safe yet challenging environments in which learners can experiment with risk and ambiguity.

The SECI model (Nonaka & Takeuchi, 1995) provides a systemic complement to these individual-focused theories. It conceptualizes knowledge creation as a cyclical process of socialization, externalization, combination, and internalization—processes that require environments where learners can meaningfully interact, reflect, and build shared understanding. For SECI dynamics to flourish in entrepreneurship education, learners must possess a profound awareness of self and others, enabling them to contribute tacit and explicit knowledge in collective settings. Without adaptive scaffolding that positions learners securely within their ZPD, such knowledge cycles collapse, leaving EE trapped in linear, output-oriented routines rather than transformative developmental processes.

The interplay between these frameworks shows the AEDF's innovativeness. Illeris foregrounds the purpose of learning as integration into society, Vygotsky specifies the pedagogical mechanism of scaffolding within the ZPD, and Nonaka and Takeuchi describe the cyclical, systemic conditions under which individual learning translates into organizational and societal innovation. The AEDF integrates these perspectives by positioning the entrepreneur (person), entrepreneurship (process), and enterprise (product) within a single developmental ecology, where scaffolding connects individual readiness with collective knowledge creation.

By equipping educators to recognize archetypes, diagnose developmental positions, and scaffold learning responsively, the AEDF increases the potential to unlock entrepreneurial capacity in a greater diversity of learners. This, in turn, broadens the pool of potential innovators capable of addressing today's and tomorrow's challenges. The central contribution of this dissertation is therefore twofold: it provides empirical evidence for scaffold–archetype alignments that guide adaptive practice, and it grounds these practices in a theoretically robust framework that connects individual learning, pedagogy, and knowledge-creating environments.

In conclusion, entrepreneurship education cannot remain confined to standardized formats or linear models of venture creation. To prepare learners for uncertain futures, it must become adaptive, learner-centered, and developmentally informed. The AEDF embodies this shift: it operationalizes scaffolding as the mediator between personal growth and societal contribution, ensuring that entrepreneurial learning is inclusive, cyclical, and transformative. By enabling educators to meet learners where they are and guide them toward where they could be, the AEDF advances the possibility of realizing entrepreneurship's true societal role: generating diverse, sustainable solutions for the pressing problems of our time.

6.4.1 Practical Implications for Educators: Bringing the AEDF to Life

The findings of this dissertation invite entrepreneurship educators to step beyond the role of content provider and embrace their identity as designers of developmental journeys. Effective entrepreneurship education is not about delivering a fixed curriculum but about cultivating the conditions in which diverse learners can emerge, adapt, and thrive. This shift requires educators to develop a heightened sensitivity to learner diversity and to respond with a repertoire of adaptive, relational teaching strategies.

First and foremost, educators are encouraged to recognize and work with the diversity of entrepreneurial mindsets present in their classrooms. The archetypes identified in this research—such as Visionary Risk-Takers, Systematic Executors, and Adaptive Opportunists—offer a practical vocabulary for understanding where students are starting from, both in terms of ability and willingness. Rather than treating these profiles as static labels, educators can use them as dynamic guides for tailoring support, knowing that a learner's needs and readiness will shift over time and in different contexts (Hattenberg, Groen, & Belousova, 2019; Illeris, 2018b).

Attentive presence becomes a central teaching stance. This means listening not only to what students say, but also to what they signal through their engagement, posture, risk-taking, or withdrawal. Subtle cues—hesitation during group work, reluctance to present, or bursts of creative energy—offer valuable information about where scaffolding is most needed. Emotional attunement, then, is not an optional extra, but a core teaching competency. Educators who create psychologically safe spaces—where failure is normalized, and experimentation is encouraged—help students build the confidence to take entrepreneurial risks (Edmondson, 1999; Kolb & Kolb, 2018).

Improvisational ability is equally essential. The research shows that no single scaffolding strategy works for all learners or in all moments. Educators need the freedom and support to adjust their approach in real time—sometimes offering direct instruction, sometimes stepping back to let students struggle productively, and sometimes sharing their own entrepreneurial stories to model resilience and adaptability (Nonaka & Takeuchi, 1995; Polman, 2000). This responsive agility is the hallmark of effective entrepreneurial teaching.

Professional growth for educators, therefore, must go beyond technical training in entrepreneurship or pedagogy. It should include structured opportunities for reflection, peer dialogue, and the externalization of tacit knowledge. Peer coaching, reflective practice groups, and video-based microteaching reviews can all help educators surface the often-invisible expertise that guides their adaptive decisions (Gibbs & Coffey, 2004; Day & Gu, 2020). Sharing critical incidents and teaching dilemmas with colleagues can foster a culture of collective learning and continuous improvement.

Finally, educators are encouraged to view themselves as co-learners alongside their students. The most effective teachers in this research did not see themselves as experts with all the answers, but as facilitators of a shared journey-willing to experiment, reflect, and adapt in response to the unpredictable realities of entrepreneurial learning. By embodying this stance, educators model the very mindsets and behaviors they seek to cultivate in their students.

In sum, the practical implication for educators is clear: teaching entrepreneurship is not about following a script, but about developing the presence, attunement, and adaptive expertise to meet learners where they are and support them as they become who they can be. This is the art- and the gift-of scaffolding entrepreneurial confidence and growth.

6.4.2 For Institutions

Educational institutions serve as the structural backbone that either enables or constrains entrepreneurial learning. This research reveals that entrepreneurship education flourishes not through rigid programmatic structures, but in environments that embrace flexibility, adaptation, and learner diversity. Institutions must create what Illeris (2018b) describes as "expansive learning environments"-spaces where both educators and students have the freedom to iterate, experiment, and co-create knowledge in response to emergent needs and opportunities.

The findings call for a fundamental shift in evaluation frameworks. Traditional metrics focused on quantifiable outputs-venture launches, entrepreneurial intentions, or participation rates-capture only a fraction of entrepreneurial development (Fayolle et al., 2017; Nabi et al., 2017). Institutions must evolve toward more nuanced evaluation systems that measure developmental trajectories, reflective capacity, and the quality of mentoring relationships. As the cluster analysis revealed, learner archetypes progress along diverse pathways, necessitating evaluation approaches that honor this heterogeneity rather than imposing standardized benchmarks that privilege certain profiles over others.

Reward and recognition systems require similar recalibration. When institutions value only visible entrepreneurial outputs, they inadvertently marginalize the vital, often invisible labor of adaptive teaching-the emotional scaffolding, tacit knowledge sharing, and relational expertise that this research identifies as central to effective entrepreneurship education. Faculty promotion criteria should explicitly recognize evidence of responsive teaching, inclusive pedagogical innovation, and the cultivation of psychological safety in learning environments (Edmondson, 1999; Carmeli et al., 2022).

Faculty development initiatives must transcend technical training to include deeper engagement with scaffolding theory, mindset archetype recognition, and differentiated support strategies. Programs should create communities of practice where teaching entrepreneurs and entrepreneurial teachers can exchange insights, collectively reflect on challenges, and cultivate the adaptive expertise that transcends standardized curricula. Such communities' bridge theory and practice by externalizing tacit knowledge through structured dialogue (Nonaka & Takeuchi, 1995; Day & Gu, 2020).

Perhaps most critically, institutions must cultivate organizational cultures that protect time and space for reflection and experimentation. The overwhelming administrative demands placed on educators often squeeze out opportunities for deep engagement with students and pedagogical innovation. By structuring workloads to include dedicated time for reflection, peer consultation, and iterative redesign, institutions signal that responsive teaching is not an add-on but a core professional responsibility worthy of institutional investment.

6.4.3 For Policymakers

Policymakers at regional, national, and international levels play a crucial role in shaping both the narrative and infrastructure of entrepreneurship education. This research invites a fundamental reimagining of entrepreneurship education policy—a shift away from narrow conceptualizations centered on economic outputs and toward a more holistic vision that encompasses human development, psychological resilience, and societal contribution. Such a reorientation aligns with emerging scholarship that positions entrepreneurship as not merely an economic activity but a vehicle for personal growth, community engagement, and social innovation (Fayolle, 2018; Rae, 2006).

Contemporary policy frameworks often emphasize entrepreneurship education primarily as a driver of employment, economic growth, or competitiveness (OECD, 2015; UNCTAD, 2012). While these outcomes remain important, they represent only a fraction of entrepreneurship education's potential impact. The AEDF developed in this research demonstrates that entrepreneurial learning is deeply developmental—a process through which learners cultivate not only business skills but also confidence, resilience, and adaptability. Policy approaches that recognize this developmental dimension would foster more inclusive and sustainable entrepreneurial ecosystems by attending to the human elements that underpin entrepreneurial action (Hattenberg, 2022; Illeris, 2018b).

Funding mechanisms and resource allocation frameworks should similarly evolve to support inclusive, interdisciplinary, and longitudinal entrepreneurship education initiatives. Current funding models often prioritize short-term, output-focused programs that demonstrate immediate impact through metrics such as venture creation rates or entrepreneurial intentions (Fayolle et al., 2016). The findings of this research suggest that sustained investment in initiatives that emphasize relational, adaptive teaching and diverse learner pathways would yield more significant long-term benefits. Programs serving underrepresented or marginalized learners—who may enter with different archetype profiles or require differentiated scaffolding—warrant dedicated support to ensure that entrepreneurial education does not inadvertently reinforce existing social and economic disparities (Florian & Black-Hawkins, 2011).

The evaluation of entrepreneurship education programs at the policy level must similarly expand beyond narrow economic indicators. This research demonstrates that entrepreneurial mindset development is a complex, non-linear process influenced by emotional, cognitive, and social factors. Policy frameworks should therefore include indicators that capture mindset evolution, learner agency, and capacity for navigating uncertainty. Metrics such as reflective depth, mentoring relationships, and adaptive problem-solving would provide a more nuanced understanding of program effectiveness than business plan completions or pitch competition results alone (Edmondson, 1999; Kolb & Kolb, 2018).

Perhaps most critically, policymakers must recognize that entrepreneurship is not a solo endeavor but fundamentally a social process—one that flourishes in environments of collaboration, psychological safety, and diversity. The AEDF illuminates how entrepreneurial learning emerges through relational interactions between educators and learners, peers, and broader communities of practice. Policy initiatives should therefore support the development of entrepreneurial ecosystems that prioritize these relational dimensions, investing in educator capacity-building, partnership networks, and platforms for knowledge exchange (Nonaka & Takeuchi, 1995; Vygotsky, 1978).

Strategic partnerships between educational institutions, industry, government, and civil society represent another policy lever for fostering adaptive entrepreneurial development. Such collaborations create rich learning environments where students can engage with real-world challenges while receiving appropriate scaffolding. Policy frameworks that incentivize cross-sector partnerships and knowledge sharing would strengthen the systemic conditions for entrepreneurial learning and innovation (Day & Gu, 2020; Wegner & Nütze, 2022).

In sum, this research challenges policymakers to broaden their conception of entrepreneurship education beyond economic imperatives to encompass its role in human development and societal transformation. By aligning policy frameworks with the adaptive, relational, and developmental dimensions of entrepreneurial learning revealed in this study, policymakers can foster more inclusive, effective, and sustainable entrepreneurial ecosystems-ones that truly serve diverse learners and contribute to addressing complex societal challenges.

6.5 Methodological Reflections and Limitations

As with any research endeavour, the findings and contributions of this dissertation are shaped by the methodological choices and epistemological commitments that guided the study. The aim throughout was to achieve depth, reflexivity, and contextual understanding-recognizing that the complexity of entrepreneurial learning resists simple measurement or universal claims. The following reflections clarify the boundaries of the study's applicability, while also pointing toward productive avenues for future inquiry.

6.5.1 Contextual Boundaries

The research was conducted primarily within Dutch higher education, spanning both vocational and applied sciences institutions. This context provided a rich setting for exploring learner diversity and responsive teaching, but it also introduces limitations regarding transferability. The specific entrepreneurial mindset archetypes and educator practices identified here are grounded in the cultural, institutional, and disciplinary realities of the Dutch system. While the challenges of differentiation and adaptive scaffolding are widely relevant, future research in other regions and educational systems will be necessary to assess the extent to which these findings and frameworks hold, adapt, or evolve in different contexts.

6.5.2 Heuristic Nature of Archetypes and AEDF

Both the entrepreneurial mindset archetypes and the Adaptive Entrepreneurial Development Framework (AEDF) developed in this study are best understood as heuristic tools. They are intended to guide reflection and inform practice-not to serve as rigid typologies or predictive models. Their empirical grounding, through cluster analysis and design-based inquiry, supports their utility in real-world settings; yet their effectiveness depends on the flexibility and thoughtfulness with which educators employ them. The archetypes, in particular, should be seen as developmental waypoints rather than fixed categories, and the AEDF as a compass for ongoing adaptation rather than a prescriptive protocol.

6.5.3 Self-Reported and Observational Data

A significant portion of the data in this study derives from self-reported experiences of learners and educators, complemented by researcher-led observations. While triangulation and reflective validation were used to strengthen credibility, such data are inherently interpretive and shaped by context, memory, and perspective. The findings thus reflect lived experiences and meaning-making processes rather than objective facts. This aligns with the study's constructivist stance, prioritizing understanding over measurement, but it does mean that results should be read as situated insights rather than generalizable truths.

6.5.4 Tacit Knowledge and Researcher Reflexivity

The emphasis on tacit knowledge-both in educators and in the researcher-introduces an additional layer of subjectivity. Capturing and interpreting moments of improvisation, emotional attunement, and reflective practice inevitably involves both what educators recall and how the researcher perceives and codes those moments. As a practitioner-researcher, my position provided privileged access to nuanced insights but also risked bias. To mitigate this, I engaged in iterative coding, peer debriefing, and reflective journaling throughout the project.

Nevertheless, this dissertation is best understood as interpretive inquiry: an effort to illuminate complex realities, not to produce positivist generalizations.

6.5.5 Resistance to Standardization

Finally, it is important to acknowledge that the very phenomena at the heart of this research-adaptive teaching, mindset development, and responsive scaffolding-resist standardization. This study does not offer universal protocols or “best practices.” Instead, it seeks to deepen our understanding of why responsiveness matters, how it works, and for whom. Its conclusions are intended to provoke reflection, inspire experimentation, and support the emergence of more inclusive, adaptive approaches to entrepreneurship education-not to prescribe a single path forward.

In sum, these methodological reflections do not detract from the significance of the findings. Rather, they clarify the boundaries within which the research should be interpreted and highlight the value of ongoing, context-sensitive inquiry in the evolving field of entrepreneurship education.

6.6 Future Research Agenda

This dissertation opens several promising avenues for further inquiry-both to extend the Adaptive Entrepreneurial Development Framework (AEDF) and to deepen our understanding of inclusive, responsive pedagogy in entrepreneurship education and beyond. The research journey has illuminated the complexity and promise of adaptive scaffolding, archetype-informed teaching, and the centrality of educator presence. Yet, as with any significant advance, it also raises new questions that call for sustained scholarly attention and collaborative exploration.

6.6.1 Longitudinal Studies on Mindset Development

Entrepreneurial mindset growth is, by its very nature, a developmental and evolving process. While this study provides a robust snapshot of how ability and willingness interact within specific contexts, future research should follow learners across longer time horizons-spanning multiple semesters, educational transitions, or even into professional life. Such longitudinal studies would allow for the tracking of shifts in mindset dimensions such as confidence, willingness, and ambiguity tolerance, as well as the identification of critical inflection points in entrepreneurial identity formation (Rae, 2006).

Moreover, by observing how learners respond to different scaffolding strategies over time, researchers can better understand the delayed and cumulative impacts of adaptive teaching-insights essential for refining both the AEDF and broader educational practice.

6.6.2 Cross-Cultural and Interdisciplinary Validation of the AEDF

The present research is grounded in Dutch higher education, with its own cultural, institutional, and disciplinary characteristics. To assess the transferability and adaptability of the AEDF and entrepreneurial mindset archetypes, future studies should seek replication and extension across diverse contexts.

How do learners in STEM, the arts, or business disciplines interpret and respond to similar scaffolding strategies? What archetypes and patterns of development emerge in other sociocultural settings? Comparative, cross-cultural, and interdisciplinary research could yield both nuanced critique and valuable adaptations of the framework, enriching our understanding of entrepreneurial learning as a global and contextually situated phenomenon.

6.6.3 Testing Adaptive Scaffolding Through Intervention Research

A further priority is to move from the identification of naturally occurring relationships between learner configurations and scaffolding towards the systematic testing of adaptive pedagogical interventions. The AEDF provides a basis for such research by generating propositions about how different forms and intensities of support may interact with learners' developmental starting points.

Future studies could examine whether educators trained to diagnose learner readiness and adapt scaffolding accordingly produce different developmental trajectories from educators using more standardised approaches. Experimental and quasi-experimental designs could also investigate which scaffold–learner alignments are robust across contexts, when forms of support become ineffective or counterproductive, and how scaffolding can be progressively faded as learners develop greater autonomy. Such research would provide an important next step from the exploratory and interpretive findings of this dissertation towards stronger causal evidence concerning adaptive entrepreneurship education.

6.6.4 Educator Development and Reflexive Practice

This dissertation foregrounds the crucial role of educator responsiveness, tacit knowledge, and improvisational capacity in effective entrepreneurship education. Yet, there is much to learn about how these qualities can be cultivated and sustained.

Future research should investigate which forms of professional learning—such as communities of practice, video feedback, or embodied teaching methods—most effectively foster reflective, inclusive pedagogical practice (Gibbs & Coffey, 2004). Studies that explore how educators develop presence, emotional attunement, and the ability to scaffold adaptively in real-time would contribute greatly to both theory and practice.

6.6.5 From Individual Profiles to Team-Level Dynamics

Entrepreneurial learning frequently unfolds in teams rather than at the level of the individual learner alone. The present dissertation primarily uses entrepreneurial mindset archetypes to understand individual developmental starting points, but an important next step is to investigate how different configurations interact within entrepreneurial teams.

Future research could examine whether combinations of ability and willingness influence peer scaffolding, leadership emergence, conflict, psychological safety, collective decision-making, and team learning. This would extend the adaptive perspective from educator–learner interaction towards the wider social ecology of entrepreneurial learning and could clarify whether learner diversity functions differently when support is provided by peers rather than educators.

6.6.6 Digital Scaffolding and Adaptive Learning Technologies

As digital and hybrid learning environments become increasingly prevalent, new questions arise about how the principles of adaptive scaffolding and archetype-sensitive support can be translated into technological formats. Can AI tutors or adaptive learning platforms detect archetypal profiles and scaffold accordingly?

How might digital tools simulate or augment educator presence and responsiveness without sacrificing the nuance and humanity that underpin effective teaching? Research in this area should critically examine the balance between automation and human judgment, ensuring that technological innovation enhances rather than diminishes the relational core of entrepreneurial learning.

6.6.7 Expanding the Framework Beyond Entrepreneurship

Finally, the AEDF and its underlying principles hold promise for application beyond the domain of entrepreneurship education. Future studies could explore its relevance in professional learning, life design coaching, youth mentorship, and interdisciplinary innovation education.

The language of scaffolding, archetypes, and educator presence may offer valuable insights for any context where mindset development under uncertainty is a central goal. Testing and refining the AEDF in these broader arenas would not only strengthen its theoretical foundations but also contribute to the democratization of adaptive, inclusive pedagogy across educational and professional fields.

6.7 Final Reflection: The Parenting Metaphor Revisited

As this dissertation draws to a close, I return to a moment that has accompanied and illuminated this journey—a photograph of me and my one-year-old daughter in Edinburgh's city square. In the image, she is upside down over my shoulder, laughing with abandon. Only moments before, she was inconsolable, and I was out of options. In an instinctive, unplanned gesture, I flipped her over my shoulder. Her laughter changed the moment. Strangers smiled. The atmosphere shifted. The square came alive.

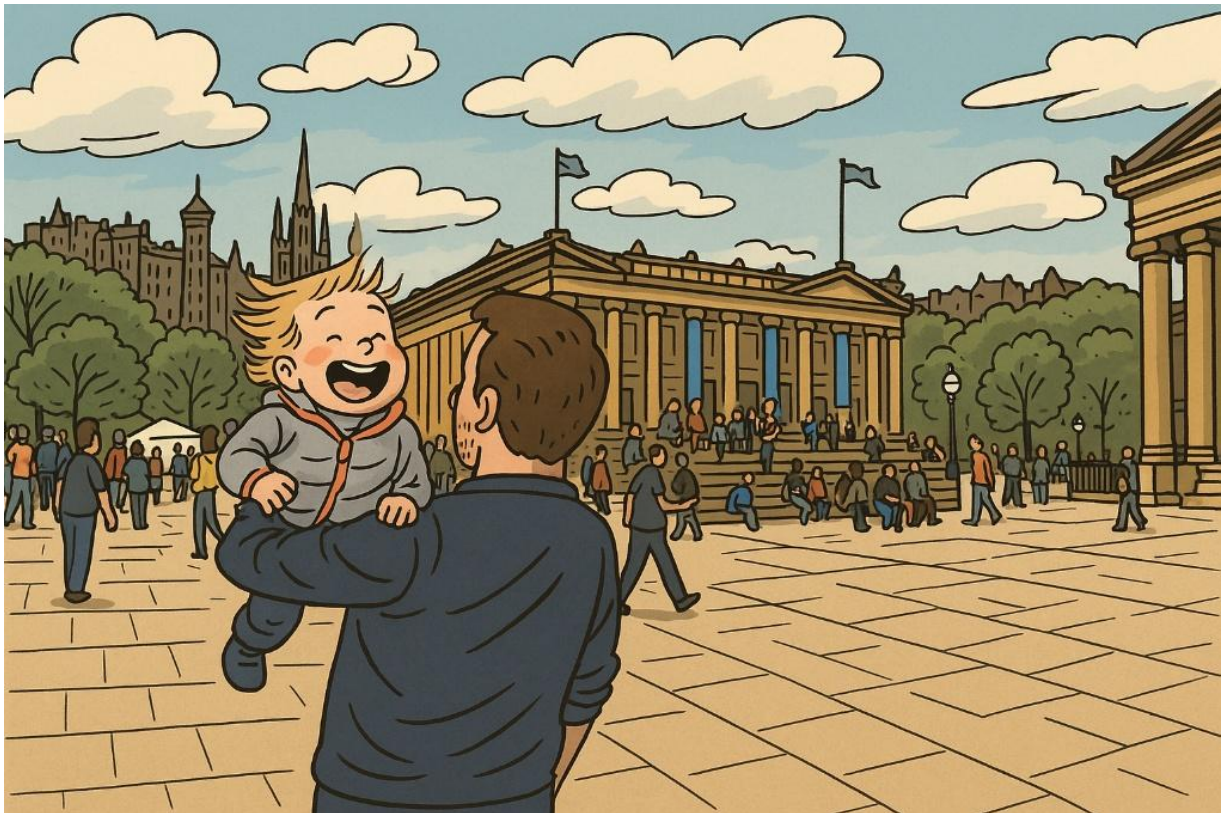


Figure 12: The importance of the right support at the right time

This moment, though deeply personal, encapsulates what I have come to understand as adaptive scaffolding. It was a response, not a solution. It was emergent, relational, and dependent on mutual trust. There was no script-only presence. And yet it worked. This mirrors what the most impactful entrepreneurial educators do: they sense the need, act responsively, and create possibility in the unknown.

Even the castle in the background was draped in scaffolding-temporary, purpose-built, and just high enough to support the work in progress. That image captures the essence of this research: scaffolding not as structure but as service. Not as constraint, but as liberation. A tool to be removed when growth has occurred.

In the same spirit, the Adaptive Entrepreneurial Development Framework (AEDF) is not a doctrine. It is a developmental guide, to be co-interpreted by educators and learners in dynamic, evolving contexts. It reminds us that learners arrive not as blank slates, but with varied readiness, resilience, and resourcefulness-and that it is our task to meet them where they are, not where we wish them to be.

The transformative potential of this work lies in its invitation to reframe both entrepreneurship education and learning more broadly. When we recognize that entrepreneurial mindset development is not about conformity to predetermined models, but about nurturing each learner's unique journey from their current archetype toward greater capability and confidence, we open education to those who might otherwise be left behind. The five mindset archetypes-from Visionary Risk-Takers to Systematic Executors-remind us that there is no single path to entrepreneurial development, and that our pedagogical approaches must honor this diversity.

Throughout my years in entrepreneurship education, I have witnessed countless moments when the right scaffold at the right time transformed not just learning, but the learner's sense of possibility. I think of the Systematic Executor who, through emotional scaffolding and normalized failure narratives, found the courage to pivot their failing venture idea.

I remember the Visionary Risk-Taker who, through structured feedback and modeling, learned to channel their abundant creativity into feasible action. These moments of transformation weren't accidents-they were the result of educators who understood that their role was not to dictate but to discern, not to instruct but to invite.

This understanding matters profoundly for learners, who deserve educational experiences that honor their starting points and potential trajectories. It matters for educators, who need frameworks that validate their tacit expertise and emotional labor rather than reducing teaching to content delivery. And it matters for society, as we face complex challenges that require not just technical knowledge but the capacity to adapt, collaborate, and create value in contexts of uncertainty.

I envision an educational ecosystem where the principles of the AEDF extend beyond entrepreneurship classrooms to transform how we approach learning throughout our institutions. Imagine schools and universities where diagnostic profiling isn't used to label learners but to illuminate their developmental edges. Imagine professional development that focuses not on standardizing teaching but on cultivating presence, attunement, and adaptive expertise.

Imagine evaluation systems that value not just what students produce but how they evolve, tracking not only venture creation but mindset transformation, not just skill acquisition but identity development.

Taken together, this dissertation suggests that entrepreneurial mindset development cannot be understood as the straightforward outcome of a curriculum, teaching method, or isolated learner characteristic. It emerges through interaction between learner, educator, task, peers, and context. Learners enter entrepreneurship education from different developmental starting points; educators interpret and respond to those differences; and scaffolding can either expand or constrain the learner's capacity for increasingly autonomous entrepreneurial action.

The central implication is therefore not that entrepreneurship education requires a different standardised method, but that it must become more deliberately adaptive. The challenge for educators is to provide enough support for learners to move beyond what they can currently accomplish, while progressively creating the conditions in which that support is no longer needed.

In this sense, the ultimate purpose of scaffolding entrepreneurial mindset development is not to produce a particular type of entrepreneur, but to expand people's capacity to create value under conditions of uncertainty.

To the learners, educators, and companions along this journey-thank you for your part in shaping this work.

It is through interactions that we grow.

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Appendices

Appendix A: Annotated Bibliography — Theoretical Foundations of Chapter 2

This appendix presents an annotated bibliography of 98 key references that informed the theoretical framework developed in Chapter 2. References are organized by the eight analytical lenses introduced in Table 3. Each entry includes the full APA 7th edition citation, a brief annotation describing the work's contribution, and its relevance to the theory–practice gap in entrepreneurship education.

Lens 1: Novice–Expert Continuum in Effectuation

Alsos, G. A., Clausen, T. H., Hytti, U., & Solvoll, S. (2016). Entrepreneurs' social identity and the preference of causal and effectual behaviours in start-up processes. *Entrepreneurship & Regional Development*, 28(3–4), 234–258. <https://doi.org/10.1080/08985626.2016.1155742>

Annotation: Using a mixed-method design (qualitative pilot + survey of 2013 Norwegian new venture registrants), this paper examines how entrepreneurial social identity (Missionary, Darwinian, Communitarian) shapes preference for effectual versus causal behavior. Social identity is shown to be an important antecedent of decision-making logic, complementing expertise-based explanations. The study builds theory by connecting identity to the choice of effectual or causal approaches, responding to calls for research on antecedents of effectuation.

Relevance: Extends the effectuation-expertise debate by showing that factors beyond experience level—particularly identity—shape effectual behavior, with implications for how entrepreneurship education should be personalized to different learner identities at various stages of development along the novice-to-expert continuum.

Chandler, G. N., DeTienne, D. R., McKelvie, A., & Mumford, T. V. (2011). Causation and effectuation processes: A validation study. *Journal of Business Venturing*, 26(3), 375–390. <https://doi.org/10.1016/j.jbusvent.2009.10.006>

Annotation: This study develops and validates the first psychometrically rigorous survey scales measuring causation and effectuation as distinct constructs across two samples of entrepreneurs in young firms. Causation is found to be a coherent unidimensional construct, while effectuation is a formative, multidimensional construct comprising experimentation, affordable loss, flexibility, and pre-commitments. Causation is negatively associated with uncertainty; effectuation's experimentation dimension is positively correlated with uncertainty.

Relevance: Provides the measurement infrastructure used in nearly all subsequent empirical research on effectuation and novice-expert comparisons (including Ruiz-Jiménez et al., 2021). Operationalizing causation/effectuation as measurable constructs enables systematic study of how educational interventions shift student reasoning along the novice-to-expert continuum.

Dew, N., Read, S., Sarasvathy, S. D., & Wiltbank, R. (2009). Effectual versus predictive logics in entrepreneurial decision-making: Differences between experts and novices. *Journal of Business Venturing*, 24(4), 287–309. <https://doi.org/10.1016/j.jbusvent.2008.02.002>

Annotation: Using think-aloud protocols with 27 expert entrepreneurs and 37 MBA students (novices), this study empirically validates that experts frame venture creation decisions using effectual logic—identifying more potential markets, emphasizing affordable loss, and building partnerships—while novices use predictive, causal logic and 'go by the textbook.' Transcripts were analyzed through cognitive science methods drawn from three decades of expertise research. The expert–novice gap in decision-making logic is shown to be systematic and measurable.

Relevance: The definitive empirical study instantiating the novice-expert continuum within effectuation theory. Directly maps onto entrepreneurship education by diagnosing the cognitive gap between students (novices) and practicing entrepreneurs (experts), providing an empirical target for educational development.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Annotation: Kolb presents a holistic, integrative theory of learning as a four-stage cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Drawing on Dewey, Lewin, and Piaget, the theory holds that knowledge is created through the transformation of experience, and that

development proceeds through increasingly sophisticated integration of these modes. The book also introduces four learning styles (diverger, assimilator, converger, accommodator) as profiles of preferred learning modes.

Relevance: The foundational experiential learning framework most frequently invoked in entrepreneurship education research to justify practice-based, reflective pedagogy. The four-stage cycle directly parallels the effectuation logic of 'means-to-possible-effects' iteration, and the developmental view of learning (from novice concrete experience to expert abstract generalization) underpins the novice-expert continuum in entrepreneurship education contexts.

Neck, H. M., & Greene, P. G. (2011). Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management*, 49(1), 55–70. <https://doi.org/10.1111/j.1540-627X.2010.00314.x>

Annotation: This conceptual paper critiques three dominant 'known worlds' of entrepreneurship education (teaching about entrepreneurs, teaching entrepreneurial processes, and teaching via cognition/intention models) and proposes a fourth, method-based approach grounded in practice. The method world treats entrepreneurship as a practice to be developed through doing, aligning closely with effectual principles of means-orientation and action under uncertainty. The authors argue that education should shift from transmitting knowledge to developing entrepreneurial method competencies.

Relevance: Provides the pedagogical bridge between effectuation theory and entrepreneurship education practice. The 'method world' directly draws on effectual logic, and the paper's novice-to-practitioner framing provides a theoretical scaffold for understanding how education can accelerate developmental progression in entrepreneurial reasoning.

Read, S., Sarasvathy, S. D., Dew, N., & Wiltbank, R. (2016). *Effectual entrepreneurship* (2nd ed.). Routledge.

Annotation: This textbook translates the effectuation research program into a practitioner- and student-accessible format, organizing the five effectual principles around cases, exercises, and reflective activities. The second edition incorporates recent empirical developments and addresses how effectuation applies across venture stages, industries, and cultural contexts. It functions as both a pedagogical tool and a secondary synthesis of the empirical literature on expert entrepreneurial cognition.

Relevance: The primary educational text based on effectuation theory, explicitly designed to teach novices the expert reasoning patterns identified by Sarasvathy and colleagues. Represents the most direct application of the effectuation framework to entrepreneurship education and maps the developmental journey from novice to expert reasoning.

Read, S., Song, M., & Smit, W. (2009). A meta-analytic review of effectuation and venture performance. *Journal of Business Venturing*, 24(6), 573–587. <https://doi.org/10.1016/j.jbusvent.2008.02.005>

Annotation: Conducting the first meta-analysis of effectuation, this study analyzes 94 variables from 48 studies published in the Journal of Business Venturing (1996–2007), covering 9,897 new ventures. Findings connect three effectual principles (means orientation, partnership/pre-commitments, and leveraging contingencies) positively with new venture performance, while also articulating a systematic method for measuring new theoretical constructs from existing variables. The paper provides the first large-sample empirical support for effectuation's predictive validity.

Relevance: Provides quantitative evidence that effectual behaviors (expertise markers) lead to better venture outcomes, strengthening the case that developing effectual reasoning in students (moving them along the novice-to-expert continuum) has practical payoffs. Foundational for effectuation-focused entrepreneurship education research.

Ruiz-Jiménez, J. M., Ruiz-Arroyo, M., & Fuentes-Fuentes, M. M. (2021). The impact of effectuation, causation, and resources on new venture performance: Novice versus expert entrepreneurs. *Small Business Economics*, 57(4), 1761–1781. <https://doi.org/10.1007/s11187-020-00371-7>

Annotation: Analyzing 178 new technology-based firms, this study finds that causation predicts performance only in expert entrepreneurs' ventures, while effectuation positively predicts performance for both novices and experts. Resource availability moderates the causation-performance link but not the effectuation link. The paper provides robust empirical evidence that the novice-expert distinction has material performance consequences when mediated by decision-making logic.

Relevance: Directly addresses the novice-expert dimension of effectuation theory within a performance outcomes framework, demonstrating that the developmental trajectory from novice to expert reasoning has

measurable strategic implications. Highly relevant for justifying effectuation-based entrepreneurship education as preparation for expert-level performance.

Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2), 243–263. <https://doi.org/10.5465/amr.2001.4378020>

Annotation: Sarasvathy introduces effectuation as an alternative decision-making logic to causation, arguing that expert entrepreneurs begin with given means (who they are, what they know, whom they know) and select among possible effects, rather than starting from a predetermined goal and working backward. Causation rests on a logic of prediction; effectuation rests on a logic of control. The paper offers four core principles—affordable loss, strategic alliances/partnerships, exploitation of contingencies, and control of an unpredictable future—and develops testable propositions at macro, industry, firm, and individual levels.

Relevance: The foundational text establishing effectuation theory. Directly posits effectuation as a hallmark of entrepreneurial expertise, setting up the novice-expert distinction (experts use effectuation; novices default to causal 'textbook' logic). Essential for any PhD thesis linking effectuation to developmental progression in entrepreneurship education.

Sarasvathy, S. D. (2008). *Effectuation: Elements of entrepreneurial expertise*. Edward Elgar Publishing.

Annotation: This book-length treatment synthesizes Sarasvathy's program of research on entrepreneurial cognition, presenting effectuation as a general theory of expert entrepreneurial action rooted in four empirical chapters and two theoretical chapters. It grounds effectuation in the cognitive science of expertise, detailing the 'bird-in-hand,' 'affordable loss,' 'crazy quilt,' 'lemonade,' and 'pilot-in-the-plane' principles. The text establishes effectuation as learnable expertise, not an innate trait, with implications for how entrepreneurship is taught.

Relevance: Extends the original theory into a full conceptual framework, explicitly connecting expert entrepreneurial cognition to the pedagogical potential of effectuation. The book is the primary secondary-level source for understanding the developmental (novice-to-expert) view underpinning effectuation, and directly bridges theory to entrepreneurship education.

Sarasvathy, S. D. (2023). Questions worth asking for futures worth making: An effectual approach. *Small Business Economics*, 61(1), 1–16. <https://doi.org/10.1007/s11187-023-00747-5>

Annotation: In this reflective essay, Sarasvathy revisits effectuation theory 22 years after its introduction, arguing that outcomes in entrepreneurship are not only unknown but unknowable, making predictive criteria insufficient for guiding action. She proposes five new research frontiers—each built on one of the five effectual principles—addressing negative contingencies, co-creation in loss aversion, self-selection, problem-of-plenty, and large-scale societal challenges. The paper reframes entrepreneurship as a 'method' for making futures rather than predicting them.

Relevance: Provides a current (2023) authorial articulation of effectuation's theoretical frontiers, directly connecting the framework to entrepreneurship education and the development of non-predictive expertise in students. The paper speaks to how effectuation education can prepare novices to navigate genuine uncertainty rather than simulated risk.

Sundström, A., Memar, N., & Larsson, T. (2020). Teaching causation and effectuation in the large classroom: A production–trade game. *Journal of Management Education*, 44(6), 744–778. <https://doi.org/10.1177/1052562920951971>

Annotation: This paper introduces and evaluates a production-trade gamification exercise designed to teach both causal and effectual logics in large classroom settings (200+ students), addressing the pedagogical challenge of scaling experiential learning. The game creates conditions where students practice affordable loss, means-orientation, and contingency exploitation, and the study provides evidence that the exercise prompts effectual and causal behaviors in students. The authors discuss design principles for translating effectuation theory into large-format pedagogy.

Relevance: Directly operationalizes effectuation as a teachable skill in formal educational settings, bridging theory to practice and speaking to how educators can move students along the novice-to-expert reasoning continuum. Contributes to the entrepreneurship pedagogy literature on experiential effectuation-based learning.

Van Gelderen, M. (2022). Developing entrepreneurial competencies through deliberate practice. *Education + Training*, 64(6), 829–844. <https://doi.org/10.1108/ET-10-2021-0396>

Annotation: Drawing on Ericsson's deliberate practice (DP) framework—the established model for expert skill development—this paper designs and evaluates a seven-week entrepreneurship training format in which students select and systematically practice a specific entrepreneurial competency. Both short- and long-term gains in competency development are observed. The paper argues that DP principles, originally articulated in the literature on expert performance, can be applied to entrepreneurial competency development even at lower proficiency levels (novices).

Relevance: Bridges the expertise/novice-expert literature (Ericsson's DP framework) with entrepreneurship education practice, providing a theoretically grounded mechanism for how education can systematically advance learners from novice to more expert-like entrepreneurial reasoning—directly complementing the effectuation-as-expertise view.

Lens 2: Entrepreneurial Journey & Individual Differences

Aadland, T., Hägg, G., Lundqvist, M. A., Stockhaus, M., & Williams Middleton, K. (2024). Mitigating the lack of prior entrepreneurial experience and exposure through entrepreneurship education programs. *International Journal of Entrepreneurial Behavior & Research*, 30(11), 19–44. <https://doi.org/10.1108/IJEBr-07-2022-0607>

Annotation: Using longitudinal data from 692 graduates of Scandinavian venture creation programmes, Hägg and colleagues demonstrate that EE can compensate for a lack of prior entrepreneurial experience, pedigree, or exposure—thus democratising entrepreneurial learning trajectories. The study distinguishes between independent and corporate VCPs, showing that different programme types produce different career outcomes (self-employment vs. intrapreneurship), and that individual background significantly moderates how students benefit. This provides strong empirical evidence that diverse learner starting points can converge toward entrepreneurial competence through appropriate programme design.

Relevance: This paper is directly relevant to learner heterogeneity and diverse aspirational pathways in Lens 2. By showing that VCPs can offset background differences in prior exposure, it supports the argument that well-designed, process-oriented EE can serve learners across a wide heterogeneity of starting points. The distinction between start-up and intrapreneurial outcomes also captures the breadth of aspirational pathways, resisting a purely venture-creation-centric view of EE success.

Dimov, D., & Pistrui, J. (2022). Entrepreneurship education as a first-person transformation. *Journal of Management Inquiry*, 31(1), 49–53. <https://doi.org/10.1177/1056492620964592>

Annotation: Dimov and Pistrui argue that entrepreneurship education must be reoriented around the first-person perspective of the learner, moving beyond the transmission of third-person knowledge about entrepreneurship. They propose a conceptual map bridging subjective, inter-subjective, and objective varieties of knowledge, re-framing the EE classroom as a space for practical reasoning about what the world could be. The paper advocates for pedagogies that activate the learner's sense of personal possibility and agency.

Relevance: This is the primary 2020/2022 seed reference for Lens 2, directly positioning entrepreneurship education as an identity-shaping, first-person journey rather than content delivery. Dimov and Pistrui's framework resonates with the iterative, subjective nature of the entrepreneurial journey and emphasises individual differences in how learners construct possibility. Their approach supports process-oriented EE that attends to diverse learner starting points and aspirational self-concepts.

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, 53(1), 75–93. <https://doi.org/10.1111/jsbm.12065>

Annotation: Fayolle and Gailly operationalize entrepreneurial intention and its antecedents—attitudes, subjective norms, and perceived behavioural control—within a quasi-experimental design to assess whether EE programmes produce lasting attitudinal change. Their key contribution is the identification of 'hysteresis' effects: the impact of EE depends heavily on students' pre-existing attitudes, meaning the same programme produces very different outcomes for different learners. They also find that EE effects can persist over time for students with favourable prior orientations.

Relevance: This paper is a cornerstone seed reference for Lens 2 because it empirically demonstrates learner heterogeneity as a fundamental moderator of EE impact. The hysteresis concept directly supports the argument that students enter EE programmes with diverse aspirational pathways and dispositions, meaning a one-size-fits-all, outcome-based approach is insufficient. It grounds the need for process-oriented EE that accounts for individual starting points and learning trajectories.

Gibb, A. (2002). In pursuit of a new 'enterprise' and 'entrepreneurship' paradigm for learning: Creative destruction, new values, new ways of doing things and new combinations of knowledge. *International Journal of Management Reviews*, 4(3), 233–269. <https://doi.org/10.1111/1468-2370.00086>

Annotation: Gibb mounts a comprehensive critique of traditional business education for its failure to capture the holistic, emergent, and social character of entrepreneurship, and calls for a new learning paradigm grounded in the ways of doing, seeing, feeling, and communicating that characterise entrepreneurial behaviour. He reframes entrepreneurship education as the cultivation of an 'entrepreneurial capacity' applicable across multiple life and career contexts—not merely new-venture creation. The paper articulates a vision of EE that embraces personal development, identity transformation, and non-linear learning as central, not peripheral, concerns.

Relevance: Gibb's paradigm-challenging essay is a foundational reference for the process-oriented vs. outcome-based EE debate central to Lens 2. His insistence that EE must engage with how entrepreneurs think, feel, and act—rather than simply what they know—speaks directly to the identity-shaping and iterative dimensions of the entrepreneurial journey. The paper also anticipates learner heterogeneity by arguing that entrepreneurial capacity is broadly applicable across diverse aspirational contexts including social entrepreneurship, intrapreneurship, and community enterprise.

Hägg, G. (2021). The entrepreneurial diary: A reflective learning activity to enhance the judgmental abilities of student entrepreneurs. *International Journal of Entrepreneurial Behavior & Research*, 27(5), 1142–1165. <https://doi.org/10.1108/IJEBr-07-2020-0496>

Annotation: Hägg theorizes the 'entrepreneurial diary' as a reflective learning activity within venture creation programmes, arguing that self-regulation and reflective thinking are essential for developing the judgmental capacity to act intelligently under uncertainty. Drawing on cognitive-load theory and experiential learning literature, the paper positions reflective practice as a bridge between theory and practice in iterative, action-based EE contexts. Empirical insights from a master-level VCP over seven years are used to illustrate how students develop self-awareness as a foundation for entrepreneurial decision-making.

Relevance: Hägg's focus on self-regulation, reflection, and iterative experience directly engages the non-linear, process dimension of the entrepreneurial journey in educational settings. The entrepreneurial diary foregrounds individual differences in how students engage with and make sense of their learning experiences, supporting personalised and identity-aware approaches to EE. The paper contributes to understanding how process-oriented EE can accommodate diverse learner trajectories rather than converging on standardised outcomes.

Lackéus, M. (2015). Entrepreneurship in education: What, why, when, how. OECD Local Economic and Employment Development (LEED) Working Papers, 2015/06. OECD Publishing. <https://doi.org/10.1787/cccac96a-en>

Annotation: Lackéus provides a comprehensive conceptual overview of entrepreneurship in education, distinguishing between education about, through, and for entrepreneurship and mapping the contested terrain of definitions, purposes, and pedagogies. The paper argues that value creation for others—rather than venture creation for self—should be the defining purpose of entrepreneurship education, enabling broader inclusion of learners with non-start-up aspirations. It also identifies the key challenges of EE implementation, including definitional ambiguity and the difficulty of assessing non-linear learning outcomes.

Relevance: Lackéus's widely cited framework is central to the process-oriented vs. outcome-based EE debate in Lens 2. By defining the field around value creation and distinguishing diverse purposes of EE, the paper legitimates aspirational diversity among learners—including intrapreneurs, social entrepreneurs, and employee-entrepreneurs—and critiques narrow, start-up-centric outcome metrics. This directly supports the argument that EE must accommodate the full heterogeneity of learner trajectories and aspirations.

Lackéus, M., & Williams Middleton, K. (2015). Venture creation programs: Bridging entrepreneurship education and technology transfer. *Education + Training*, 57(1), 48–73. <https://doi.org/10.1108/ET-02-2013-0013>

Annotation: Lackéus and Williams Middleton analyse six European venture creation programmes (VCPs) as a distinct type of action-based EE in which the real-life venture is the primary learning vessel. Through qualitative comparative analysis, they identify unique characteristics of VCPs—including non-linear learning trajectories, iterative action-reflection cycles, and strong identity development components—and distinguish VCPs from conventional case-based or lecture-based EE. They connect VCPs to technology transfer contexts while showing their broader applicability.

Relevance: This paper directly addresses process-oriented EE and the role of iterative, real-life entrepreneurial activity in shaping both competencies and entrepreneurial identity. It empirically documents the non-linear

nature of entrepreneurial learning trajectories within structured programmes, supporting Lens 2's core arguments. The study also surfaces individual differences among student entrepreneurs regarding their readiness for and responses to action-based learning.

McMullen, J. S., & Dimov, D. (2013). Time and the entrepreneurial journey: The problems and promise of studying entrepreneurship as a process. *Journal of Management Studies*, 50(8), 1481–1512. <https://doi.org/10.1111/joms.12049>

Annotation: McMullen and Dimov critically examine the disconnect between process-oriented conceptions of entrepreneurship theorized in premier journals and the variance-oriented empirical studies that dominate the field. They propose shifting inquiry from entrepreneurship as an act to entrepreneurship as a journey, raising foundational questions about when the journey begins and ends, how it might be subdivided, and what remains constant. The paper establishes the construct of the 'entrepreneurial journey' as a temporal, processual phenomenon requiring dedicated research designs and longitudinal methods.

Relevance: This is the foundational paper establishing the entrepreneurial journey as a core theoretical construct in entrepreneurship research. It directly underpins Lens 2 by framing entrepreneurship as an extended, non-linear process rather than a discrete act, and by highlighting the inadequacy of snapshot, outcome-based approaches for capturing what learners actually experience. Its critique of variance-oriented over process-oriented research has direct implications for how entrepreneurship education should be designed and evaluated.

Mei, W., & Symaco, L. (2022). Students' entrepreneurial identity construction: Role and social identity influences. *SAGE Open*, 12(2). <https://doi.org/10.1177/21582440221089961>

Annotation: Mei and Symaco investigate the formation and transition of entrepreneurial identity among student-entrepreneurs in a Chinese research university, showing that identity construction is a dynamic, non-linear process involving both role identity (entrepreneur as a social category) and social identity (group belonging). They find that individual background, institutional support, and peer interaction all shape identity trajectories differently for different students. The paper argues that EE programmes must explicitly integrate identity issues into the curriculum rather than treating identity formation as an incidental outcome.

Relevance: This paper directly contributes to the identity-formation dimension of the entrepreneurial journey concept in Lens 2. Its demonstration of non-linearity and individuality in how students construct entrepreneurial identities provides empirical grounding for the heterogeneity of learner pathways in EE. The finding that identity formation responds differently to similar institutional conditions supports the need for process-oriented EE responsive to diverse learner contexts and backgrounds.

Politis, D. (2005). The process of entrepreneurial learning: A conceptual framework. *Entrepreneurship Theory and Practice*, 29(4), 399–424. <https://doi.org/10.1111/j.1540-6520.2005.00091.x>

Annotation: Politis synthesizes extant research on entrepreneurial learning into a conceptual framework portraying it as a continuous, experiential process. The framework identifies three main components: entrepreneurs' career experience, a transformation process (via exploration or exploitation modes), and the entrepreneurial knowledge outcomes of opportunity recognition and coping with newness. Career orientation and outcomes of previous events are identified as individual-level factors that shape how experience is transformed into knowledge.

Relevance: This landmark paper underpins the iterative, experience-driven view of the entrepreneurial learning trajectory central to Lens 2. By locating individual differences—career orientation, prior experience, reasoning logic—as key moderators of the transformation process, it provides theoretical grounding for the heterogeneity of learning pathways among entrepreneurship learners. It also supports a process-oriented rather than outcome-focused approach to entrepreneurship education.

Politis, D., Poček, J., & Gabrielsson, J. (2022). Entrepreneurial learning in extra-curricular start-up programs for students. *International Journal of Entrepreneurial Behavior & Research*, 28(2), 325–345. <https://doi.org/10.1108/IJEBR-04-2020-0206>

Annotation: Politis, Poček, and Gabrielsson investigate how students in extra-curricular start-up programmes learn entrepreneurship through social and situated practice. Using a communities-of-practice lens, they identify three interconnected components driving entrepreneurial learning—immersion, comprehension, and co-participation—and show how these enable students to expand both venture creation and enterprising competencies. The study highlights the co-constructed, relational nature of entrepreneurial learning in contexts beyond the formal curriculum.

Relevance: This recent paper extends Politis's 2005 framework into a contemporary educational setting, confirming that entrepreneurial learning trajectories are shaped by social participation and situated experience rather than linear instruction. The distinction between venture creation and enterprising competency outcomes speaks to the heterogeneity of learner aspirations—some oriented toward start-up, others toward broader enterprising careers. The study supports process-oriented EE that leverages authentic, relational learning contexts.

Rae, D. (2006). Entrepreneurial learning: A conceptual framework for technology-based enterprise. *Technology Analysis & Strategic Management*, 18(1), 39–56. <https://doi.org/10.1080/09537320500520494>

Annotation: Drawing on social constructionist perspectives and narrative discourse analysis of technology-based entrepreneurs, Rae develops a three-dimensional conceptual framework for entrepreneurial learning: personal and social emergence (formation of entrepreneurial identity), contextual learning (social and situated knowledge acquisition), and the negotiated enterprise (venture formation as a social negotiation). The framework demonstrates that entrepreneurial learning is fundamentally about identity formation, sense-making, and situated practice rather than mere skill acquisition.

Relevance: Rae's framework is a key seed reference for Lens 2, directly linking entrepreneurial learning trajectories to identity formation and the social context of practice. His emphasis on narrative, emergence, and 'becoming' an entrepreneur positions the entrepreneurial journey as inherently iterative and identity-shaping. The contextual and social dimensions of his framework also speak to the diversity of learner backgrounds and the multiple pathways through which entrepreneurial identity is negotiated.

Lens 3: Entrepreneurial Mindset — Ability–Willingness Nexus

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)

Annotation: Ajzen presents the Theory of Planned Behavior (TPB), arguing that behavioral intentions — shaped by attitudes, subjective norms, and perceived behavioral control (PBC) — are the immediate antecedents of behavior. PBC, which closely mirrors Bandura's self-efficacy concept, captures an individual's perceived ability to perform a given behavior. This framework became the dominant model for studying entrepreneurial intention, with PBC directly operationalizing the 'ability' side of the ability-willingness nexus.

Relevance: Foundational for all entrepreneurial intention research; PBC is the cognitive-competence proxy in the ability-willingness nexus, directly linking perceived capability to motivational readiness for entrepreneurial action. Seed reference for Fayolle, Liñán, and virtually all subsequent EE intention studies.

Bacigalupo, M., Kampylis, P., Punie, Y., & Van Den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*. Publications Office of the European Union. <https://doi.org/10.2791/160811>

Annotation: The EntreComp framework, developed by the European Commission's Joint Research Centre, defines entrepreneurship as a competence comprising 15 learnable sub-competences organized across three areas: Ideas and Opportunities, Resources, and Into Action. Critically, it includes self-efficacy-adjacent constructs (self-awareness, motivation, and perseverance) as core competences alongside cognitive skills, bridging the ability-willingness divide. With an 8-level progression model, it provides a structured framework for EE curriculum design.

Relevance: Offers a policy-level operationalization of the ability-willingness nexus in EE, classifying both cognitive competences (ability) and motivational/affective attributes (willingness) as learnable entrepreneurial mindset components. Widely adopted in European EE interventions and programme design.

Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.

Annotation: Bandura's landmark book articulates social cognitive theory of self-efficacy, defining it as beliefs about one's capacity to execute behaviors required to produce specific outcomes. It describes four sources of efficacy information — mastery experiences, vicarious learning, social persuasion, and physiological states — and demonstrates how efficacy beliefs regulate motivation, affect, cognition, and behavior. These mechanisms underpin every self-efficacy construct in entrepreneurship education.

Relevance: The foundational theoretical source for entrepreneurial self-efficacy (ESE) as the 'ability' dimension in the ability-willingness nexus; directly informs how EE interventions build cognitive competence and motivational readiness for entrepreneurial action.

Cardon, M. S., & Kirk, C. P. (2015). Entrepreneurial passion as mediator of the self-efficacy to persistence relationship. *Entrepreneurship Theory and Practice*, 39(5), 1027–1050.
<https://doi.org/10.1111/etap.12089>

Annotation: Using data from 129 entrepreneurs, Cardon and Kirk show that entrepreneurial passion fully mediates the relationship between self-efficacy and persistence — meaning that self-efficacy influences persistence because it intensifies passion for inventing and founding. The study demonstrates that affective states (passion) are the motivational bridge between cognitive competence (self-efficacy/ability) and sustained action (willingness/persistence). This reveals how the ability-willingness gap is bridged affectively.

Relevance: Provides direct empirical evidence for the interplay between the cognitive (self-efficacy/ability) and motivational (passion/willingness) dimensions of the entrepreneurial mindset, showing that affect mediates the ability-to-action pathway — central to EE mindset intervention design.

Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing*, 13(4), 295–316.
[https://doi.org/10.1016/S0883-9026\(97\)00029-3](https://doi.org/10.1016/S0883-9026(97)00029-3)

Annotation: Chen, Greene, and Crick develop and validate the Entrepreneurial Self-Efficacy (ESE) scale, showing that ESE (comprising innovation, marketing, management, risk-taking, and financial control dimensions) distinguishes entrepreneurs from managers more powerfully than locus of control. Their scale became the primary instrument for measuring entrepreneurial cognitive competence across subsequent decades of EE research. The paper grounds ESE in Bandura's social cognitive theory and links it to venture intentions.

Relevance: Provides the canonical measurement tool for the 'ability' side of the ability-willingness nexus — entrepreneurial self-efficacy as distinct cognitive competence for venture creation — making it essential for any EE intervention study assessing mindset development.

Fayolle, A., Liñán, F., & Moriano, J. A. (2014). Beyond entrepreneurial intentions: Values and motivations in entrepreneurship. *International Entrepreneurship and Management Journal*, 10(4), 679–689.
<https://doi.org/10.1007/s11365-014-0306-7>

Annotation: Fayolle, Liñán, and Moriano argue that entrepreneurial intentions alone are insufficient predictors of action, and that values, motivation, and identity must be integrated into intention models. Drawing on self-determination theory and social identity theory, they show that intrinsic motivation and entrepreneurial identity significantly predict intention beyond TPB constructs. The paper directly challenges the dominance of cognitive-only models and calls for a richer motivational account.

Relevance: Explicitly addresses the willingness side of the ability-willingness nexus by demonstrating that motivational readiness (values, identity, intrinsic motivation) supplements cognitive competence in driving entrepreneurial intention — directly informing how EE should target both ability and willingness simultaneously.

Haynie, J. M., Shepherd, D., Mosakowski, E., & Earley, P. C. (2010). A situated metacognitive model of the entrepreneurial mindset. *Journal of Business Venturing*, 25(2), 217–229.
<https://doi.org/10.1016/j.jbusvent.2008.10.001>

Annotation: Haynie and colleagues propose that the entrepreneurial mindset is fundamentally metacognitive — involving awareness of and control over one's own thinking in dynamic, uncertain environments. They introduce a situated metacognitive model showing that adaptive cognition (knowing how to know) drives entrepreneurial opportunity recognition and action. The model integrates cognitive competence with motivational engagement through feedback loops that regulate both thinking and effort.

Relevance: Directly models the entrepreneurial mindset as a learnable cognitive structure that integrates ability (metacognitive competence) with motivational regulation (willingness to adapt and persist), providing the theoretical foundation for EE interventions targeting both dimensions of the nexus simultaneously.

Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5–6), 411–432. [https://doi.org/10.1016/S0883-9026\(98\)00033-0](https://doi.org/10.1016/S0883-9026(98)00033-0)

Annotation: Krueger and colleagues empirically compare Ajzen's TPB and Shapero & Sokol's entrepreneurial event model as predictors of entrepreneurial intentions, finding that perceived desirability and perceived feasibility — including self-efficacy — are the primary drivers. The study establishes that entrepreneurial intention is cognitively mediated rather than trait-driven, making it responsive to educational intervention. It remains one of the most cited empirical tests of intention models in entrepreneurship.

Relevance: Directly addresses the ability-willingness nexus: 'perceived feasibility' maps onto cognitive competence/self-efficacy (ability), while 'perceived desirability' maps onto motivational readiness (willingness). Confirms the dual structure underpinning EE mindset interventions.

Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *International Entrepreneurship and Management Journal*, 11(4), 907–933. <https://doi.org/10.1007/s11365-015-0356-5>

Annotation: Liñán and Fayolle conduct a systematic review of 409 entrepreneurial intention papers published between 2004 and 2013, revealing that TPB and self-efficacy constructs dominate the field but that motivational antecedents (passion, identity, personal values) remain underexplored. They identify critical gaps around the intention-to-action transition and the role of educational contexts in shaping intention formation. The paper calls for longitudinal designs and richer psychological models.

Relevance: Directly maps the state of the field on entrepreneurial intention research, situating the ability-willingness nexus within a broader research agenda. Highlights self-efficacy as the dominant 'ability' construct while calling for more attention to motivational and identity-based 'willingness' drivers in EE.

Mawson, S., Casulli, L., & Simmons, E. L. (2022). A competence development approach for entrepreneurial mindset in entrepreneurship education. *Entrepreneurship Education and Pedagogy*, 5(4), 815–843. <https://doi.org/10.1177/25151274221143146>

Annotation: Mawson and colleagues conceptualize the entrepreneurial mindset (EM) as a learnable set of cognitive and emotional competences — not innate traits — that educators can develop through structured EE programming. They integrate growth mindset theory, self-efficacy, and emotional regulation (e.g., passion, empathy) into a competence development framework that explicitly bridges thinking and action. Practical guidance is offered for operationalizing EM in higher education settings.

Relevance: Provides the most current integrative framework for the ability-willingness nexus in EE, defining EM as encompassing both cognitive competences (ability) and emotional competences (willingness/motivation) as simultaneously developable through pedagogical intervention — directly applicable to PhD-level EE research.

Shepherd, D. A., Douglas, E. J., & Shanley, M. (2000). New venture survival: Ignorance, external shocks, and risk reduction strategies. *Journal of Business Venturing*, 15(5–6), 393–410. [https://doi.org/10.1016/S0883-9026\(98\)00032-9](https://doi.org/10.1016/S0883-9026(98)00032-9)

Annotation: Shepherd and colleagues examine how prior knowledge and capabilities moderate new venture survival under environmental shocks, showing that entrepreneurial competence — particularly domain-relevant knowledge — is a critical buffer against failure. The paper bridges ability and action, establishing that cognitive readiness shapes resilience outcomes. While pre-2015, it anchors Shepherd's extensive subsequent work on entrepreneurial learning, grief, and mindset.

Relevance: Establishes the competence-resilience link foundational to the ability-willingness nexus: cognitive capability (ability) mediates motivational persistence (willingness) under adversity, directly informing EE curriculum design for resilience and mindset development.

Shi, J., Zhang, J., & Sun, J. (2023). From entrepreneurship education to entrepreneurial intention: Mindset, motivation, and prior exposure. *Frontiers in Psychology*, 14, Article 954118. <https://doi.org/10.3389/fpsyg.2023.954118>

Annotation: Using large-scale SEM data from over 90,000 students across 100 Chinese universities, Shi and colleagues show that entrepreneurship education enhances entrepreneurial mindset, which in turn strengthens intention. Intrinsic motivation positively moderates the education-mindset-intention pathway, while extrinsic motivation negatively moderates it, demonstrating that motivational quality (not just quantity) shapes whether EE successfully converts cognitive readiness into entrepreneurial willingness. Prior entrepreneurial exposure amplifies all effects.

Relevance: Provides high-powered empirical evidence for the ability-willingness nexus: EE builds cognitive mindset (ability), but the conversion to entrepreneurial intention (willingness) is moderated by intrinsic motivation — showing that both dimensions must be cultivated together in EE programme design.

Lens 4: Zone of Proximal Development & Scaffolding

Belland, B. R., Kim, C., & Hannafin, M. J. (2013). A framework for designing scaffolds that improve motivation and cognition. *Educational Psychologist*, 48(4), 243–270.

Annotation: This conceptual framework paper argues that scaffolding has drifted from its roots as an equally motivational and cognitive construct. The authors propose an integrated design framework with six motivational scaffolding goals (establish task value, promote mastery goals, promote belonging, promote emotion regulation, promote expectancy for success, promote autonomy) and provide design guidelines for problem-based learning environments. The framework reconnects scaffolding to its sociocultural and motivational origins.

Relevance: Highly relevant to entrepreneurship education, where motivation, self-efficacy, and risk tolerance are as important as cognitive skill. The framework guides the design of scaffolded entrepreneurship programmes that address both the cognitive demands of venture creation and the affective dimensions of entrepreneurial identity formation.

Belland, B. R., Walker, A. E., Kim, N. J., & Lefler, M. (2017). Synthesizing results from empirical research on computer-based scaffolding in STEM education: A meta-analysis. *Review of Educational Research*, 87(2), 309–344.

Annotation: This comprehensive meta-analysis of 144 experimental studies (333 outcomes) finds that computer-based scaffolding produces a consistently positive effect on cognitive outcomes ($\bar{g} = 0.46$) across diverse learner populations, assessment levels, and scaffolding characteristics. Notably, the effectiveness of scaffolding did not differ significantly based on whether support was faded, added, or unchanged—challenging prior assumptions about fading's necessity. Effects were strongest among adult and college learners.

Relevance: Provides the empirical backbone for the use of scaffolded, problem-centred instructional approaches in higher education and entrepreneurship education. The finding that scaffolding is robustly effective for adult learners supports its application in university-level entrepreneurship programmes, and the analysis of fading informs design decisions about when and how to withdraw instructional support.

Doo, M. Y., Bonk, C. J., & Heo, H. (2020). A meta-analysis of scaffolding effects in online learning in higher education. *International Review of Research in Open and Distributed Learning*, 21(3), 60–81.

Annotation: This meta-analysis of 18 studies (64 effect sizes) from 2010–2019 shows that scaffolding in online higher education environments produces a large, statistically significant effect on learning outcomes ($g = 0.866$). Metacognitive scaffolding yielded larger effects than cognitive or affective scaffolding. Computer-based scaffolding was more prevalent than instructor scaffolding as a delivery mode, and language/literacy studies had adopted scaffolding most widely among academic disciplines.

Relevance: Establishes the effectiveness of scaffolding specifically in higher education contexts, including online and blended delivery models increasingly used in entrepreneurship education. The large effect size supports the case for scaffolded course design, and the metacognitive scaffolding findings are relevant to entrepreneurship education's emphasis on reflective learning and self-regulation.

Hermkes, R., Minnameier, G., & Heuer-Kinscher, M. (2022). A processual perspective on whole-class-scaffolding in business education. *International Journal for Research in Vocational Education and Training*, 9(2), 216–238.

Annotation: This paper develops a measurement method for process-adaptive scaffolding in whole-class business education settings, integrating scaffolding principles with dialogic teaching. The study shows that scaffolding in business/vocational contexts goes beyond individual learner support to include heterogeneous groups with varying support needs simultaneously. Findings demonstrate that scaffolding positively affects classroom satisfaction, motivation, and knowledge acquisition in business education.

Relevance: One of the few papers to apply scaffolding theory directly to business education contexts, making it directly applicable to entrepreneurship education in higher education settings. The processual and dialogic framing aligns with entrepreneurship pedagogy that emphasises co-creation of knowledge in cohort-based programmes.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, 42(2), 99–107.

Annotation: This influential response paper argues that problem-based and inquiry learning are not minimally-guided but employ extensive scaffolding to reduce cognitive load and support students in complex domains. The authors demonstrate that PBL scaffolds learning by situating it in authentic tasks within students' ZPD, and review empirical evidence showing PBL produces deep learning and significant achievement gains. They identify how scaffolding in PBL supports sense-making, process management, and articulation.

Relevance: Directly bridges ZPD theory, scaffolding, and project/problem-based learning—the pedagogical model most commonly used in entrepreneurship education. Provides the theoretical rationale for scaffolding in venture creation projects, where students engage in authentic but complex entrepreneurial tasks that require calibrated instructor support.

Margolis, A. A. (2020). Zone of Proximal Development, scaffolding and teaching practice. *Cultural-Historical Psychology*, 16(3), 15–26.

Annotation: This conceptual paper revisits Vygotsky's original ZPD construct, contrasting it with Bruner's scaffolding metaphor and examining how ZPD can be operationalised in teaching activity. The author argues that constructing a ZPD requires conditions for collectively distributed learning actions and a Socratic polylogue that enables the externalisation and internalisation of spontaneous concepts. The paper offers a reinterpretation of teaching activity as the deliberate construction of ZPD conditions rather than merely offering support.

Relevance: Provides a theoretically refined reading of the ZPD-scaffolding relationship, moving beyond the simple 'support and fade' model to examine how learning environments can be designed to actively construct developmental zones. This has direct implications for entrepreneurship education programme design that seeks to create transformative learning experiences rather than merely supportive ones.

Martin, N. D., Tissenbaum, C. D., Gnesdilow, D., & Puntambekar, S. (2019). Fading distributed scaffolds: The importance of complementarity between teacher and material scaffolds. *Instructional Science*, 47(1), 69–98.

Annotation: This study examines 'distributed scaffolding'—support spread across curriculum materials and the teacher—in two middle-school science classrooms. It demonstrates that when material scaffolds faded, student outcomes depended critically on whether teachers provided responsive (adaptive) or static support. The teacher who monitored understanding and adapted her moves maintained student performance through fading phases; the teacher who replicated static materials led to significant performance decline.

Relevance: Directly addresses the fading mechanism in scaffolded learning, showing that adaptive teacher behaviour is essential when structural supports are removed—precisely the challenge faced in entrepreneurship courses that use staged project templates or frameworks which are gradually withdrawn as students develop independence.

Oliver, P. G., & Oliver, S. (2022). Innovative online learning in entrepreneurship education: The impact of embedding real-life industry practice in the virtual learning environment. *Industry and Higher Education*, 36(6), 756–767.

Annotation: This case study explores how educational scaffolding can facilitate the delivery of online experiential activities in a postgraduate music management/entrepreneurship programme, using VLE tools (breakout rooms, chat functions, discussion boards) as scaffolding mechanisms. The authors find that digital scaffolds embedded within the learning environment support real-time adaptive facilitation, enabling tutors to calibrate their support contingently during role-play and masterclass activities. The study illustrates how scaffolding principles translate into entrepreneurship-specific online pedagogy.

Relevance: One of the rare studies to directly apply scaffolding theory to entrepreneurship education, demonstrating how the ZPD and contingent support principles operate in experiential entrepreneurship learning contexts. Particularly relevant to PhD research on scaffolded entrepreneurship pedagogy in higher education.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.

Annotation: Vygotsky introduces the Zone of Proximal Development (ZPD) as the distance between what a learner can achieve independently and what can be achieved with expert guidance or more capable peer collaboration. He argues that learning is inherently social and culturally mediated, and that effective instruction must operate within this developmental zone. The concept foregrounds the fundamental role of social interaction and mediation in cognitive development.

Relevance: The foundational theoretical source for the ZPD construct. All scaffolding theory and adaptive instructional support in entrepreneurship education is grounded in Vygotsky's sociocultural framework; the ZPD defines precisely the space in which entrepreneurship educators scaffold learners from novice towards entrepreneurial competence.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100.

Annotation: This landmark paper introduces the concept of 'scaffolding' as a metaphor for the support a more knowledgeable other provides to enable a learner to accomplish a task they could not complete alone. The authors identify six key scaffolding functions: recruitment, reduction in degrees of freedom, direction maintenance, marking critical features, frustration control, and demonstration. Crucially, they introduce the contingent shift principle—instructors should increase control when learners fail and decrease control when they succeed.

Relevance: The original articulation of scaffolding as an instructional construct, directly rooted in Vygotsky's ZPD. The contingency principle and the six scaffolding functions are foundational to designing adaptive support systems in entrepreneurship education, where facilitators must calibrate guidance to each student's developing entrepreneurial competence.

van de Pol, J., Mercer, N., & Volman, M. (2019). Scaffolding student understanding in small-group work: Students' uptake of teacher support in subsequent small-group interaction. *Journal of the Learning Sciences*, 28(2), 206–239.

Annotation: Using mixed methods with 35 secondary lessons, this study investigates how scaffolding promotes learning by examining students' 'uptake' of teacher support in subsequent small-group work. It finds that when students apply (rather than ignore) teacher support, their accuracy improves significantly, and that gradually faded contingent support is most effective in fostering uptake. Premature fading is identified as a key mechanism that can undermine learning even when support is contingent.

Relevance: Illuminates the micro-mechanism by which adaptive scaffolding translates into learning outcomes—particularly relevant in entrepreneurship education where facilitators work with student teams, and the timing of support withdrawal (fading) critically affects whether entrepreneurial skills are internalised or remain dependent on external guidance.

van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher–student interaction: A decade of research. *Educational Psychology Review*, 22(3), 271–296.

Annotation: This comprehensive review synthesises a decade of empirical research on instructional scaffolding, proposing a three-characteristic definition: contingency (adapting support to learner understanding), fading (withdrawing support as competence grows), and transfer of responsibility (shifting ownership to the learner). The paper identifies scaffolding means (questioning, explaining, modelling, feedback, instructing, telling) and distinguishes between diagnostic and supportive strategies. It reveals a persistent gap between theoretical ideals and actual classroom practice.

Relevance: The most widely cited contemporary scaffolding framework. Provides the operational definition of scaffolding—contingency, fading, and transfer—that maps directly onto adaptive mentoring and facilitation practices in entrepreneurship education, where instructors must diagnose student entrepreneurial readiness and calibrate support accordingly.

van de Pol, J., Volman, M., Oort, F., & Beishuizen, J. (2015). The effects of scaffolding in the classroom: Support contingency and student independent working time in relation to student achievement, task effort and appreciation of support. *Instructional Science*, 43(5), 615–641.

Annotation: This experimental classroom study with 768 secondary students examined the combined effect of scaffolding contingency and independent working time, finding that the effectiveness of contingent versus non-contingent support depends critically on how much time students have for independent work. High contingent support was most effective when independent working time was higher, while low contingent support was better when help was very frequent. The study is among the first fully experimental tests of scaffolding in authentic classroom conditions.

Relevance: Provides empirical evidence on the conditions under which scaffolding produces learning gains, with direct implications for designing entrepreneurship courses where project-based independent work alternates with instructor feedback. Highlights that fading and pacing of support must be calibrated to the task's autonomy demands—a critical design parameter in venture creation programmes.

Lens 5: Personal–Professional Knowledge of Educators

Berger, J.-L., & Lê Van, K. (2019). Teacher professional identity as multidimensional: Mapping its components and examining their associations with general pedagogical beliefs. *Educational Studies*, 45(2), 163–181. <https://doi.org/10.1080/03055698.2018.1446324>

Annotation: This survey study of 236 secondary teachers maps teacher professional identity as multidimensional — encompassing self-efficacy beliefs, motivation, affective commitment, and type of expertise — and tests associations with constructivist versus direct-transmission pedagogical beliefs. Multidimensional scaling reveals that direct-transmission beliefs are tightly coupled with subject-specific identity, while constructivist beliefs are independent of identity components. The study provides empirical architecture for understanding how professional identity shapes pedagogical orientations.

Relevance: Establishes the empirical architecture of professional identity and its relationship to pedagogical beliefs — the core analytical layer for a PPK framework studying how identity components predispose teachers to different modes of instructional enactment.

Clayback, K. A., Williford, A. P., & Vitiello, V. E. (2023). Identifying teacher beliefs and experiences associated with curriculum implementation fidelity in early childhood education. *Prevention Science*, 24(1), 27–38. <https://doi.org/10.1007/s11121-022-01414-z>

Annotation: This implementation science study of 87 early childhood educators finds that teachers with more positive initial perceptions of a new curriculum consistently show higher implementation fidelity across dosage and responsiveness measures; teacher stress and centre climate show context-dependent effects. Individual teacher beliefs are identified as malleable targets for improving fidelity. The study extends implementation fidelity research into early childhood by foregrounding the educator's belief system as a proximal driver.

Relevance: Directly evidences how teacher beliefs — a core component of PPK — determine the degree to which pedagogical innovations are enacted with fidelity versus adaptation, and how institutional context (centre climate) moderates this relationship.

Ilonen, S. (2021). Creating an entrepreneurial learning environment for entrepreneurship education in HE: The educator's perspective. *Industry and Higher Education*, 35(4), 518–530. <https://doi.org/10.1177/09504222211020637>

Annotation: This qualitative study investigates how HE entrepreneurship educators conceptualise and create entrepreneurial learning environments, finding that educators emphasise adjustable co-creation, team-based structures, and alignment with individual teaching philosophy. The educator's own beliefs about learning and autonomy fundamentally shape the environments they construct. The study argues for attending to educator subjectivity as a central variable in EE environment design.

Relevance: Illuminates how the educator's personal philosophy and subjective beliefs operationally shape learning environment construction in EE — a direct expression of personal practical knowledge as pedagogical enactment.

Joensuu-Salo, S., Hämäläinen, M., Peltonen, K., & Raappana, A. (2024). The temporal development of teachers' attitudes on entrepreneurship education: A latent growth curve analysis. *Teaching and Teacher Education*, 144, 104600. <https://doi.org/10.1016/j.tate.2024.104600>

Annotation: Using latent growth curve modelling on three-wave longitudinal data (n = 204 Finnish UAS teachers), this study reveals notable individual variation in teachers' attitudes towards EE and their stability over three years. Prior entrepreneurship-related training and perceived university support positively shape attitude formation, and attitudes tend to persist once established. The research emphasises the importance of early career support for shaping enduring teacher dispositions toward EE.

Relevance: Directly maps the longitudinal stability of EE-related teacher beliefs and attitudes — a critical dimension of PPK — demonstrating how personal professional histories and institutional support interact to fix or shift pedagogical dispositions over time.

Oksanen, L., Oikkonen, E., & Pihkala, T. (2022). Adopting entrepreneurship education: Teachers' professional development. *Entrepreneurship Education and Pedagogy*, 6(2), 264–291. <https://doi.org/10.1177/25151274221091698>

Annotation: This longitudinal quantitative study (n = 309 Finnish teachers, two time-points) tracks change in EE practices across time, revealing three distinct teacher profiles — EE experimenters, EE critics, and EE selectors — each representing different stages of professional adoption. Institutional and social support are shown to mediate the trajectory of adoption, with introductory-stage support insufficient for sustained practice change. The study introduces an EE teacher typology grounded in professional development theory.

Relevance: Provides empirical evidence for variation in how teachers personally adopt and sustain entrepreneurship education practices, with institutional support and individual professional identity as explanatory factors — core PPK territory.

Peura, K., & Hytti, U. (2023). Identity work of academic teachers in an entrepreneurship training camp: A sensemaking approach. *Education + Training*, 65(4), 548–563. <https://doi.org/10.1108/ET-06-2021-0203>

Annotation: Through a sensemaking lens, this paper inductively analyses how academic teachers engage in identity work when confronted with entrepreneurship pedagogy in a training camp, revealing tensions between scholarly and entrepreneurial identities. Teachers make sense of entrepreneurship by alternating between distancing and embracing moves, and the institutional context of academia mediates their identity negotiations. The study shows that EE adoption is inseparable from the teacher's ongoing professional identity construction.

Relevance: Provides in-depth qualitative evidence of how professional identity, personal values, and institutional norms interact to shape how (and whether) educators enact entrepreneurship education — a microcosm of the PPK personal-professional dimension.

Raappana, A., Oikkonen, E., Peltonen, K., Hämäläinen, M., & Joensuu-Salo, S. (2021). Entrepreneurial teachers do make a difference – Or do they? *Industry and Higher Education*, 35(4), 536–546. <https://doi.org/10.1177/0950422220983236>

Annotation: This study investigates whether teachers' own innovativeness and risk tolerance are related to the breadth of entrepreneurial teaching methods used. Results confirm that more innovative and risk-taking teachers vary their methods more widely, while lower innovativeness predicts a narrower, more conservative pedagogical repertoire. The paper provides rare quantitative evidence linking teacher personal dispositions to entrepreneurial pedagogy variation.

Relevance: Provides direct empirical evidence that personal characteristics — specifically risk tolerance and innovativeness — constitute elements of the educator's personal-professional knowledge that shape how entrepreneurship education is enacted in classrooms.

Ruskovaara, E., & Pihkala, T. (2013). Teachers implementing entrepreneurship education: Classroom practices. *Education + Training*, 55(2), 204–216. <https://doi.org/10.1108/00400911311304832>

Annotation: This quantitative study of 521 Finnish teachers maps the entrepreneurship education (EE) practices used in basic and upper secondary education, revealing wide variation in how teachers implement EE in their classrooms. Findings show that teacher training in EE is the strongest predictor of practice breadth, and that teachers' own self-perceived skills in EE are closely linked to implementation frequency. The study underscores that pedagogical enactment in EE is highly personal and shaped by individual teacher background rather than institutional mandate.

Relevance: A foundational empirical benchmark for understanding how individual teacher characteristics — particularly personal EE skills and training histories — determine the range and depth of entrepreneurship pedagogical practice, directly mirroring the PPK concept of knowledge-in-action.

Ruskovaara, E., & Pihkala, T. (2015). Entrepreneurship education in schools: Empirical evidence on the teacher's role. *The Journal of Educational Research*, 108(3), 236–249. <https://doi.org/10.1080/00220671.2013.878301>

Annotation: Building on the 2013 study, this article analyses how teacher-specific factors — such as training, participation in planning, and personal capability — are significantly more influential on EE practice than demographic or tenure characteristics. The research provides compelling evidence that what teachers believe they are capable of (self-efficacy) determines the scope of their entrepreneurial pedagogy. It challenges deficit-based professional development models and points to the need for belief-focused teacher support in EE.

Relevance: Directly evidences the relationship between teacher self-beliefs, personal capabilities, and pedagogical enactment in EE contexts, aligning with PPK frameworks that foreground subjective, experiential knowledge as the engine of practice.

Ruskovaara, E., Hämäläinen, M., & Pihkala, T. (2016). HEAD teachers managing entrepreneurship education: Empirical evidence from general education. *Teaching and Teacher Education*, 55, 155–164. <https://doi.org/10.1016/j.tate.2016.01.004>

Annotation: This study examines how school principals manage and enable EE implementation, demonstrating that institutional leadership norms and principal development activities significantly predict the level of EE practice in schools. Enterprise-related training for principals, rather than personal entrepreneurial background, is the key driver of institutional EE culture. The study reveals how organisational and leadership contexts shape the conditions under which teachers enact EE.

Relevance: Positions institutional norms and managerial support as shapers of pedagogical enactment in EE, showing how the personal-professional knowledge of school leaders interacts with classroom teacher practice — a key contextual layer for PPK analysis.

Wraae, B., Brush, C., & Nikou, S. (2023). Entrepreneurship educators: A configurational analysis of factors influencing pedagogical choices. *International Journal of Entrepreneurial Behavior & Research*, 29(3), 717–740. <https://doi.org/10.1108/IJEBR-08-2022-0760>

Annotation: Using fuzzy-set comparative qualitative analysis (fsQCA) on data from 289 global entrepreneurship educators, this study identifies multiple pathways that lead to teacher-centric versus student-centric pedagogical models. Self-efficacy, teaching philosophy, entrepreneurship training, and teaching experience interact in distinct configurations — and gender further moderates these configurations. The study demonstrates that no single factor determines pedagogical preferences; instead, personal-professional knowledge operates through complex combinatorial logic.

Relevance: Directly investigates how entrepreneurship educators' self-efficacy, personal philosophy, and professional background jointly determine their pedagogical choices — a configurational account of PPK in EE.

Wraae, B., Jones, C., & Hägg, G. (2025). Who is the entrepreneurial educator? A transferability perspective to tease out antecedents needed to form a signature pedagogy. *International Journal of Entrepreneurial Behavior & Research*, 31(8), 1988–2007. <https://doi.org/10.1108/IJEBR-07-2023-0672>

Annotation: This conceptual paper uses evolutionary theory and transferability to problematise the diversity of who teaches entrepreneurship education — identifying four archetypes (experienced entrepreneur, entrepreneurship scholar, academic scholar, pedagogical expert) and arguing that variability among educators creates the antecedents for signature pedagogies. The paper highlights how identity, background, and personal knowledge transfer differently into pedagogical practice across educator types. It calls for recognising educator variability as a resource for legitimising EE.

Relevance: Theorises how the personal-professional knowledge and identity of different educator types shapes the possibility space for entrepreneurship pedagogy, directly addressing how individual backgrounds generate pedagogical variation in EE.

Lens 6: Learning as a Triadic Process (Illeris)

Bell, R., & Bell, H. (2020). Applying educational theory to develop a framework to support the delivery of experiential entrepreneurship education. *Journal of Small Business and Enterprise Development*, 27(6), 987–1004. <https://doi.org/10.1108/JSBED-01-2020-0012>

Annotation: The authors integrate constructivism, Kolb's experiential learning cycle, Schön's reflection-in-action, and Mezirow's transformative learning to build a three-stage pedagogical framework (pre-experience, experience, post-experience) for entrepreneurship educators in further and higher education. The framework addresses cognitive knowledge acquisition, experiential and reflective processing, and transformative meaning-making, all of which correspond to the triadic dimensions. Empirical implications for educator practice are discussed.

Relevance: This paper operationalises holistic, multi-dimensional learning theory (closely aligned with Illeris's triadic model) within entrepreneurship education, providing a concrete bridge between the theoretical framework of Lens 6 and pedagogical practice. Its explicit engagement with transformative learning as part of entrepreneurship education makes it a strong empirical anchor for the thesis.

Eschenbacher, S., & Fleming, T. (2020). Transformative dimensions of lifelong learning: Mezirow, Rorty and COVID-19. *International Review of Education*, 66(5–6), 657–672. <https://doi.org/10.1007/s11159-020-09859-6>

Annotation: The article uses the COVID-19 disorienting dilemma to update and critique Mezirow's transformation theory, drawing on Rorty's philosophy to argue that transformative learning must be emotionally grounded and dialogically situated rather than purely rational. It addresses the emotional-motivational dimension of transformation (directly paralleling Illeris's incentive dimension) and calls for richer social-interactional theories of adult learning. Published in the International Review of Education (sister journal to IJLE), it bridges Mezirow and lifelong learning scholarship.

Relevance: This post-2015 paper demonstrates how transformative learning theory is being actively updated to incorporate the emotional and social-interactional dimensions stressed by Illeris, making it highly relevant for

triangulating the triadic model with transformative learning literature in a PhD thesis on entrepreneurship education.

Illeris, K. (2003). Towards a contemporary and comprehensive theory of learning. *International Journal of Lifelong Education*, 22(4), 396–406. <https://doi.org/10.1080/02601370304837>

Annotation: This foundational article introduces Illeris's triadic learning model, arguing that all learning involves two interlocking processes—external interaction with the environment and internal acquisition—spanning three irreducible dimensions: the cognitive (content), the emotional/motivational (incentive), and the social (interaction). The model is constructed as a theoretical 'umbrella' that accommodates existing learning theories while adding four levels of learning depth. It is the seminal peer-reviewed articulation of the framework underpinning the author's subsequent books.

Relevance: The article is the primary journal source for the triadic structure at the core of Illeris's model. It directly defines the cognitive, incentive, and interaction dimensions that are the theoretical spine of Lens 6, providing the vocabulary and conceptual scaffolding for applying the model to entrepreneurship education contexts.

Illeris, K. (2007). *How we learn: Learning and non-learning in school and beyond*. Routledge. <https://doi.org/10.4324/9780203939895>

Annotation: This comprehensive book elaborates the full triadic model across nine thematic chapters—content, incentive, and interaction—situating each within a broad overview of learning theory, brain science, motivation, gender, and socio-cultural context. Illeris introduces four learning types (cumulative, assimilative, accommodative, and transformative) and explores how barriers to learning emerge when any one dimension is blocked. The text synthesises insights from Piaget, Vygotsky, Freud, and Wenger under a unified constructivist architecture.

Relevance: As the most widely cited English-language exposition of the three-dimensional model, this book supplies the detailed theoretical grounding for each pole of the triadic triangle—knowledge/skills (content), emotions/motivation (incentive), action/communication/cooperation (interaction)—making it essential for framing learning in entrepreneurship education programmes.

Illeris, K. (2014). Transformative learning re-defined: as changes in elements of the identity. *International Journal of Lifelong Education*, 33(5), 573–586. <https://doi.org/10.1080/02601370.2014.917128>

Annotation: Illeris argues that transformative learning should be re-defined as changes in the learner's identity rather than in Mezirow's 'frames of reference' or 'habits of mind', because identity encompasses the cognitive, emotional, and social dimensions simultaneously. The article explains how liquid modernity creates continuous pressure for identity change and why this makes transformative learning a central challenge for adult and higher education. It distinguishes between assimilative, accommodative, and genuinely transformative learning processes within the triadic framework.

Relevance: This article links Illeris's triadic model directly to the concept of identity transformation, which is directly relevant to entrepreneurship education where learners develop an entrepreneurial self. It appears in the International Journal of Lifelong Education—one of the target journals—and bridges cognitive, motivational, and social change.

Illeris, K. (2016). *Learning, development and education: From learning theory to education and practice*. Routledge. <https://doi.org/10.4324/9781315620565>

Annotation: This book bridges the gap between Illeris's theoretical model and its application to educational design. It discusses the triadic dimensions—emotional, cognitive, and social—through the lens of youth and adult development, competence development, and teaching practice, providing practical frameworks for curriculum designers. The text addresses how teachers and learners co-construct learning environments that stimulate all three dimensions, drawing on Illeris's four-type learning typology.

Relevance: This work is essential for applying the triadic model to entrepreneurship course design, directly addressing how the incentive (motivation/emotion), content (cognitive), and interaction (social environment) dimensions should be consciously activated in higher education pedagogical settings.

Illeris, K. (2018b). A comprehensive understanding of human learning. In K. Illeris (Ed.), *Contemporary theories of learning: Learning theorists ... in their own words* (2nd ed., pp. 1–19). Routledge. <https://doi.org/10.4324/9781315147277-1>

Annotation: This chapter presents the most updated distillation of Illeris's triadic model, refining the earlier language so that 'incentive' explicitly encompasses feelings, emotions, motivation, and volition, and 'interaction' incorporates perception, transmission, experience, imitation, activity, and participation. The chapter retains the triangular diagram connecting individual, content, incentive, and environment, and updates it with advances in neurological research and competence theory. It also clarifies the relationship between triadic learning and transformative learning.

Relevance: The 2018 version is the most recent authoritative statement of the triadic model (meeting the post-2015 preference). It explicitly connects the incentive dimension to entrepreneurial motivation and volition, and the interaction dimension to the social environments central to entrepreneurship education pedagogy.

Illeris, K. (2018b). An overview of the history of learning theory. *European Journal of Education*, 53(1), 86–101. <https://doi.org/10.1111/ejed.12265>

Annotation: Written at the end of nearly five decades of engagement with learning theory, this article positions Illeris's triadic model within the broader intellectual trajectory from behaviourism through cognitivism, social constructivism, and neuroscience, explaining why a multi-dimensional synthesis was necessary. It reviews the key traditions that fed each of the three dimensions—Piaget and schema theory (content), psychoanalytic and motivational psychology (incentive), and situated learning theory (interaction)—and evaluates their explanatory limits when taken alone.

Relevance: By contextualising the triadic model historically, this article allows PhD researchers to situate Illeris's framework relative to competing theories, strengthening the theoretical justification for using it as an analytical lens in entrepreneurship education studies.

Jarvis, P. (2006). *Towards a comprehensive theory of human learning*. Routledge.
<https://doi.org/10.4324/9780203001677>

Annotation: Jarvis proposes a holistic model of human learning rooted in existential philosophy and lifelong learning theory, in which the whole person—body, mind, and self—engages with the social world in response to disjuncture (perceived mismatches between experience and expectation). Unlike cognitivist theories, Jarvis's model places embodied experience and social relationships as the primary sources of learning, with emotion and meaning-making central to the acquisition process. The book argues for lifelong learning as a fundamentally social and biographical process.

Relevance: As one of the seed authors for Lens 6, Jarvis provides a parallel holistic model to Illeris's triadic framework. His concept of disjuncture maps onto Illeris's incentive dimension (motivational disturbance), while his emphasis on social participation parallels the interaction dimension, enabling productive comparative theorising in entrepreneurship education research.

Lackéus, M. (2020). Comparing the impact of three different experiential approaches to entrepreneurship in education. *International Journal of Entrepreneurial Behavior & Research*, 26(5), 937–971.
<https://doi.org/10.1108/IJEBR-04-2018-0236>

Annotation: Based on 10,953 emotional learning events collected from 1,048 students across 35 settings, this mixed-methods study compares the outcomes of idea-creation, value-creation, and venture-creation pedagogies, finding that value-creation pedagogy produces the strongest effects on entrepreneurial competencies, student motivation, and knowledge acquisition. The study explicitly attributes outcome differences to variation in emotional learning events and the quality of purposeful social interaction, directly implicating the incentive and interaction dimensions of the triadic model.

Relevance: This high-quality empirical study demonstrates how the emotional-motivational (incentive) and social (interaction) dimensions—core components of Illeris's triadic model—drive differential learning outcomes in entrepreneurship education. It provides direct evidence supporting the thesis argument that holistic, multi-dimensional learning design produces superior entrepreneurial competence development.

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. Jossey-Bass.

Annotation: This edited volume, introducing and elaborating Mezirow's transformation theory, argues that adult learning involves critical reflection on and revision of meaning structures—premises, beliefs, and habits of mind acquired through prior experience. Mezirow and contributors address the cognitive, emotional, and social prerequisites for transformative learning, exploring discourse, critical reflection, and disorienting dilemmas as mechanisms of change. The book also engages critiques about the theory's neglect of emotion and social context.

Relevance: Mezirow's transformative learning theory is one of the two key seed frameworks (alongside Illeris) for Lens 6. It maps onto the incentive dimension (disorienting emotion as a catalyst) and the interaction dimension (transformative discourse with others), and its limitations in handling the social dimension invite comparison with Illeris's more holistic triadic model.

Politis, D., Poček, J., & Gabrielsson, J. (2021). Entrepreneurial learning in extra-curricular start-up programs for students. *International Journal of Entrepreneurial Behavior & Research*, 27(6), 1547–1570. <https://doi.org/10.1108/IJEBR-04-2020-0206>

Annotation: Using a grounded theory approach, this study examines how students in extra-curricular start-up programs learn through immersion, comprehension, and co-participation in entrepreneurship as a social practice. It produces a process model in which social learning and situated interaction progressively expand students' knowledge structures and self-confidence. The study highlights that cognitive knowledge gains are inseparable from affective and social-contextual experiences, affirming a triadic structure of learning in entrepreneurial settings.

Relevance: This study directly evidences all three Illeris dimensions in action in entrepreneurship education: cognitive knowledge building (content dimension), motivational development (incentive dimension), and community co-participation (interaction dimension), providing rich empirical grounding for applying the triadic model to PhD research on entrepreneurship education.

Lens 7: SECI Knowledge Conversion Model

Brix, J. (2017). Exploring knowledge creation processes as a source of organizational learning: A longitudinal case study of a public innovation project. *Scandinavian Journal of Management*, 33(2), 113–127. <https://doi.org/10.1016/j.scaman.2017.05.001>

Annotation: This longitudinal, participatory case study reestablishes the theoretical link between organizational learning and knowledge creation—streams that had been pursued separately for two decades. Using the SECI model as an analytical lens in a Danish public-sector innovation project, Brix develops eight propositions about how knowledge creation processes generate organizational learning across individual, group, and organizational levels. The study demonstrates the practical applicability of the SECI framework in non-corporate settings.

Relevance: Bridges organizational learning theory and the SECI knowledge creation model—highly relevant for a PhD thesis framing SECI as an explanation for how entrepreneurship education programs generate new competences and transform knowledge across learning levels.

Farnese, M. L., Barbieri, B., Chirumbolo, A., & Patriotta, G. (2019). Managing knowledge in organizations: A Nonaka's SECI model operationalization. *Frontiers in Psychology*, 10, Article 2730. <https://doi.org/10.3389/fpsyg.2019.02730>

Annotation: This empirical study develops and validates the Knowledge Management SECI Processes Questionnaire (KMSP-Q), an eight-dimensional psychometric instrument designed to capture the four SECI knowledge conversion modes in organizational work contexts. Across two studies involving 838 employees, the authors demonstrate the instrument's reliability and construct validity, and show that each SECI dimension predicts distinct organizational outcomes such as performance, innovativeness, and collective efficacy. It is the first rigorous empirical operationalization of the SECI model.

Relevance: Provides empirical grounding for the SECI model, demonstrating that socialization, externalization, combination, and internalization are measurable and produce distinct organizational and learning outcomes—directly applicable to entrepreneurship education assessment frameworks.

Hu, J., Lee, J., & Yi, X. (2023). Blended knowledge sharing model in design professional. *Scientific Reports*, 13, Article 16407. <https://doi.org/10.1038/s41598-023-43505-z>

Annotation: Grounded in the SECI model, this study develops a Blended Knowledge Sharing Activity (BKSA) model for design practitioners in higher education and empirically tests its effect on learning outcomes and creativity. Results show a significant positive correlation between BKSA participation and both academic achievement and creative output, demonstrating that SECI-based knowledge sharing activities—which blend tacit socialization with explicit combination—meaningfully enhance student competence. The paper identifies SECI as underrepresented in design education research.

Relevance: Provides a direct post-2015 empirical test of the SECI model in a higher education competence-development context, paralleling how entrepreneurship education could use SECI-based blended activities to develop entrepreneurial knowledge and creativity.

Jing, Z. (2022). Research on the influence of invisible knowledge learning in online learning on students' entrepreneurial orientation. *International Journal of Emerging Technologies in Learning*, 17(2), 34–47. <https://doi.org/10.3991/ijet.v17i02.28543>

Annotation: This study applies the SECI model to investigate how tacit (invisible) knowledge learning in e-learning environments affects students' entrepreneurial orientation, proposing four SECI-based hypotheses about the sociality, dominance, and recessiveness dimensions of tacit knowledge in online entrepreneurship contexts. Structural equation modelling confirms that tacit knowledge learning positively influences entrepreneurial orientation, with socialization-type learning processes proving most impactful. E-learning familiarity is identified as a significant moderating variable.

Relevance: Directly links the SECI model to entrepreneurship education by demonstrating that SECI knowledge conversion processes—particularly socialization and internalization—shape students' entrepreneurial orientation, making it a key reference for the entrepreneurship education strand of the thesis.

Kim, E., & Wang, J. (2023). The development and validation of an instrument to collaborative teaching assessment under the impact of COVID-19 through the SECI model. *Sustainability*, 15(12), Article 9540. <https://doi.org/10.3390/su15129540>

Annotation: This study develops and validates a SECI-based questionnaire for assessing collaborative teaching quality in transnational higher education during COVID-19, incorporating information technology utilization as a fifth dimension added to the four SECI knowledge conversion processes. Quantitative findings confirm that the SECI model effectively maps onto dimensions of collaborative pedagogical knowledge creation and transfer. The study demonstrates SECI's adaptability to digital and hybrid educational environments.

Relevance: Provides a recent, empirically validated application of the SECI model specifically in higher education teaching and knowledge creation, demonstrating how socialization, externalization, combination, and internalization processes operate in collaborative learning—directly applicable to entrepreneurship education design.

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37. <https://doi.org/10.1287/orsc.5.1.14>

Annotation: This landmark paper proposes a paradigm for managing dynamic organizational knowledge creation through a continuous dialogue between tacit and explicit knowledge. Nonaka identifies four patterns of interaction (socialization, externalization, combination, and internalization) that form the SECI model, and argues organizations amplify and articulate knowledge created by individuals through a knowledge spiral. The theoretical framework constitutes one of the most cited works in knowledge management.

Relevance: This is the foundational paper that formally introduced the SECI model (Socialization, Externalization, Combination, Internalization) and the tacit–explicit knowledge conversion concept. It is the core theoretical reference for any research applying SECI to learning or entrepreneurship contexts.

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.

Annotation: This seminal book elaborates the SECI model within a full theory of organizational knowledge creation, distinguishing tacit from explicit knowledge and describing how knowledge conversion spirals across ontological levels—individual, group, organization, and inter-organization. Drawing on cases from leading Japanese firms, Nonaka and Takeuchi show how knowledge creation drives sustained competitive innovation. The work remains the single most-cited source in knowledge management scholarship.

Relevance: Provides the full theoretical elaboration of the SECI spiral and the concept of 'Ba' (shared knowledge space), directly underpinning research on knowledge creation in education and entrepreneurial learning contexts.

Nonaka, I., & von Krogh, G. (2009). Perspective—Tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory. *Organization Science*, 20(3), 635–652. <https://doi.org/10.1287/orsc.1080.0412>

Annotation: Nonaka and von Krogh respond to scholarly critiques of the original SECI model by synthesizing six fundamental questions about organizational knowledge creation theory, clarifying the distinction between tacit and explicit knowledge as a continuum rather than a binary, and advancing the theory by integrating new research perspectives. The paper defends and refines the two foundational premises of knowledge conversion. It is a critical reference for researchers navigating debates about the epistemological underpinnings of SECI.

Relevance: Directly addresses controversies around the tacit–explicit distinction and knowledge conversion central to applying SECI in educational and entrepreneurial settings; essential for a PhD thesis that must engage with critiques of the model.

Nonaka, I., von Krogh, G., & Voelpel, S. (2006). Organizational knowledge creation theory: Evolutionary paths and future advances. *Organization Studies*, 27(8), 1179–1208. <https://doi.org/10.1177/0170840606066312>

Annotation: This article traces the intellectual development of organizational knowledge creation theory from its origins through subsequent refinements, identifying evolutionary paths and unresolved issues including the role of context ('Ba'), the management of knowledge assets, and the distributed nature of knowledge creation. The authors articulate future research agendas that extend the SECI model to new organizational forms and knowledge contexts. It serves as a meta-theoretical overview of where SECI fits in broader management scholarship.

Relevance: Provides the evolutionary and critical context for the SECI model, essential for establishing theoretical sophistication in a thesis chapter on SECI and for connecting knowledge conversion to organizational learning and entrepreneurial competence development.

Tynjälä, P. (2008). Perspectives into learning at the workplace. *Educational Research Review*, 3(2), 130–154. <https://doi.org/10.1016/j.edurev.2007.12.001>

Annotation: This thematic review synthesizes workplace learning research through four propositions: that workplace learning is both similar to and different from school learning; that it operates at multiple levels from individual to network; that it encompasses informal and formal modalities; and that workplaces vary greatly in how they support learning. Tynjälä frames learning through the knowledge creation metaphor and integrates SECI-compatible concepts of tacit knowledge production and the integration of theoretical and practical knowledge. It is one of the most-cited reviews in vocational and professional education.

Relevance: Directly relevant to how SECI maps onto workplace and vocational learning, the distinction between explicit school knowledge and tacit workplace knowledge, and the theoretical underpinning of knowledge conversion as a learning mechanism—crucial for connecting SECI to entrepreneurship education contexts.

Tynjälä, P., Virtanen, A., Klemola, U., Kostiainen, E., & Rasku-Puttonen, H. (2016). Developing social competence and other generic skills in teacher education: Applying the model of integrative pedagogy. *European Journal of Teacher Education*, 39(3), 368–387. <https://doi.org/10.1080/02619768.2016.1171314>

Annotation: This study applies Tynjälä's Integrative Pedagogy model—which integrates theoretical, practical, self-regulative, and sociocultural knowledge—to teacher education, assessing how social and generic competences are developed through pedagogical processes that mirror the SECI knowledge conversion cycle. Results from 95 student-teachers show broad competence gains across domain-specific, generic academic, and metacognitive skills. The model operationalizes knowledge integration as the transformation from explicit to internalized professional expertise.

Relevance: Connects SECI-compatible integrative knowledge conversion (theoretical to practical to self-regulative) to competence development in professional education, offering a pedagogical model directly transferable to entrepreneurship education research.

Wuytens, N., Schepers, J., Vandekerckhof, P., & Voordeckers, W. (2022). Entrepreneurs can know more than they can tell: Conceptualizing and measuring tacit entrepreneurial knowledge. *Frontiers in Psychology*, 13, Article 892223. <https://doi.org/10.3389/fpsyg.2022.892223>

Annotation: This paper introduces Tacit Entrepreneurial Knowledge (TEK), defined as experiential learning from past experiences resulting in tacit knowledge regarding entrepreneurship that is implicit, personal, and uncodified. The authors develop a situational judgment test (SJT)-based measurement instrument for TEK, providing a three-dimensional nomological network involving knowledge type, experience, and time. The study addresses a significant gap in entrepreneurship research by developing an individual-level operationalization of tacit knowledge.

Relevance: Directly links the tacit knowledge dimension of the SECI model to entrepreneurship, demonstrating how tacit entrepreneurial knowledge is accumulated through socialization-type learning and how it underpins entrepreneurial competence—central to the thesis's focus on SECI in entrepreneurship education.

Lens 8: Learner-Following Educational Design

Florian, L. (2015). Inclusive pedagogy: A transformative approach to individual differences but can it help reduce educational inequalities? *Scottish Educational Review*, 47(1), 5–14.

<https://doi.org/10.1163/27730840-04701003>

Annotation: This SERA Lecture paper synthesises evidence on inclusive pedagogy and positions it as a systemic tool for reducing three interrelated forms of educational inequality: bell-curve-based grouping practices, the labelling of additional support needs, and the disproportionate representation of minority groups in special provision. Florian argues that inclusive pedagogy is not a set of special techniques but a fundamental reframing of ordinary teaching to be inherently responsive to learner variability. The paper situates inclusive pedagogy within broader equity-oriented policy debates in education.

Relevance: Directly extends the Florian & Black-Hawkins framework by arguing that learner-following design is transformative, not merely accommodating—it reconfigures the assumptions built into curriculum and assessment. For entrepreneurship education, this supports arguments for moving away from 'one-size-fits-all' business school curricula toward flexible pedagogies that do not presuppose prior commercial experience, particular cultural backgrounds, or dominant models of entrepreneurial identity.

Florian, L., & Black-Hawkins, K. (2011). Exploring inclusive pedagogy. *British Educational Research Journal*, 37(5), 813–828. <https://doi.org/10.1080/01411926.2010.501096>

Annotation: This paper examines teachers' craft knowledge of inclusive practice through classroom observations and interviews with 11 teachers in two Scottish primary schools. The authors identify practical examples of inclusive pedagogy that extend what is generally available to all pupils, rather than differentiating separately for students with additional support needs. The analysis distinguishes an 'inclusive pedagogical approach' from a 'special/additional needs approach,' establishing a foundational framework for design that responds to the whole class without singling out individuals.

Relevance: This is the seed paper for Lens 8. It establishes the core principle of learner-following design: 'extending what is generally available to everybody' rather than 'providing for all by differentiating for some.' In entrepreneurship education this means building programmes rich and flexible enough to accommodate diverse learner backgrounds—disciplinary, cultural, biographical—without labelling any group as deficient or requiring special remediation.

Fornauf, B. S., & Erickson, J. D. (2020). Toward an inclusive pedagogy through universal design for learning in higher education: A review of the literature. *Journal of Postsecondary Education and Disability*, 33(2), 183–199.

Annotation: This literature review synthesises empirical and descriptive scholarship on UDL in postsecondary settings, examining how faculty and researchers conceptualise and operationalise the framework. The authors find persistent ambiguity between UDL as an intervention versus a process-based framework for inclusive pedagogy, and argue that UDL must move beyond accommodating disability to transforming teaching and learning for all students. The review extends prior syntheses by focusing exclusively on CAST's UDL framework and including both empirical and descriptive sources.

Relevance: By positioning UDL as a pathway to inclusive pedagogy in higher education—not merely a disability accommodation mechanism—this review provides theoretical and empirical scaffolding for a PhD thesis arguing that entrepreneurship education should be proactively designed for learner variability. It supports claims that flexible assessment and varied representation formats benefit entrepreneurs-in-training with diverse disciplinary, cultural, and prior-experience backgrounds.

Kim, Y. (2025). Investigating innovative teaching practices of U.S. entrepreneurship instructors: Inquiry-based, learner-centered, and technology-integrated approaches. *Entrepreneurship Education and Pedagogy*, advance online publication. <https://doi.org/10.1177/25151274251388663>

Annotation: Drawing on 107 surveys and 9 interviews with U.S. entrepreneurship instructors, this mixed-methods study finds widespread adoption of inquiry-based and learner-centred teaching in entrepreneurship classrooms, though technology integration remains uneven. The study identifies that instructors' entrepreneurial identity shapes their pedagogical choices and that professional development is a critical enabler of innovative learner-centred practice. It also surfaces structural barriers—large class sizes, assessment constraints—that impede full adoption of experiential and responsive approaches.

Relevance: This paper provides timely empirical evidence that learner-centred and inquiry-based pedagogies are gaining ground in entrepreneurship education, directly validating the thesis's focus on Lens 8. It identifies systemic constraints that any learner-following design framework must address to achieve scalability. The focus

on instructor identity also connects learner-following design to the professional development of entrepreneurship educators—an important dimension of the thesis's broader pedagogical argument.

McKenney, S., & Reeves, T. C. (2018). *Conducting educational design research* (2nd ed.). Routledge. <https://doi.org/10.4324/9781315105642>

Annotation: This methodological text establishes educational design research (EDR) as a rigorous and practice-relevant approach in which curriculum solutions are iteratively developed and refined in real learning settings, yielding both theoretical understanding and practical improvements. McKenney and Reeves describe the cyclical core processes of analysis and exploration, design and construction, and evaluation and reflection, with detailed guidance on assessment tools and behind-the-scenes project work. The second edition adds enhanced coverage of design-based implementation research and expanded practical examples.

Relevance: EDR is the methodological vehicle through which learner-following curricula for entrepreneurship education can be developed, tested, and validated. Because EDR operates iteratively with practitioners in authentic educational contexts, it is ideally suited to designing entrepreneurship programmes that genuinely adapt to diverse learner cohorts. McKenney and Reeves provide both the epistemological rationale and the practical toolkit for such iterative, context-sensitive design work.

Moriña, A. (2021). Approaches to inclusive pedagogy: A systematic literature review. *Pedagogika*, 140(4), 123–143. <https://doi.org/10.15823/P.2020.140.8>

Annotation: This systematic review distinguishes inclusive pedagogy from the broader constructs of inclusive education and inclusive practice, and synthesises empirical and conceptual literature to propose a four-element framework: beliefs, knowledge, design, and actions. The review shows that teachers' inclusive pedagogical practice is multi-dimensional and cannot be reduced to a set of discrete techniques. The author identifies a research gap in understanding what teachers actually do, how, and why—calling for more granular studies of practitioner experience.

Relevance: The four-element framework (beliefs, knowledge, design, actions) provides a structural lens for the thesis to evaluate whether entrepreneurship curricula embody inclusive pedagogy at every level—not just in course design documents but in educator mindsets and enacted practice. It is particularly useful for diagnosing gaps between stated learner-following intentions and the reality of teaching and assessment decisions in entrepreneurship programmes.

Nind, M., & Lewthwaite, S. (2018). Hard to teach: Inclusive pedagogy in social science research methods education. *International Journal of Inclusive Education*, 22(1), 74–88. <https://doi.org/10.1080/13603116.2017.1355413>

Annotation: This paper applies Florian's inclusive pedagogy framework for the first time to research methods teaching in the social sciences—a domain often characterised by student anxiety and deficit discourses about ill-prepared learners. Nind and Lewthwaite identify practitioner strategies that reach out to diverse learners, including using data and standpoints as inclusive teaching tools, and argue for replacing blame-of-the-learner discourse with proactive, barrier-removing design. The paper demonstrates that inclusive pedagogy can be operationalised in technically demanding, cognitively challenging higher education content.

Relevance: This paper bridges inclusive pedagogy theory directly with higher education practice, making it relevant to entrepreneurship educators who work with students varying greatly in business knowledge, quantitative literacy, risk orientation, and methodological background. It models how learner-following design can be applied to demanding content without lowering standards—a critical consideration for entrepreneurship programmes that combine theoretical rigour with experiential practice.

Rodrigues, A. (2023). Entrepreneurship education pedagogical approaches in higher education. *Education Sciences*, 13(9), Article 940. <https://doi.org/10.3390/educsci13090940>

Annotation: This paper consolidates evidence on pedagogical approaches in higher education entrepreneurship courses, identifying experiential learning as the most widely validated approach when it combines practical experience with theoretical grounding and shared learner responsibility. Rodrigues maps the most frequently used student-centred instructional methods—problem-based learning, project-based learning, design thinking, formative feedback, service learning, and active digital methodologies—and illustrates these with a University of Lisbon case study. Learner agency and co-construction of knowledge emerge as defining features of effective entrepreneurship pedagogy.

Relevance: This paper situates learner-following design within entrepreneurship education by documenting how the field's most validated pedagogies are inherently student-centred and adaptive. It supports the thesis

argument that entrepreneurship education is already trending toward learner-following principles in practice, and that a formal design framework can strengthen and systematise what innovative educators are already attempting. It also identifies the specific methods through which learner diversity can be productively engaged in entrepreneurship classrooms.

Smale-Jacobse, A. E., Meijer, A., Helms-Lorenz, M., & Maulana, R. (2019). Differentiated instruction in secondary education: A systematic review of research evidence. *Frontiers in Psychology*, 10, Article 2366. <https://doi.org/10.3389/fpsyg.2019.02366>

Annotation: This systematic review synthesises 14 papers covering 12 empirical studies on the effects of within-class differentiated instruction on secondary students' academic achievement. The authors find small to moderate positive effects across a range of DI operationalisations—tiered tasks, ability grouping, mastery learning, and individualised flipped-classroom remediation—with summarised effect sizes ranging from $d = +0.51$ to $+0.74$. The review highlights severe knowledge gaps and calls for more rigorous, theoretically coherent empirical studies.

Relevance: As an authoritative empirical synthesis, this review provides the evidentiary grounding for claims that adapting instruction to learner diversity yields better academic outcomes. In higher education and entrepreneurship education research, it underpins arguments for replacing uniform lecture-based delivery with varied, responsive pedagogies. It also models the systematic evidence-based approach needed when evaluating learner-following designs in entrepreneurship courses.

Timuş, N., Bartlett, M. E., Bartlett, J. E., Ehrlich, S., & Babutsidze, Z. (2023). Fostering inclusive higher education through universal design for learning and inclusive pedagogy – EU and US faculty perceptions. *Higher Education Research & Development*, 43(1), 259–274. <https://doi.org/10.1080/07294360.2023.2234314>

Annotation: This quantitative international study analyses survey data from EU and US faculty to examine how knowledge and use of inclusive pedagogy predict UDL implementation. The authors find that all gender- and country-related variance in UDL implementation is fully explained by faculty's inclusive pedagogy knowledge and utilisation, demonstrating that the two frameworks are complementary and mutually reinforcing rather than competing. The study concludes that institutional investment in professional development around both frameworks is the key lever for scalable, system-wide inclusive design.

Relevance: This paper provides direct empirical evidence that UDL and inclusive pedagogy must be developed together to achieve systemic impact in higher education. For entrepreneurship education, it shows that faculty beliefs and training—not just curriculum artefacts—are critical design variables when building programmes that genuinely respond to learner diversity. It also foregrounds the cross-national relevance of learner-following design principles, supporting their applicability in diverse entrepreneurship education contexts.

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed-ability classrooms* (2nd ed.). Association for Supervision and Curriculum Development.

Annotation: This foundational text provides the conceptual and practical framework for differentiated instruction (DI), arguing that teachers should proactively vary content, process, and product in response to learners' readiness, interest, and learning profile. Tomlinson positions DI as qualitative rather than quantitative—more challenging and engaging for all rather than more or less work for different groups. The book synthesises research on how students learn differently and supplies concrete classroom strategies for flexible grouping and responsive curriculum design.

Relevance: Tomlinson's DI framework is a cornerstone of learner-following design and has been widely applied in higher education. The three dimensions—content, process, product—map directly onto entrepreneurship course design decisions: what entrepreneurial knowledge is taught, how students explore it experientially, and how they demonstrate competence. DI legitimises entrepreneurship educators who flex delivery to accommodate students from different disciplinary and cultural starting points.

du Plooy, E., Casteleijn, D., & Franzsen, D. (2024). Personalized adaptive learning in higher education: A scoping review of key characteristics and impact on academic performance and engagement. *Heliyon*, 10(21), e39630. <https://doi.org/10.1016/j.heliyon.2024.e39630>

Annotation: This Joanna Briggs Institute scoping review of 69 studies examines the characteristics and outcomes of personalised adaptive learning (PAL) in higher education. It reports that 59% of included studies documented improved academic performance and 36% found increased student engagement when adaptive platforms tailored pathways to individual needs, with pre-knowledge quizzes as the most common adaptive trigger. The review identifies persistent technological limitations and calls for stronger pedagogical integration to realise PAL's full potential.

Relevance: This review bridges the pedagogical construct of personalised learning with its empirical effects in higher education, providing a synthesis directly applicable to entrepreneurship programmes that seek to adapt pathways to students with varying prior knowledge, entrepreneurial self-efficacy, and intent. It also stresses that adaptive learning must be embedded within pedagogical strategy rather than technology alone—consistent with the learner-following design philosophy that this thesis lens foregrounds.

Appendix B: Detailed Data Collection and Methodology

To ensure **reproducibility**, this appendix provides a step-by-step account of all data collection procedures used in the study, from the initial survey through the diary study and experimental interventions, to the focus group debriefings. Each stage's setup, instruments, and data processing (e.g., diary coding) are described in detail.

1. Entrepreneurial Mindset Survey Phase

Participants and Administration:

The study began with a **survey** to profile students' entrepreneurial mindsets. A total of 834 **undergraduate students** across three Dutch Universities of Applied Sciences) participated. The survey was administered in the first week of an entrepreneurship module. It was delivered **online** during class time (with an instructor present to answer questions), ensuring a high response rate. Participation was voluntary and anonymous for research purposes (students provided informed consent and were assured that individual results would not affect their grades). On average, the survey took about 10–15 minutes to complete.

Instrument (EMP Questionnaire):

We used the **Entrepreneurial Mindset Profile (EMP)** developed by Davis, Hall, & Mayer (2016) as our questionnaire. The EMP is a validated instrument that measures **14 dimensions** of entrepreneurial mindset, divided into personality-related scales and skill-related scales. Below all 14 EMP dimensions with brief descriptions and example items are listed:

- **Independence:** Preference for working autonomously (e.g., *"I prefer to set my own rules than follow others' rules."*).
- **Preference for Limited Structure:** Comfort with ambiguity and unstructured tasks (e.g., *"I find clearly structured tasks boring."*).
- **Nonconformity:** Tendency to act in unconventional or unique ways (e.g., *"I like to stand out from the crowd."*).
- **Risk Acceptance:** Willingness to pursue goals despite uncertain success (e.g., *"I'll take a risk if it could lead to significant success."*).
- **Action Orientation:** Propensity to take initiative and make decisions quickly (e.g., *"I tend to act on ideas immediately."*).
- **Passion:** Degree of excitement and enjoyment in one's work (e.g., *"I feel energized and passionate about the projects I pursue."*).
- **Need to Achieve:** Strong desire to accomplish challenging goals (e.g., *"I constantly set higher standards for my performance."*).
- **Future Focus:** Ability to plan and think long-term (e.g., *"I often consider how decisions now will impact the future."*).
- **Idea Generation:** Ability to produce many novel ideas and approaches (e.g., *"I easily come up with multiple ideas for a task."*).
- **Execution:** Ability to turn ideas into actionable plans and implement them (e.g., *"I excel at turning an idea into a workable plan."*).
- **Self-Confidence:** General belief in one's ability to succeed (e.g., *"I am confident in my ability to achieve my goals."*).
- **Optimism:** Tendency toward a positive outlook, even in adversity (e.g., *"I usually expect things to turn out well."*).
- **Persistence:** Ability to bounce back from setbacks and keep going (e.g., *"I do not give up easily, even after failures."*).
- **Interpersonal Sensitivity:** Sensitivity to others' feelings and needs in a team (e.g., *"I am very aware of my teammates' emotions."*).

Each dimension was assessed with multiple Likert-scale items (5-point scale from “Strongly disagree” to “Strongly agree”). In total, the EMP survey consisted of **71 items** across these 14 scales. We used the standardized EMP instructions and items without modification, aside from minor wording adjustments for local context (e.g., clarifying any idioms for Dutch students).

Before full deployment, the survey was **piloted** with 30 students to ensure clarity; this led to small tweaks in phrasing (for instance, simplifying double negatives in questions about nonconformity). The final instrument demonstrated high internal reliability in our sample (all subscale **Cronbach’s alpha** values exceeded 0.78, indicating acceptable to excellent consistency).

Data Handling and Profile Identification:

Survey responses were collected electronically and imported into SPSS for analysis. We first scored the EMP by averaging item scores for each of the 14 dimensions per student (after reverse-coding any negatively phrased items according to the EMP scoring key). We then conducted basic **psychometric checks**: Cronbach’s alpha for each scale (range in our data: $\alpha = 0.78$ to 0.92 , confirming reliability) and a **confirmatory factor analysis** using AMOS to verify the 14-factor structure (fit indices were good, CFI = 0.93 , RMSEA = 0.06 , consistent with the instrument’s validation).

To identify recurring entrepreneurial mindset configurations, we first standardised the 14 EMP dimension scores and conducted exploratory hierarchical and k-means analyses to examine the broad structure of the data. These exploratory analyses served as an initial screening step rather than as the basis for the final archetype solution. Because k-means assumes relatively spherical and equal-variance clusters, we subsequently applied model-based latent profile analysis using Gaussian mixture models (GMM), which allow clusters to vary in dispersion and provide probabilistic class membership.

Models containing two through six latent classes were estimated. Model selection was based primarily on the Bayesian Information Criterion (BIC), supported by the Integrated Completed Likelihood (ICL), classification entropy, average posterior probabilities, split-sample cross-validation, and bootstrap stability. Converging evidence supported a five-class solution as the best balance between empirical fit, classification quality, stability, and substantive interpretability.

The final five-class model showed entropy of approximately $.78$, with average posterior probabilities of at least $.80$ for assigned class membership. These five empirically derived configurations formed the basis for the entrepreneurial mindset archetypes used throughout the subsequent phases of the study.

Archetype Labeling: We interpreted and labelled each latent profile as an Entrepreneurial Mindset Archetype. The labels were chosen based on the defining high/low traits of each cluster (and aligned with prior research by Loef et al., 2023, which had proposed similar archetype names):

- *Visionary Risk-Takers*: characterized by very high scores in creativity/Idea Generation and Risk Acceptance, but relatively lower Execution and Persistence.
- *Pragmatic Innovators*: high Execution and Future Focus, but more risk-averse and lower Passion for novelty.
- *Systematic Executors*: very strong Execution and preference for structure (low Preference for Limited Structure), coupled with low Idea Generation and Nonconformity.
- *Adaptive Opportunists*: high Independence and Future Focus (scanning for opportunities), but lower Persistence and follow-through on execution.
- *Resilient Pioneers*: exceptional Persistence and Optimism, but comparatively lower scores on Idea Generation and Passion (indicating focus on pushing through challenges rather than generating radical new ideas).

Each of the 834 students was thus assigned to one of these five profile groups based on the cluster analysis. This profiling data formed the basis for subsequent phases: it informed participant sampling and enabled the composition of pre-existing teams in the classroom experiments to be characterised in terms of entrepreneurial mindset archetypes. **Importantly, students themselves were not informed of their archetype labels at this stage** (to avoid influencing their behavior in the upcoming activities).

They were simply told that the survey was to help us understand different learning preferences in entrepreneurship. Only after all interventions were completed did we debrief participants about the archetypes.

2. Reflective Diary Study Phase

Participants and Procedure: A subset of the surveyed students participated in a **reflective diary study** to capture qualitative, real-time insights into their learning experiences. We focused on students from two of the participating institutions who were enrolled in a four-week intensive entrepreneurship module (these comprised **150 students** out of the original 834, spread across several class sections). All 150 students were invited to keep daily learning diaries as part of their course activities.

This diary exercise was integrated into the course curriculum as a reflective practice (and described to students to enhance their self-awareness and learning – they received course credit for completion, but entries were not graded for content). Students gave additional consent for their diary entries to be used in our research, with assurances of confidentiality.

Each student was instructed to write a **short diary entry at the end of each class day** over the 4-week module. In total, most students completed around 15–20 diary entries (one per weekday; weekends were excluded as classes did not meet). We provided a structured template to guide their reflections without being overly restrictive.

The **diary prompts** asked students to briefly record:

- **Emotional States:** How they felt about the day's learning activities and challenges (e.g., excited, confused, frustrated, motivated).
- **Teacher Support and Scaffolding:** What kind of support or guidance (if any) they noticed from the instructor that day, and whether it helped. We encouraged them to note specific instances (e.g., *"The teacher gave us a hint when we were stuck prototyping our idea, which pointed us in the right direction"* or *"I felt lost because we didn't get clear instructions for the project"*).
- **Grade the support given:** Students were asked to grade the received support on a scale of 1 – 10.
- **Collaboration and Challenges:** Their experiences working with peers that day – for instance, team dynamics, how they tackled group tasks, conflicts or breakthroughs – and any difficulties or successes encountered.

Students entered their diary responses via an **online learning platform** each evening. We emphasized honesty and reflection; to reduce potential bias, entries were confidential (instructors did not read individual diaries until after course completion, and researchers de-identified the content for analysis). By the end of the module, this process yielded a rich qualitative dataset of approximately **2,800 diary entries** (about 18–20 entries per student on average).

The approximately 2,800 collected diary entries constituted the full diary corpus. For the scaffolding analysis reported in this chapter, 347 entries were retained because they contained sufficiently clear and interpretable descriptions of educator support relevant to the research question. Entries that were incomplete, illegible, overly general, or did not contain an identifiable scaffolding interaction were excluded from this specific analysis.

The resulting 347 entries therefore represent the analytical subset used to examine relationships between scaffold type, learner response, and entrepreneurial mindset archetype.

Diary Data Coding and Analysis: We analyzed the diary entries using a combination of **thematic analysis** and directed content analysis, focusing on reports of scaffolding.

The coding process was as follows:

- **Preparation:** All diary entries were transcribed from the online platform into a textual database. Each entry was tagged with an anonymous student ID which was linked (in a secure key file) to that student's archetype profile from the survey. This way, we could later sort or filter diary excerpts by the writer's archetype group.
- **Codebook Development:** We developed an initial **codebook** both inductively from the data and deductively based on our theoretical framework. To capture scaffolding interactions, we drew on the scaffolding literature (Wood et al., 1976; Van de Pol, Volman, & Beishuizen, 2010) to define codes for different **types of instructor support**. Specifically, we included codes for six common scaffolding strategies observed in educational settings: **Instructing** (direct telling or step-by-step guidance), **Explaining** (clarifying concepts or task goals), **Modeling** (demonstrating a process or example solution), **Questioning** (probing students with questions to stimulate thinking), **Feedback** (providing evaluative or corrective comments on student work), and **Hinting** (giving indirect suggestions or clues). In addition, we allowed for emergent coding of **emotional reactions** (e.g., expressions of confidence, anxiety, confusion) and **collaborative dynamics** (mentions of peer support, conflict, leadership in the group, etc.), since these were key to understanding the learning experience.
- **Coding Process:** Two researchers **independently coded** an initial sample of 30 diary entries to refine the code definitions. They compared results, discussed discrepancies, and iteratively adjusted the codebook. Once consensus was reached on coding rules, the full set of diary entries was divided among the two coders for primary coding, with an overlap of about 20% of entries double-coded to ensure reliability. Coders marked each instance where a student mentioned a teacher's action or support, assigning it one (or more) of the scaffolding-type codes. Crucially, they also noted the **valence** of the mention – whether the student described the scaffold as **helpful/positive** (e.g., “the feedback gave me confidence”) or **unhelpful/negative** (e.g., “the instructions were still confusing”). Non-mentions of scaffolding were not coded under these categories. Separately, coders highlighted recurring **themes** in the open-ended emotional and collaborative reflections (for example, emerging themes included “*overwhelmed by ambiguity*,” “*learning from peers*,” “*gaining confidence through small wins*,” etc.).
- **Reliability:** The coding team met regularly to reconcile any differences. Inter-rater reliability for the scaffolding strategy codes was robust (Cohen's $\kappa \approx 0.80$ across the six scaffold types, indicating substantial agreement). Differences in interpretation were resolved by discussion, and occasionally by consulting a third researcher. After coding, we compiled a tally of how many diary entries (and unique students) mentioned each type of scaffold, and how many of those mentions were positive vs. negative. These counts (summarized in our results tables) allowed us to identify which forms of support were **perceived as effective or ineffective by students** overall.
- **Linking to Archetypes:** Because each diary entry was associated with the writer's archetype, we were able to stratify the qualitative data by profile. In practice, this meant we could compare patterns like “*How did Visionary Risk-Takers respond to open-ended questioning?*” versus “*How did Systematic Executors respond to the same?*” For instance, we noted that **Systematic Executors** frequently wrote comments like “*Without clear instructions, I felt stuck*” (indicating a need for more structured guidance), whereas **Visionary Risk-Takers** often said, “*I had so many ideas, but feedback helped me decide which to pursue*”. This archetype-tagging of diary excerpts was invaluable for triangulating with the experimental findings later.

Throughout the diary phase, our approach aligned with **Van de Pol et al.'s (2010)** scaffolding principles: we noted whether instructor support was **contingent** (tailored to student's immediate needs), how it was **faded** (gradually removed) or not, and whether it promoted **transfer of responsibility** to the learner. These aspects were later examined to see if some archetypes experienced, for example, too little fading (leading to dependence) or too rapid fading (leading to frustration). By the end of this phase, we had both quantitative indicators (frequency of certain codes) and qualitative illustrations (student quotes) of how different learners perceived and reacted to various teaching supports in real time.

Importantly, scaffolding interactions were coded based on the diary content rather than on the student's archetype classification. Only after the relevant scaffolding interactions and their perceived effects had been coded were these observations linked to the student's previously established archetype. This separation reduced the risk that expectations associated with a particular archetype would determine the initial qualitative coding. The resulting archetype × scaffold matrix enabled comparison of recurring patterns within and across learner configurations.

3. Classroom Experiment Phase

To complement the individual-level evidence from the survey and diary phases, the study incorporated classroom experiments within existing entrepreneurship programmes. These experiments were designed to examine how entrepreneurial mindset configurations, team dynamics, and educator scaffolding interacted during authentic entrepreneurial tasks.

The experiments took place during regular workshop sessions after the EMP profiles had been established. Importantly, students were already working in project teams as part of their entrepreneurship programmes. Team membership was therefore not determined or randomly assigned by the researchers based on entrepreneurial mindset archetype. Instead, the EMP-derived profiles were used to characterise the archetypal composition of teams that had already been formed.

This resulted in naturally occurring variation in team composition. Some teams displayed relatively homogeneous configurations, in which one archetype was strongly represented, whereas others contained a broader mixture of entrepreneurial mindset archetypes. Homogeneity and heterogeneity should therefore be understood as analytical characteristics of existing teams rather than experimentally assigned conditions. Because archetypal composition exists on a continuum, a team could be relatively homogeneous around a dominant profile while still containing members representing other archetypes.

The classroom experiments also varied the degree of task structure and educator scaffolding. Whereas aspects of task design and scaffolding could be deliberately adjusted, team composition itself was observed rather than manipulated. This enabled comparison of how different naturally occurring team configurations responded to uncertainty, collaboration, task demands, and educator support while maintaining the ecological validity of the existing educational setting.

3.1 Homogeneous Archetype Team Experiment

In the first experimental setting, three existing project teams displayed sufficiently homogeneous archetype compositions to enable focused comparison. These teams predominantly represented the Pragmatic Innovator, Systematic Executor, and Adaptive Opportunist archetypes. Team sizes reflected the normal programme structure and generally ranged from four to six students. The teams had been formed before EMP profiling and were not reconstructed for research purposes.

Task: All homogeneous teams were given an identical **real-world business case** to work on. This case was a comprehensive, open-ended entrepreneurship challenge designed in collaboration with an industry partner. In brief, the case described a struggling small business scenario and asked students to develop an innovative solution or new business model to turn it around. The task required teams to analyze information (market trends, financial data provided in the case) and propose a viable entrepreneurial strategy or concept. It was intentionally a **moderately ambiguous, complex task**, mirroring real startup problems – thus providing a suitable arena to observe where different archetype teams would excel or get stuck. Teams had a fixed time limit of **20 minutes** to discuss the case and prepare a brief concept proposal. They were told they would pitch their proposed solution informally at the end of the session (to ensure every team worked towards a tangible outcome).

Scaffolding Interventions: During this 90-minute session, the facilitator (instructor) monitored progress and provided **targeted scaffolding** to teams, **contingent** on their needs. We entered with a prepared set of scaffolding actions (aligned with the six types defined earlier), but we allowed the timing and choice of scaffold to be dictated by each team's situation (reflecting real teaching responsiveness). Examples of how scaffolding was employed in the homogeneous condition:

- For a **Systematic Executor** team that appeared paralyzed by the open-ended nature of the case (e.g., members were hesitating to begin brainstorming), the instructor offered **Instructing** scaffolding: “*Start by listing out what you know from the case and then identify one concrete goal for the business. I’ll come back in 10 minutes to see what you have.*” This provided structure and a clear next step, alleviating their initial paralysis.
- For a **Pragmatic Innovator** team generating many wild ideas but struggling to converge on one plan, the instructor employed **Questioning**, asking: “*Which of these ideas excites you the most, and which would be easiest to start with given the resources described?*” This question aimed to focus their creative energy toward a viable choice (echoing effectuation principles like starting with available means).
- An **Adaptive Opportunist** team quickly leapt into splitting up tasks without a plan. The instructor used **Modeling** by sharing a quick example approach (sketching a simple opportunity evaluation matrix on a whiteboard using a different context) to demonstrate how they might systematically vet their many opportunity ideas before pivoting.

All scaffolding interventions were logged by observers (noting time, type, and team response). Importantly, the instructor attempted to **fade** support appropriately – for example, after giving an initial instructing scaffold to a Systematic team, subsequent help was reduced to open-ended questions to encourage autonomy. Some teams requested help (which we answered with one of the scaffold types), while in other cases the instructor proactively intervened if a team seemed stuck or off-track for an extended period. A few teams hardly asked for help at all; in those cases, the instructor still checked in periodically and offered at least one form of input (often feedback or a probing question) to observe their reaction.

Data Collected: Besides the observations, each team produced a short-written **concept proposal** and did a **5-minute informal pitch** at the end of the session. These outputs were collected for analysis of **performance quality**. We had two expert judges (entrepreneurship instructors uninvolved in the experiment) **evaluate each team’s solution** on a few criteria: creativity of the idea, feasibility, and thoroughness of analysis. While this was primarily for research insight (to compare outcomes across groups), we also provided qualitative feedback to the students afterward for learning purposes (the activity itself was not graded).

The judges’ assessments, combined with observer notes, indicated clear differences in how each archetype group approached the problem (as described in the Results section of the chapter). After the session, we also administered a short **questionnaire** to participants asking how they felt about their team’s process and the support they got (e.g., “*Did you feel you had the guidance you needed?*” on a 5-point scale, plus open comments). This questionnaire was anonymous but tagged by team for our analysis.

3.2 Subsequent Experimental Setting: Variation in Existing Team

A subsequent experimental setting involved a larger pool of participants and consequently a greater number and wider variety of existing team configurations. As in the first setting, students were already organised into project teams within the entrepreneurship programme before EMP profiling took place. The archetype classifications were therefore used retrospectively to characterise team composition rather than to construct new teams.

Within this larger pool, both relatively homogeneous and heterogeneous configurations emerged. Some teams contained a dominant entrepreneurial mindset archetype, whereas others comprised students representing several different archetypes. The larger participant pool consequently made it possible to examine a broader range of naturally occurring configurations than in the first experimental setting.

For analytical purposes, heterogeneous teams were characterised by the presence of multiple entrepreneurial mindset archetypes, while relatively homogeneous teams showed greater concentration around one dominant configuration. These distinctions were used to compare patterns of collaboration, peer scaffolding, task organisation, and educator support. They should not be interpreted as experimentally assigned treatment conditions.

Task: In this subsequent experimental setting, teams were presented with a more open-ended “concept development challenge.” To simulate the variety of opportunities entrepreneurs might pursue, we prepared a **set of random business concept prompts**. Each team drew a prompt from a hat (literally, at random) so that every team worked on a different concept. Examples of these prompts included short phrases or themes like “*Sustainable urban transport solution*,” “*Educational technology for remote learning*,” “*Innovative use for recycled plastics*,” etc. The prompt cards intentionally provided only a broad theme, not a detailed case, to encourage teams to identify a specific problem and invent a concept from scratch.

This introduced a high level of uncertainty and creativity demand, which we expected would especially reveal the benefits (or challenges) of having mixed skill sets in a team. Teams were given **half an hour** to define a specific opportunity related to their prompt and sketch out a preliminary business concept (target customer, value proposition, and an outline of implementation steps). At the end, each team briefly **presented their concept** to the class in a gallery walk format (rotating to view each other’s outputs), fostering peer learning.

Scaffolding Interventions: During the heterogeneous team task, the instructor-facilitator again provided scaffolding, but an interesting observation was that **these groups were more self-sufficient**. Often, team members naturally “**peer scaffolded**” one another. For example, in one mixed team, the Visionary Risk-Taker member enthusiastically generated ideas, while the Pragmatic Innovator and Systematic Executor members in the group took the role of critiquing feasibility and adding structure to the discussion. This peer balance meant the facilitator could adopt a more hands-off approach compared to the homogeneous session. Nevertheless, we remained attentive and intervened as needed. Some scaffolding examples in the heterogeneous context:

- If a diverse team got into **deadlock** due to conflicting working styles (we observed one team spending too long debating because their Systematic member wanted more analysis while the Visionary wanted to jump on an idea), the instructor stepped in with **Questioning** to the group: “*How can you test this idea quickly to satisfy everyone’s concerns?*” This helped them find a middle ground by running a quick thought experiment, satisfying the need for both action and analysis.
- For a team that seemed to **settle too fast** on a safe idea (possibly due to a dominant Pragmatic Innovator or risk-averse dynamic), the facilitator used **Explaining** or **Hinting** to gently push their creativity: “*Often the first idea isn’t the most innovative. Can you think of a more novel angle? Maybe consider what a very different customer might need.*” This prompt was aimed at the whole team, and the Visionary member typically picked it up to suggest bolder alternatives, thus reinvigorating the ideation.
- If a team’s discussion was **dominated by one or two members**, we occasionally used **Modeling** of inclusive behavior—stepping in and explicitly inviting a quieter member (often the Resilient Pioneer or Adaptive Opportunist in some cases) to share their perspective, modeling how a team leader might facilitate equal participation. This was done carefully so as not to embarrass anyone, but to show the team the value of drawing out input from all archetypes.

Overall, **fewer scaffolding interventions** were required in the mixed teams session; many groups progressed without needing much instructor help, as they had internal resources (diverse perspectives) to draw on. Observers logged each instance of instructor support similarly to the first experiment. We also noted occurrences of **peer support** – for example, when one student informally taught another (like a Systematic student showing others how to create a quick Gantt chart for planning, or a Visionary student encouraging the team to embrace a crazy idea). These peer scaffolding moments were later coded from video as well.

Data Collected: The output of each heterogeneous team was a **concept description** (often a one-page summary or a canvas filled out) and any sketches or notes they produced. During the gallery walk presentations, researchers circulated and listened to how teams explained their concepts, taking notes on the depth of opportunity recognized and the innovativeness of ideas. We did not formally judge these with external evaluators (since each team had a unique prompt, direct comparison was less straightforward), but we gathered qualitative impressions.

Additionally, just like in the first experiment, we gave students a short **feedback questionnaire** afterwards to gauge their perceptions of the group process and support. They were asked, for instance, to rate statements like “Our team’s diverse skills helped us develop a better concept” and “I felt more confident in this team than in my previous team,” etc., plus open-ended questions about what they thought went well or poorly. These responses helped us understand their subjective experience of homogeneous vs. heterogeneous collaboration.

At the end of the experimental phase, we conducted a **debrief session in class**.

Ethical Note: Both experimental settings were embedded in regular classroom activities, with the instructor’s educational and research roles necessarily intersecting. No students were intentionally deprived of support for the purpose of creating an experimental control condition. Educator support remained available to all teams in accordance with normal educational practice. The research therefore relied on naturally occurring variation in team composition and systematic observation of scaffolding interactions rather than on experimentally assigning students to homogeneous or heterogeneous treatment groups. All recordings, observations, and student outputs were treated confidentially, and participation in the research had no effect on course grades.

4. Focus Group Debriefing Phase

Finally, in Phase 4 we conducted focus groups to validate and enrich the findings. After completing the course and the earlier phases, we invited a diverse subset of students to participate in group interviews. Each focus group consisted of approximately 6–8 students and was intentionally mixed to include a range of entrepreneurial mindset archetypes. In total, approximately 15 students participated across two focus group sessions.

The focus groups were semi-structured and were used as a form of member checking and interpretive triangulation. Participants were presented with accessible descriptions of the five archetypes and selected observations from the diary and classroom phases, after which they were invited to reflect on whether these interpretations resonated with their own experiences. Discussion focused on perceived fit with the archetypes, experiences of educator support and scaffolding, team dynamics, and the influence of working with peers who approached entrepreneurial tasks differently.

Each session lasted approximately 90 minutes and was audio-recorded with permission. The recordings were transcribed verbatim and analysed thematically using the existing scaffolding codebook as a starting point while allowing new themes to emerge. Particular attention was paid to convergences and divergences between focus-group accounts and the patterns identified in the diary and classroom data. The focus-group findings therefore primarily served an explanatory and validation function within the broader mixed-methods design.

Focus Group Procedure: Each session lasted about **90 minutes** and was facilitated by two researchers. We used a **semi-structured interview guide** with open-ended questions. At the start of the focus group, we **revealed and explained the five archetypes** to the participants (each student had previously been emailed a short summary of their own EMP results, so they came in knowing which archetype our analysis had assigned them – this was the first time they learned about their personal profile and the archetype terminology). We encouraged them to discuss whether they felt the description fit them, and to share reflections on working with others of the same or different profiles.

Some of the guiding questions and activities in the focus groups included:

- **Personal Archetype Reflection:** *“Now that you know your profile (e.g., Visionary Risk-Taker, etc.), how did this manifest in your behavior during the course? Can you give an example from the project or diary where you saw this aspect of yourself?”* (This prompted students to connect abstract profile descriptions to concrete incidents – many referred to diary moments or team tasks, e.g., *“Yes, I always had ideas (Visionary) but I noticed I struggled to finish them without someone keeping me on track.”*)

- **Homogeneous vs. Heterogeneous Team Experience:** *“Think back to the two group projects (the case study and the concept development). How did the group composition affect your experience? Which setting did you prefer and why?”* We also asked, *“Did you notice differences in how your team functioned or the kind of help you needed from the teacher in those two scenarios?”* Students discussed these differences candidly. For instance, one Systematic Executor in FG1 said, *“In the all-Systematic group, we were very organized, but we had no big visionary idea – we kept waiting for the ‘creative spark’ that never came until the teacher gave us a hint. In the mixed group, luckily one team-mate was super creative which helped a lot.”* This kind of testimony directly validated the experiment observations.
- **Perceptions of Scaffolding Strategies:** We presented the list of scaffolding types (in everyday language) and asked: *“Which forms of support from your instructors did you find most helpful? Can you recall specific moments? Were there times support was missing or unhelpful?”* This led to discussions aligning with our diary findings – e.g., several students echoed that **feedback** and clear **instructions** were reassuring especially early on, whereas too many open **questions** without guidance frustrated some. A Resilient Pioneer student noted, *“I appreciated that our coach didn’t give us the answer but kind of guided us – though one time I remember wishing they’d just show us how to do the financials because we were all lost.”* Such comments helped us identify situations where more modeling or direct instruction would have been appropriate.
- **Mindset Diversity and Peer Learning:** We asked, *“How did working with people of different mindsets help or hinder your learning?”* and *“Did you learn anything from your peers specifically because they approached things differently?”* Here, many students recognized the value of heterogeneity: e.g., *“Our group’s Adaptive Opportunist kept suggesting quick experiments – at first I (as a Pragmatic type) was skeptical, but it taught me that trying something small and fast can be better than over-analyzing,”* said one participant. Conversely, a Visionary Risk-Taker admitted, *“I realized I need people like [Systematic Executor] in my team; otherwise I’ll never get to implementation.”* These reflections reinforced the idea that mixed teams prompted *peer scaffolding*—students essentially coaching each other in areas of strength.
- **Adaptive Teaching & Profiling:** Finally, we prompted, *“What do you think about the idea of teachers adjusting their coaching style based on profiles like these? Would knowing your students’ archetypes (or your own) change anything for you?”* The overall response was positive – students felt seen and understood when we described the tailored scaffolding. Some vocational students noted that in earlier education they often either felt bored or lost because teaching wasn’t targeted; they appreciated that this study acknowledged different needs. We also gathered their suggestions, e.g., *“Maybe at the start of a course, taking a survey like this and then mixing teams earlier could help everyone learn more.”* This feedback provided practical validation that adaptive pedagogy was valued from the learner perspective.

Data and Analysis: The focus groups were audio-recorded (with permission) and transcribed. We analyzed the transcripts thematically, much as we did the diaries, to extract key insights and illustrative quotes. The focus group data mainly served a **triangulation and explanation purpose** – it helped explain *why* we saw certain patterns in the quantitative and observational data. For example, focus group narratives helped us understand the emotional aspect behind Systematic Executors’ paralysis in the homogeneous task (they voiced feeling “anxious without structure,” which adds depth to mere observations of them freezing up). We also used focus group input to refine our interpretation of each archetype’s developmental needs and to generate practical recommendations (many of which are reported in the Discussion section of the chapter).

Before concluding, we held a **debrief and closure** with all participants (either via a short report emailed or an in-class summary) to explain the study findings at a high level and to thank them. All participants were given the opportunity to review their own EMP results in more detail and were provided with a one-page personal development tip sheet aligned to their archetype (as a small educational benefit for their time and contribution).

5. Summary of Data Integration and Validity Checks

While the above steps were distinct, it is important to note how they **interconnected** to strengthen the study's validity:

- **Sequential Design Flow:** The **survey** results (archetypes) fed into sampling and grouping decisions for the diaries and experiments. The **diary** insights influenced how we interpreted what we saw in the experiments (e.g., diary comments alerted us to certain student struggles, which we then specifically watched for in the videos). The **focus groups** at the end allowed member-validation of our interpretations (students confirmed or clarified why certain scaffolding worked or not). This sequential mixed-method design (Creswell & Plano Clark, 2017) ensured that each phase informed the next and that the quantitative and qualitative findings converged.
- **Convergence and Triangulation:** We created a **convergence coding matrix** to align findings from different sources. For instance, for each archetype we summarized the survey trait profile, noted the diary themes (needs and preferences reported), checked the experiment outcomes (performance and observed behavior), and incorporated focus group quotes. This helped us see a full picture for each archetype and for each scaffolding strategy. Wherever multiple sources agreed (e.g., all data indicated Visionary Risk-Takers thrive with freedom but need help with execution), we gained confidence in the result. Where there were discrepancies (e.g., perhaps diaries suggested a scaffold was helpful but in experiment it didn't seem to work as expected), we dug deeper to explain the context or moderating factors. Overall, there was a high degree of consistency across data sources, which bolsters the reliability of our conclusions.
- **Ethical and Quality Considerations:** At each stage, we followed ethical guidelines for research with human participants (Israel, 2014). All participants were informed about the study's purpose and their rights. They had the right to withdraw at any time (though none chose to withdraw) and we provided contact information for counseling services in case reflecting on "failures" or challenges triggered any distress (thankfully, participants largely reported the activities were motivating and educational). Data were anonymized in all analyses – students are referred to by codes, and any quotes used in publications are not attributable to full names. Finally, we conducted a **member check** by sharing a summary of results with a small subset of participants to ensure our interpretations resonated with their experiences (this was done informally during the focus group debrief and via follow-up emails). Their feedback affirmed the accuracy of our findings.

By detailing the above procedures, we aim to provide full transparency for replication. **In summary, the data collection was carefully staged and integrated:** beginning with broad quantitative profiling, then capturing in-situ learning experiences, then observing behavior under controlled conditions, and finally engaging learners in reflection. This comprehensive approach allowed us to rigorously examine how **tailored scaffolding** can be matched to **entrepreneurial mindset archetypes**, yielding robust evidence to answer our research questions. Researchers or educators seeking to replicate or build on this study can follow these step-by-step methods to profile student mindsets, implement adaptive support strategies, and evaluate their impact in an educational setting.

Appendix C: English Summary

Chapter 1

General Introduction

Over the past decades, entrepreneurship education has developed into an important component of higher education. Whereas entrepreneurship was traditionally associated primarily with starting businesses, increasing emphasis is now placed on developing an entrepreneurial mindset: the ability to recognise opportunities, cope with uncertainty, take initiative, and create value across a variety of contexts (Fayolle & Gailly, 2008; Neck & Greene, 2011). At the same time, contemporary society is characterised by increasing complexity, uncertainty, and rapid change, making entrepreneurial skills and attitudes increasingly relevant (Dimov, 2020).

Despite the growth of entrepreneurship education, there is still considerable uncertainty about how entrepreneurial development actually takes place within educational contexts. Much research focuses on why entrepreneurship education is important and what students should learn, while relatively little attention is paid to the pedagogical processes through which entrepreneurial development is supported (Fayolle, 2007; Lack us et al., 2015). Moreover, students respond very differently to the same educational interventions. While some experience freedom and uncertainty as motivating, others may feel inhibited or overwhelmed by them.

This dissertation therefore investigates how entrepreneurship education can be better aligned with differences between students through adaptive scaffolding and teacher responsiveness. The central research question is:

How can entrepreneurship education be tailored to diverse entrepreneurial mindset profiles through adaptive scaffolding and teacher responsiveness?

The theoretical framework of this dissertation draws on, among others, Vygotsky's (1978) Zone of Proximal Development, scaffolding theory (Wood, Bruner, & Ross, 1976), Illeris' theory of learning (2003, 2018), Nonaka and Takeuchi's (1995) SECI model, and Sarasvathy's (2001) effectuation theory. Together, these theories conceptualise entrepreneurial learning as an iterative, social, and context-dependent developmental process.

The research employs a mixed-methods design combining a literature review, qualitative case studies, quantitative profile analyses, and experimental research. The chapters of this dissertation build progressively on one another: from theoretical exploration to teaching practices, mindset archetypes, and, ultimately, adaptive educational strategies.

Chapter 2

Exploring the Gap Between Theory and Practice

Chapter 2 examines which pedagogical and didactical approaches are currently used in entrepreneurship education and how these are theoretically grounded. To this end, a narrative literature review was conducted in which entrepreneurship education was analysed through the questions of why entrepreneurship education takes place, what is learned, and how education is designed and delivered (Fayolle & Gailly, 2008).

The literature shows that entrepreneurship education is often oriented towards measurable outputs, such as business plans, pitches, or startup creation. At the same time, entrepreneurship is theoretically described as an iterative, uncertain, and non-linear process (Sarasvathy, 2001; Dimov, 2020). This creates a tension between the practice of entrepreneurship and the ways in which entrepreneurship education is often organised and assessed (Honig, 2004; Neck & Corbett, 2018).

This chapter uses eight theoretical perspectives to analyse this tension, including effectuation theory, scaffolding, learner diversity, learner-following educational design, and the SECI model. The analysis shows that many educational programmes insufficiently account for differences between students in motivation, self-confidence, ability to act, and developmental needs (Nabi et al., 2017).

Furthermore, entrepreneurship education is often highly standardised, whereas entrepreneurial development requires flexibility, differentiation, and adaptive support (Florian & Black-Hawkins, 2011; Van de Pol et al., 2010). The chapter concludes that entrepreneurship education should be better understood as a developmental process in which learning trajectories are aligned with the specific needs and starting points of individual students.

Based on the literature review, several propositions and hypotheses are formulated that provide the foundation for the empirical chapters of this dissertation.

Chapter 3

Adaptive Teaching Practice & Personal Professional Knowledge in Entrepreneurship Education

Chapter 3 focuses on the role of educators. It examines how educators shape entrepreneurship education, how they adapt their guidance to students, and the role that personal professional knowledge plays in this process.

A qualitative case study was conducted within a programme in which students establish and operate their own businesses. Through interviews and observations, the study examined how educators apply scaffolding during entrepreneurial learning processes.

The results show that educators continuously shift between providing structure and allowing autonomy. Common scaffolding strategies include providing feedback, asking questions, and modelling through practical examples and storytelling (Van de Pol et al., 2010). Educators continually adapt their guidance to students' progress, motivation, and emotional state.

An important insight from this chapter is that effective guidance in entrepreneurship education is not merely cognitive in nature, but also strongly emotional and relational. Educators support students not only in terms of content, but also in dealing with uncertainty, fear of failure, and lack of self-confidence. Psychological safety emerges as an important prerequisite for entrepreneurial learning (Edmondson, 1999).

The research also demonstrates considerable differences between educators in how they provide guidance. Some place greater emphasis on autonomy and experimentation, while others provide more structure and clarity. The most effective guidance appears to combine elements of both approaches.

The chapter concludes that adaptability and situational responsiveness are essential characteristics of effective entrepreneurship education. Personal professional knowledge (PPK) plays an important role in this process, as educators draw on experience, intuition, and reflection to determine when to provide direction and when to create space for students to act independently (Clandinin & Connelly, 1996).

Chapter 4

Entrepreneurial Mindset Archetypes

Chapter 4 examines the different entrepreneurial mindset profiles that exist among students and how these differences relate to entrepreneurial development.

The study began with focus groups, interviews, and diary studies in which students described their experiences within entrepreneurship education. These qualitative insights resulted in preliminary profiles of students who responded differently to identical educational interventions.

Subsequently, quantitative research was conducted among 834 students. Through cluster analysis, five entrepreneurial mindset archetypes were identified:

- **Visionary Risktaker**
- **Pragmatic Innovator**
- **Adaptive Opportunist**
- **Systemic Executor**
- **Resilient Pioneer**

These archetypes differ in, among other aspects, motivation, ability to act, approaches to risk, need for structure, and ways of learning.

The results demonstrate that the same educational intervention can be experienced very differently by different students. Students with a strong need for autonomy, for example, may experience open-ended assignments as motivating, whereas students who require greater structure may instead experience them as a source of uncertainty.

The chapter builds on the Ability × Willingness approach of Hattenberg et al. (2022), in which entrepreneurial development is conceptualised as an interplay between the ability to act and the willingness to do so. The findings also align with Sarasvathy's (2001) effectuation theory and Dimov's conceptualisation of entrepreneurship as an iterative developmental process (2007; 2010).

The chapter demonstrates that entrepreneurial development does not follow a uniform trajectory and that differentiation within entrepreneurship education is necessary to effectively support different types of students.

Chapter 5

Tailoring Scaffolding to Entrepreneurial Mindset Profiles

Chapter 5 examines which scaffolding strategies are effective for different entrepreneurial mindset archetypes.

Through experimental research and reflective analyses, the study investigated how students with different mindset profiles respond to varying forms of guidance, autonomy, and structure. The results show that the effectiveness of scaffolding strongly depends on the student's mindset profile. Students differ in their need for guidance, feedback, structure, and opportunities for experimentation. While some students benefit from open and exploratory assignments, others require clear frameworks and step-by-step guidance.

Based on these findings, the **Adaptive Entrepreneurial Development Framework (AEDF)** is developed. This framework links different mindset archetypes to appropriate forms of guidance and scaffolding.

The AEDF provides educators with practical guidance for better aligning entrepreneurship education with students' individual developmental needs. In this approach, entrepreneurship education is not understood as teaching students fixed step-by-step procedures, but rather as a process through which students learn to deal with uncertainty, responsibility, and value creation.

The chapter builds on previous research into scaffolding and the Zone of Proximal Development (Vygotsky, 1978; Wood et al., 1976) and emphasises that effective support depends on the extent to which guidance is aligned with the student's stage of development.

Chapter 6

General Discussion and Conclusions

The final chapter brings together the main findings of the dissertation.

The central conclusion is that entrepreneurial development is neither a linear nor a uniform process, but rather a relational and context-dependent developmental process in which differences between students play a central role. Effective entrepreneurship education therefore requires adaptive guidance in which educators tailor their support to students' developmental needs.

The dissertation demonstrates that entrepreneurship education is not merely concerned with knowledge transfer or startup creation, but primarily with developing self-confidence, the capacity to act, and the ability to act meaningfully under conditions of uncertainty.

Furthermore, it concludes that many essential teaching capabilities are implicit in nature. Intuition, timing, relational sensitivity, and personal professional knowledge prove crucial to effectively supporting entrepreneurial development.

The findings have implications for educators, educational institutions, and policymakers.

Entrepreneurship education should provide greater scope for differentiation, process-oriented learning, and development-oriented assessment. Evaluation should therefore focus not only on measurable outputs, but also on identity development, self-confidence, and personal growth.

Ultimately, this dissertation positions entrepreneurship education as a human-centred developmental process in which interaction, trust, and adaptability are central. Entrepreneurial development does not occur in isolation, but in relation to others.

Appendix D: Nederlandse samenvatting

Hoofdstuk 1

Algemene introductie

Ondernemerschapsonderwijs heeft zich de afgelopen decennia ontwikkeld tot een belangrijk onderdeel van het hoger onderwijs. Waar ondernemerschap traditioneel vooral werd gekoppeld aan het starten van bedrijven, ligt de nadruk tegenwoordig steeds vaker op het ontwikkelen van een ondernemende mindset: het vermogen om kansen te herkennen, met onzekerheid om te gaan, initiatief te nemen en waarde te creëren in uiteenlopende contexten (Fayolle & Gailly, 2008; Neck & Greene, 2011). Tegelijkertijd wordt de hedendaagse samenleving gekenmerkt door toenemende complexiteit, onzekerheid en snelle veranderingen, waardoor ondernemende vaardigheden en houdingen steeds relevanter worden (Dimov, 2020).

Ondanks de groei van ondernemerschapsonderwijs bestaat er nog steeds onduidelijkheid over hoe ondernemende ontwikkeling daadwerkelijk plaatsvindt binnen onderwijscontexten. Veel onderzoek richt zich op de vraag waarom ondernemerschapsonderwijs belangrijk is en wat studenten zouden moeten leren, maar er is relatief weinig aandacht voor de pedagogische processen waarmee ondernemende ontwikkeling wordt ondersteund (Fayolle, 2007; Lackéus et al., 2015). Daarbij blijkt dat studenten zeer verschillend reageren op dezelfde onderwijsinterventies. Waar sommige studenten vrijheid en onzekerheid als motiverend ervaren, voelen anderen zich hierdoor juist geremd of overweldigd.

Dit proefschrift onderzoekt daarom hoe ondernemerschapsonderwijs beter kan worden afgestemd op verschillen tussen studenten door middel van adaptieve scaffolding en responsief docentschap. De centrale onderzoeksvraag luidt:

Hoe kan ondernemerschapsonderwijs worden afgestemd op diverse ondernemende mindsetprofielen door middel van adaptieve scaffolding en docentresponsiviteit?

Het theoretisch kader van dit proefschrift is gebaseerd op inzichten uit onder andere de Zone of Proximal Development van Vygotsky (1978), scaffolding-theorie (Wood, Bruner, & Ross, 1976), de leertheorie van Illeris (2003, 2018), het SECI-model van Nonaka en Takeuchi (1995), en Sarasvathy's effectuation theory (2001). Gezamenlijk beschouwen deze theorieën ondernemend leren als een iteratief, sociaal en contextafhankelijk ontwikkelproces.

Het onderzoek bestaat uit een mixed-methods onderzoeksopzet waarin literatuuronderzoek, kwalitatieve casestudies, kwantitatieve profielanalyses en experimenteel onderzoek gecombineerd worden. De hoofdstukken van dit proefschrift bouwen stapsgewijs voort op elkaar: van theoretische verkenning naar docentpraktijken, mindset-archetypen en uiteindelijk adaptieve onderwijsstrategieën.

Hoofdstuk 2

Exploring the gap between theory and practice

In hoofdstuk 2 wordt onderzocht welke pedagogische en didactische benaderingen momenteel worden gebruikt binnen ondernemerschapsonderwijs en hoe deze theoretisch worden onderbouwd. Hiervoor is een narratieve literatuurstudie uitgevoerd waarin ondernemerschapsonderwijs werd geanalyseerd vanuit de vragen waarom ondernemerschapsonderwijs plaatsvindt, wat er geleerd wordt en hoe dit onderwijsvorm krijgt (Fayolle & Gailly, 2008).

Uit de literatuur blijkt dat ondernemerschapsonderwijs vaak gericht is op meetbare output, zoals businessplannen, pitches of startupcreatie. Tegelijkertijd wordt ondernemerschap in theorie juist beschreven als een iteratief, onzeker en niet-lineair proces (Sarasvathy, 2001; Dimov, 2020). Hierdoor ontstaat een spanningsveld tussen de praktijk van ondernemerschap en de wijze waarop ondernemerschapsonderwijs vaak georganiseerd en beoordeeld wordt (Honig, 2004; Neck & Corbett, 2018).

In dit hoofdstuk worden acht theoretische perspectieven gebruikt om deze spanning te analyseren, waaronder effectuation theory, scaffolding, learner diversity, learner-following educational design en het

SECI-model. De analyse laat zien dat veel onderwijsprogramma's onvoldoende rekening houden met verschillen tussen studenten in motivatie, zelfvertrouwen, handelingsbekwaamheid en ontwikkelbehoeften (Nabi et al., 2017).

Daarnaast blijkt dat ondernemerschapsonderwijs vaak sterk gestandaardiseerd is, terwijl ondernemende ontwikkeling juist vraagt om flexibiliteit, differentiatie en adaptieve ondersteuning (Florian & Black-Hawkins, 2011; Van de Pol et al., 2010). Het hoofdstuk concludeert dat ondernemerschapsonderwijs beter begrepen moet worden als een ontwikkelingsproces waarbij leertrajecten aansluiten op de specifieke behoeften en uitgangspunten van individuele studenten.

Op basis van de literatuurstudie worden verschillende proposities en hypothesen geformuleerd die de basis vormen voor de empirische hoofdstukken van dit proefschrift.

Hoofdstuk 3

Adaptive Teaching Practice & Personal Professional Knowledge in Entrepreneurship Education

In hoofdstuk 3 staat de rol van docenten centraal. Onderzocht wordt hoe docenten ondernemerschapsonderwijs vormgeven, hoe zij hun begeleiding aanpassen aan studenten en welke rol persoonlijke professionele kennis hierbij speelt.

Hiervoor is een kwalitatieve casestudie uitgevoerd binnen een programma waarin studenten een eigen onderneming opzetten. Door middel van interviews en observaties werd onderzocht hoe docenten scaffolding toepassen tijdens ondernemende leerprocessen.

De resultaten laten zien dat docenten voortdurend schakelen tussen structuur bieden en autonomie geven. Veelgebruikte scaffoldingstrategieën zijn feedback geven, vragen stellen en modelling door middel van praktijkvoorbeelden en storytelling (Van de Pol et al., 2010). Docenten blijken hun begeleiding voortdurend aan te passen aan de voortgang, motivatie en emotionele toestand van studenten.

Een belangrijk inzicht uit dit hoofdstuk is dat effectieve begeleiding in ondernemerschapsonderwijs niet alleen cognitief van aard is, maar ook sterk emotioneel en relationeel. Docenten ondersteunen studenten niet alleen inhoudelijk, maar helpen hen ook omgaan met onzekerheid, angst voor falen en gebrek aan zelfvertrouwen. Psychologische veiligheid blijkt hierbij een belangrijke voorwaarde voor ondernemend leren (Edmondson, 1999).

Daarnaast laat het onderzoek zien dat docenten sterk verschillen in hun manier van begeleiden. Sommige docenten leggen meer nadruk op autonomie en experimenteren, terwijl anderen meer structuur en duidelijkheid bieden. De meest effectieve begeleidingssituaties blijken een combinatie van beide benaderingen te bevatten.

Het hoofdstuk concludeert dat adaptiviteit en situationeel handelen essentiële kenmerken zijn van effectief ondernemerschapsonderwijs. Persoonlijke professionele kennis (PPK) speelt hierbij een belangrijke rol, omdat docenten op basis van ervaring, intuïtie en reflectie bepalen wanneer zij moeten sturen en wanneer zij ruimte moeten geven (Clandinin & Connelly, 1996).

Hoofdstuk 4

Entrepreneurial Mindset Archetypes

In hoofdstuk 4 wordt onderzocht welke verschillende ondernemende mindsetprofielen onder studenten bestaan en hoe deze verschillen samenhangen met ondernemende ontwikkeling.

Het onderzoek begon met focusgroepen, interviews en dagboekstudies waarin studenten hun ervaringen binnen ondernemerschapsonderwijs beschreven. Op basis hiervan ontstonden voorlopige profielen van studenten die verschillend reageerden op identieke onderwijsinterventies.

Vervolgens werd kwantitatief onderzoek uitgevoerd onder 834 studenten. Door middel van clusteranalyse werden vijf ondernemende mindset-archetypen geïdentificeerd:

- Visionary Risktaker
- Pragmatic Innovator
- Adaptive Opportunist
- Systemic Executor
- Resilient Pioneer

Deze archetypen verschillen onder andere in motivatie, handelingsbekwaamheid, omgang met risico's, behoefte aan structuur en wijze van leren.

De resultaten laten zien dat dezelfde onderwijsinterventie door verschillende studenten totaal anders kan worden ervaren. Studenten met veel behoefte aan autonomie ervaren open opdrachten bijvoorbeeld als motiverend, terwijl studenten die meer behoefte hebben aan structuur hierdoor juist onzeker kunnen worden.

Het hoofdstuk bouwt voort op de Ability × Willingness-benadering van Hattenberg et al. (2022), waarin ondernemende ontwikkeling wordt gezien als een samenspel tussen handelingsbekwaamheid en bereidheid om te handelen. Tevens sluiten de bevindingen aan bij Sarasvathy's effectuation theory (2001) en Dimovs visie op ondernemerschap als een iteratief ontwikkelproces (2007; 2010).

Het hoofdstuk laat zien dat ondernemende ontwikkeling niet uniform verloopt en dat differentiatie in ondernemerschapsonderwijs noodzakelijk is om verschillende typen studenten effectief te ondersteunen.

Hoofdstuk 5

Tailoring Scaffolding to Entrepreneurial Mindset Profiles

In hoofdstuk 5 wordt onderzocht welke scaffoldingstrategieën effectief zijn voor verschillende ondernemende mindset-archetypen.

Door middel van experimenteel onderzoek en reflectieve analyses werd gekeken hoe studenten met verschillende mindsetprofielen reageren op uiteenlopende vormen van begeleiding, autonomie en structuur.

De resultaten tonen aan dat de effectiviteit van scaffolding sterk afhankelijk is van het mindsetprofiel van de student. Studenten verschillen in hun behoefte aan begeleiding, feedback, structuur en experimenteerruimte. Waar sommige studenten profiteren van open en exploratieve opdrachten, hebben anderen juist behoefte aan duidelijke kaders en stapsgewijze begeleiding.

Op basis van deze bevindingen wordt het **Adaptive Entrepreneurial Development Framework (AEDF)** ontwikkeld. Dit framework koppelt verschillende mindset-archetypen aan passende vormen van begeleiding en scaffolding.

Het AEDF biedt docenten handvatten om ondernemerschapsonderwijs beter af te stemmen op individuele ontwikkelbehoeften van studenten. Daarbij wordt ondernemerschapsonderwijs niet gezien als het aanleren van vaste stappenplannen, maar als een proces waarin studenten leren omgaan met onzekerheid, verantwoordelijkheid en waardecreatie.

Het hoofdstuk sluit aan bij eerder onderzoek naar scaffolding en de Zone of Proximal Development (Vygotsky, 1978; Wood et al., 1976) en benadrukt dat effectieve ondersteuning afhankelijk is van de mate waarin begeleiding aansluit op de ontwikkelingsfase van de student.

Hoofdstuk 6

Algemene discussie en conclusies

In het afsluitende hoofdstuk worden de belangrijkste bevindingen van het proefschrift samengebracht.

De centrale conclusie is dat ondernemende ontwikkeling geen lineair of uniform proces is, maar een relationeel en contextafhankelijk ontwikkelproces waarin verschillen tussen studenten centraal staan. Effectief ondernemerschapsonderwijs vraagt daarom om adaptieve begeleiding waarbij docenten hun ondersteuning afstemmen op de ontwikkelbehoeften van studenten.

Het proefschrift laat zien dat ondernemerschapsonderwijs niet alleen draait om kennisoverdracht of startupcreatie, maar vooral om het ontwikkelen van zelfvertrouwen, handelingsvermogen en het vermogen om betekenisvol te handelen onder onzekerheid.

Daarnaast wordt geconcludeerd dat veel essentiële docentvaardigheden impliciet van aard zijn. Intuïtie, timing, relationele sensitiviteit en persoonlijke professionele kennis blijken cruciaal voor het effectief begeleiden van ondernemende ontwikkeling.

De bevindingen hebben implicaties voor docenten, onderwijsinstellingen en beleidsmakers. Ondernemerschapsonderwijs zou meer ruimte moeten bieden voor differentiatie, procesgericht leren en ontwikkelingsgerichte evaluatie. Daarbij dient niet alleen gekeken te worden naar meetbare output, maar ook naar identiteitsontwikkeling, zelfvertrouwen en persoonlijke groei.

Uiteindelijk positioneert dit proefschrift ondernemerschapsonderwijs als een mensgericht ontwikkelproces waarin interactie, vertrouwen en adaptiviteit centraal staan. Ondernemende ontwikkeling ontstaat niet in isolatie, maar in relatie tot anderen.

Na- en dankwoord

Als ik nu terugkijk op de weg naar dit proefschrift, is het verleidelijk om er een logisch verhaal van te maken. Alsof de ene stap vanzelf op de andere volgde en er ergens aan het begin al een pad lag dat uiteindelijk bij dit boek zou uitkomen.

Zo is het natuurlijk helemaal niet gegaan.

Er waren ideeën die nergens toe leidden, plannen die veranderden, gesprekken die onverwacht alles in beweging zetten en afslagen waarvan ik pas veel later begreep hoe bepalend ze waren. En vooral waren er onderweg steeds weer mensen. Mensen die vragen stelden, me tegenspraken en hielpen. Die vertrouwen gaven, deuren openden of gewoon naast me bleven staan terwijl ik zelf nog niet precies wist waar ik naartoe ging.

Misschien past dat wel heel goed bij dit proefschrift. Want als ik in dit onderzoek iets heb geleerd, dan is het dat ontwikkeling zelden een rechte lijn volgt. We ontwikkelen ons in interactie met anderen. Door wat iemand ons leert, door een vraag die ons anders laat kijken, door vertrouwen dat precies op het juiste moment wordt uitgesproken. En soms doordat iemand mogelijkheden in ons ziet die we zelf nog niet zien.

Veel van de mensen die hieronder staan, hebben dat voor mij gedaan.

Een reis die veel eerder begon

Mijn reis begon lang voordat ik wist dat er ooit een proefschrift aan het einde ervan zou liggen.

Tijdens mijn studie richtte ik samen met **Theo, Niek, Maarten en Mark** de Hanze Studentenbelangen Vereniging op. Later vormde ik met **Johan en Steven** het tweede bestuur. Misschien zat daar al iets in wat steeds terug zou komen: de nieuwsgierigheid naar hoe onderwijs werkt en de behoefte om dingen die volgens mij anders of beter konden ook daadwerkelijk anders te proberen te doen.

Na mijn studie ging ik met **Niek** verder bij YEAH!. Daar ontmoette ik vooral heel veel ondernemers. Mensen met ideeën, plannen, mislukkingen, nieuwe plannen en de neiging om gewoon te beginnen. Sommige van hen kom ik bijna twintig jaar later nog steeds tegen.

Met **Remko** begon ik in die periode ook aan iets wat we Jonge Honden noemden. We wilden jong en gevestigd ondernemerschap met elkaar verbinden. We konden toen onmogelijk vermoeden wat daar jaren later allemaal uit zou voortkomen.

Vanuit YEAH! mocht ik één dag per week studenten van het Alfa-college begeleiden. Daar ontmoette ik **Adri en Albert**. Met Albert zou ik veel later samen BECEE schrijven. Maar de belangrijkste ontdekking was eenvoudiger.

Op de dagen dat ik met studenten werkte, ging ik fluitend naar mijn werk.

Tijdens een lezing over YEAH! ontmoette ik **Sonja**. Zij stelde me een vraag die mijn leven behoorlijk heeft veranderd: of onderwijs misschien iets voor mij was.

Sonja, ik vermoed dat jij destijds niet hebt kunnen voorzien hoeveel je met die ene vraag in beweging zette.

Ik in ieder geval niet.

Frans gaf me vervolgens de kans. **Wilma, Debbie, Jacques, André, Rudi, Martin en Rinze**: met jullie leerde ik het vak vooral door het te doen. Tijdens mijn master hielpen **Paul, Douwe, Hardus, Vincent en Hillary** me beter te begrijpen wát ik eigenlijk aan het doen was.

Van **Henk, Rob en Paul** kreeg ik daarna de ruimte om te experimenteren met onderwijs dat nog niet helemaal bestond.

En ergens tijdens die experimenten zat **Klaske** naar mij te kijken.

Klaske, tijdens onze experimenten met de dedicated classroom zag jij misschien eerder dan ikzelf dat ik niet alleen graag onderwijs ontwikkelde, maar ook opvallend veel plezier beleefde aan het onderzoeken waarom iets wel of niet werkte. Je hielp me ontdekken dat onderzoek misschien wel bij mij paste.

Achteraf bleek dat een behoorlijk belangrijke afslag.

Onderzoeker worden

Karel Jan, jij gaf die zoektocht vervolgens letterlijk ruimte door mij als nul-urenonderzoeker bij Marklinq aan te stellen. Nul uren klinkt misschien niet direct als het begin van een wetenschappelijke carrière, maar voor mij was het een belangrijke stap. Je gaf me een plek om onderzoeker te zijn, nog voordat ik mezelf helemaal zo zag.

Er waren meer mensen die blijkbaar iets in mij zagen voordat ik het zelf helemaal zag.

Marca, als lector inspireerde jij me in mijn denken over talentontwikkeling, honours en de ruimte die mensen nodig hebben om zich te ontwikkelen. Maar minstens zo belangrijk was het vertrouwen dat je mij gaf in mijn eigen mogelijkheden.

En **Alexander**, tot mijn complete verrassing had jij mij voorgedragen voor een PhD-traject. Achteraf vind ik dat een van de mooiste gedachten van deze reis: dat anderen soms mogelijkheden in je zien voordat je ze zelf kunt zien. Klaske, Karel Jan, Marca en Alexander, dank jullie wel dat jullie dat bij mij deden.

Met **Elanor, Maarten, Pieter, Sanne en Liesbeth** ging vervolgens de wereld van honours voor me open. Vanuit het vertrouwen van **Paul en Sonja** mocht ik samen met **Marieke, Mieke, Arjen en Debbie** honours een plek geven in ons eigen onderwijs.

Het lectoraat en de vrijdagochtenden van TOHOS werden ondertussen een soort academische thuisbasis. De mensen aan tafel veranderden door de jaren heen, maar **Marca, Elanor, Jorien, Annegien, Liesbeth, Aafke, Maaike, Judith, Leontien, Peter** en alle anderen die daar aanschoven: jullie lazen, vroegen, dachten mee en spraken tegen. Veel van wat ik over onderzoek heb geleerd, gebeurde gewoon op die vrijdagochtenden.

Elanor, eerst binnen honours en later als lector heb jij me steeds opnieuw vertrouwen gegeven in mijn ontwikkeling als onderzoeker.

Jorien, jij liep als begeleider een deel van de eerste route van mijn promotietraject met mij mee. Door ziekte kon dat niet de gezamenlijke reis worden die we voor ogen hadden, maar jouw bijdrage aan het begin ervan hoort bij dit verhaal.

En **Peter**, ook na TOHOS bleven onze wegen elkaar kruisen. Ik koester onze gesprekken over vroeger op de WP, de relativering en het feit dat ik ook in de laatste hectische fase nog bij je kon aankloppen.

Aard, vanaf het begin was jij mijn promotor. Via jou kwam ik terecht bij VentureLab en ontmoette ik **Olga, Dagmar, Sylvia, Inna, Arjen, Cees-Jan en Sean**. Het was een wereld waarin mensen en ideeën voortdurend bij elkaar werden gebracht en waarin ik steeds beter begon te begrijpen wat *entrepreneurial mindset* eigenlijk betekende.

Dat bij elkaar brengen van mensen is misschien wel iets wat ik het meest met jou associeer. Jij gaat ervan uit dat er iets ontstaat wanneer mensen elkaar ontmoeten, inspireren, uitdagen en helpen.

Zo heb je mij ook begeleid.

Je gaf me de ruimte om van dit onderzoek echt mijn onderzoek te maken. Je vragen dwongen me regelmatig nog een laag dieper te gaan, maar je vertelde me nooit welk antwoord ik moest vinden. Je hielp me betere vragen te stellen.

Voor een proefschrift over mensen die hun eigen ontwikkelroute moeten kunnen vinden, had ik me nauwelijks een passender promotor kunnen wensen.

En toen, bijna aan het einde van de reis, kwam **Jan**.

Na jaren van schrijven, twijfelen, aanpassen en opnieuw beginnen verwachtte ik bij je eerste feedback vooral een nieuwe lijst met dingen die nog beter moesten.

Die kwam ongetwijfeld ook.

Maar eerst zei je hoe goed je vond wat er lag.

Dat heeft me meer geraakt dan je waarschijnlijk hebt beseft. Op precies het goede moment gaf je me iets terug wat onderweg soms naar de achtergrond was verdwenen: vertrouwen in mijn eigen academische kunnen.

Dat vertrouwen neem ik mee tot ver voorbij mijn verdediging.

Een wereld die steeds groter werd

Ondertussen ging het gewone werk natuurlijk gewoon door. Alhoewel 'gewoon' misschien niet helemaal het juiste woord is.

Toen **Petra P.** Sonja opvolgde, ontstond met **Petra K., Wendy, Arjen, Ellis, Lex, Previen, Warner, Gea, Anneke, Bas en Rob** een volgende periode van samen onderwijs maken en ontwikkelen. **Peter I.**, die Paul opvolgde, gaf me daarin veel ruimte en vertrouwen. Onze gesprekken over onderwijs, bestuur, leiderschap en ondernemerschap heb ik altijd als bijzonder wederkerig ervaren.

Na zestien jaar onderwijs bracht **Carla** me in contact met **Vanessa** en uiteindelijk bij Hanze Ondernemen. Met **Ingrid, Aziem, Jan, Floor, Jorg, Immo, Lisette** en alle anderen ging het ineens niet meer alleen over ondernemerschapsonderwijs binnen één opleiding, maar over hoe we dat voor studenten in een hele regio konden organiseren.

En daar kwam ook **Danny** weer op mijn pad.

Danny, ik leerde je kennen als student binnen honours en begeleidde later je afstuderen bij Hanze Ondernemen. Inmiddels ben je mijn collega en in het adviseren over ondernemerschapsonderwijs mijn steun en toeverlaat. Ik leg ideeën bij je neer als ze nog half af zijn, vertrouw op je oordeel en leer inmiddels net zo goed van jou.

Dat de verhouding tussen docent en student zich zo kan ontwikkelen, vind ik een van de mooiste dingen aan werken in het onderwijs.

De wereld werd ook letterlijk groter. Binnen **STARS EU** vond ik met **Rima, Anja, Patricia, Elana en Hein** en alle andere collega's een Europese gemeenschap waarin we samen bouwen aan onderwijs over grenzen heen. Binnen het **NLPO** vond ik met **Ageeth, Lianne, Juanfra, Judith, Maarten en Thomas** mensen met wie ik dichterbij huis aan diezelfde ambitie kon werken. Thomas, in onze gesprekken over de ondernemende mindset herken ik steeds opnieuw een gelijkgestemde.

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BECCE bracht daar met **Alisha, Josca, Jos, Bill, Rachel, Helen, Ultan, Christian, Marina, Redi, Denada, Rezarta, Marsida en Ariola** weer een internationale dimensie bij. We ontwikkelden, reisden en leerden samen en probeerden iets te bouwen dat over de grenzen van onze instellingen en landen heen betekenis heeft.

Ook de samenwerking met het mbo werd steeds belangrijker. **Jurgen en Christiaan** bij het Alfa-college en **Tieny, Irene, Pieter en Jeroen** bij Noorderpoort: dank voor het vertrouwen en voor de gedeelde overtuiging dat goed ondernemerschapsonderwijs zich weinig hoeft aan te trekken van grenzen tussen instellingen of onderwijssectoren.

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René, met jou zoek ik naar manieren om de samenwerking met de strategische partners van de Hanze verder te versterken en soms opnieuw uit te vinden. **Anouk**, vanuit verschillende invalshoeken vinden wij elkaar in de vraag hoe we de verbinding met het mkb sterker en betekenisvoller kunnen maken.

En dan zijn er de vele **studenten en studentondernemers** met wie ik in al die jaren heb mogen werken. Sommigen ontmoette ik met niet veel meer dan een eerste idee en kom ik jaren later weer tegen als ondernemer, collega of partner. Misschien is er weinig in mijn werk dat mij meer voldoening geeft dan dat.

Als ik al deze namen teruglees, realiseer ik me hoeveel mensen ik onderweg heb leren kennen. En zelfs dan ontbreken er nog velen. Mensen met wie ik heb gewerkt, gebouwd, gedacht, gelachen, geprobeerd en soms gewoon iets ben begonnen zonder precies te weten waar het zou eindigen. Misschien is dat uiteindelijk niet de voetnoot bij deze reis, maar de kern ervan.

Veel van wat ik heb kunnen doen, kon bovendien alleen doordat mensen bereid waren vertrouwen te geven voordat precies duidelijk was wat dat zou opleveren. **Peter, Dick, Annemarie, Linda, Suzanne, Hilda, Patricia en Petra**: vanuit verschillende leidinggevende en bestuurlijke rollen hebben jullie mij die ruimte gegeven.

Soms is *ga het maar doen* de krachtigste vorm van ondersteuning die er bestaat.

De mensen onderweg

Sommige mensen lopen al heel lang mee.

Martijn, met jou bouwde ik Jonge Honden verder uit tot veel meer dan we ooit hadden kunnen voorzien. Maar belangrijker nog is wat er in al die jaren daarnaast is ontstaan. Je bent een steun en toeverlaat geweest, juist ook op momenten dat het leven wat ingewikkelder was. Iemand met wie ik kon klankborden, relativeren en delen wat er speelde.

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Dank je wel voor alles wat we samen hebben opgebouwd, maar vooral voor het feit dat je er was wanneer het ertoe deed.

En dan zijn er twee mensen die op de dag van mijn verdediging letterlijk naast me zullen staan: **Arjen en Wendy**.

Het aardige is dat jullie min of meer tegelijkertijd opnieuw of voor het eerst op mijn pad kwamen. Midden in COVID zat ik in de BAC voor jullie sollicitatiegesprekken. Bij Wendy vroeg ik me vooral af wat we moesten met een yogadame die iets met fietsen had gedaan. En Arjen — ooit een van mijn eerste studenten — bleek opeens een baard te hebben.

Het waren, achteraf bezien, niet mijn meest diepgravende observaties.

Gelukkig werden jullie allebei aangenomen.

Arjen, onze geschiedenis begon natuurlijk al veel eerder. Jij was een van mijn eerste studenten en inmiddels kan ik me mijn werk als onderzoeker nauwelijks voorstellen zonder jou als vaste rots en sparringspartner. Ergens onderweg veranderden docent en student in collega's en vervolgens in twee mensen die bij elkaar binnenlopen met een half idee, een ingewikkelde vraag of gewoon de behoefte om even hardop te denken.

Wendy, bij ons begon dat anders. Omdat ik volop met mijn promotie bezig was en het onderzoeksonderwijs niet meer alleen kon dragen, werden we samen hogeschooldocent onderzoek. We werden verantwoordelijk voor het afstuderen, schreven aan het landelijke opleidingsprofiel van ORM en vonden elkaar steeds meer in onze ideeën over onderzoek en onderwijs.

En ondertussen waren er de vele uren in het Forum. Naast elkaar werken, koffie, praten, weer werken — ik vaak aan dit proefschrift. Er was ruimte voor ideeën en concepten, maar ook voor twijfel, persoonlijke ontwikkeling en alles wat zich niet zo gemakkelijk in een agenda of taakomschrijving laat vangen.

Misschien is dat wat ik zo bijzonder vind aan jullie allebei. Er was en is **ruimte en tijd voor ontmoeting**. Om een half idee op tafel te leggen zonder dat het al af hoeft te zijn. Om te vragen, luisteren, spiegelen en relativeren. Om het soms over onderzoek te hebben en soms juist helemaal niet.

Jullie hebben mijn ideeën zien ontstaan, veranderen en soms weer verdwijnen. Maar jullie hebben ook **mij** zien veranderen.

En ik jullie.

Niet ieder gesprek hoefde ergens toe te leiden om toch iets in beweging te zetten. Achteraf denk ik dat juist in die ruimte veel van onze ontwikkeling heeft plaatsgevonden. Ieder op onze eigen manier, maar nooit helemaal alleen.

Dat ik straks promoveer met een van mijn eerste studenten en die yogadame die iets met fietsen had gedaan naast me, vind ik daarom eigenlijk ongelooflijk bijzonder.

Arjen en Wendy, ik had me geen betere paranimfen kunnen wensen.

Han, Wouter, Wietse, Ger, Gerben, Daniëlle en Martine: sommige vriendschappen lopen al zo lang mee dat je bijna vergeet hoe bijzonder dat eigenlijk is. Met een groot deel van jullie deel ik inmiddels meer dan dertig jaar geschiedenis. We hebben elkaar zien studeren, werken, relaties aangaan, gezinnen stichten, veranderen en ouder worden — al klinkt dat laatste ernstiger dan het hopelijk is.

Door de jaren heen is die kring veranderd en gegroeid, maar de vanzelfsprekendheid is gebleven. We zien elkaar lang niet altijd zoveel als we zouden willen. Maar als we elkaar weer zien, pakken we de draad weer op, praten, lachen en weten van elkaar wat er speelt.

We hoeven elkaar niet voortdurend te zien om te weten dat we bij elkaar horen.

En gelukkig wordt er ook nog steeds gespeeld.

Wietse, Ger, Wouter, Robert-Jan en Bert, al die jaren Dungeons & Dragons zijn voor mij veel meer gaan betekenen dan alleen een spel. En **Arnoud en Ashmir**, hetzelfde geldt voor onze avonden met Frosthaven en Magic: The Gathering. Juist in jaren waarin er altijd wel iets moest, waren dit momenten waarop er even helemaal niets hoefde. Gewoon samen aan tafel, spelen, lachen en een paar uur verdwijnen in een andere wereld.

Ik hoop dat we dat nog heel lang blijven doen.

Bij **Han en Robert-Jan** lopen die werelden dan toch weer mooi door elkaar. Han, jij bouwde de tool waarmee ik mijn onderzoeksdata kon verzamelen. Robert-Jan, met jou ontwikkel ik inmiddels zelfs een

game. Blijkbaar lukt het me ook tijdens het spelen niet altijd om werk en hobby volledig gescheiden te houden.

Als ik zo terugkijk op alle mensen, ontmoetingen en interacties onderweg, zie ik iets wat ik tijdens de reis zelf nooit zo heb kunnen zien.

De student die ooit begon met een belangenvereniging, de ondernemer, de docent, de onderwijsontwikkelaar, de adviseur en de onderzoeker waren misschien helemaal geen verschillende versies van mij. Ze waren steeds een volgende versie van hetzelfde verhaal.

Ik wist alleen nog niet waar het naartoe ging.

Misschien weet ik dat trouwens nog steeds niet.

En dat is eigenlijk wel een mooie gedachte.

Thuis

En dan zijn er de mensen voor wie woorden eigenlijk tekortschieten.

Ook mijn schoonfamilie hoort bij dit verhaal.

Roel en Berta, vanaf het moment dat ik onderdeel werd van jullie familie heb ik me daar altijd welkom gevoeld. Berta, jij hebt het einde van deze reis helaas niet meer mee kunnen maken. Tijdens je ziekte werd duidelijk hoe graag je mijn promotie nog had willen meemaken. Dat heeft mij geraakt en me ook aangespoord om in de laatste fase vaart te blijven maken.

Ergens in dit proefschrift ben je er toch een klein beetje bij. In een van de afbeeldingen zit een uiltje op een boom, kijkend naar Fay en Benja op hun reis. Niet iedereen die dit boek leest zal weten waarom het daar zit, maar wij weten het wel. Het is mijn kleine herinnering aan jou.

Anitia, met jou heb ik altijd een bijzondere klik gehad. Niet alleen omdat je de zus van Heidi bent, maar ook omdat we elkaar inhoudelijk gemakkelijk vinden. We kunnen praten over wat er in het leven speelt en net zo gemakkelijk een lolletje maken. Die combinatie waardeer ik enorm.

En **Roy**, jij bent misschien wel een van de rustigste mensen die ik ken. Waar ik nogal eens geneigd ben ergens vol enthousiasme in te duiken, straal jij een rust uit die ik bewonder. Gelukkig vinden we elkaar ook in iets waarvoor ingewikkelde woorden helemaal niet nodig zijn: onze gedeelde liefde voor LEGO.

Mama.

Zonder jou was ik er niet geweest. Letterlijk natuurlijk, maar ook op zoveel andere manieren.

Wij vinden het niet altijd gemakkelijk om elkaar te begrijpen. Misschien lijken we soms zelfs meer op elkaar dan voor ons allebei handig is. Er zijn momenten waarop woorden ons dichter bij elkaar brengen en momenten waarop precies diezelfde woorden het tegenovergestelde doen.

Maar wat er ook gebeurt: uiteindelijk vinden we altijd weer een weg naar elkaar.

Misschien hoort ook dat bij ontwikkeling. Dat begrijpen niet betekent dat je altijd hetzelfde ziet of hetzelfde voelt, maar dat je bereid bent opnieuw te blijven zoeken naar de ander.

Dank je wel dat jij dat met mij blijft doen.

Ik hou van je.

Fay, ergens in dit proefschrift zit een stukje van jou verstopt dat uiteindelijk veel groter is geworden dan ik ooit had kunnen bedenken. Dat moment samen in Edinburgh was gewoon een moment tussen een vader en zijn dochter. Pas later begreep ik dat jij mij daar iets liet zien waar ik als onderzoeker al heel lang naar op zoek was. Het werd een van de ankers van dit proefschrift.

Misschien is dat wel de mooiste illustratie van wat ik in al die jaren heb geleerd: soms vind je het antwoord op een wetenschappelijke vraag niet waar je ernaar zoekt, maar in een klein moment met iemand van wie je houdt.

Benja, jij hebt me iets anders geleerd. Jij hebt mij het verschil laten begrijpen tussen *vader zijn* en *papa zijn*. Dat klinkt misschien eenvoudig, maar voor mij is het een van de belangrijkste lessen van de afgelopen jaren.

Jij herinnert me eraan dat begrijpen soms begint met anders kijken. Dat wat voor de één vanzelfsprekend lijkt, dat voor een ander helemaal niet hoeft te zijn. En vooral dat nabijheid belangrijker kan zijn dan het juiste antwoord hebben.

Ik hoop dat ik nog heel lang van jou mag blijven leren.

En **Heidi**.

Jij hebt alle versies van mij tijdens dit traject meegemaakt. De enthousiaste versie die ineens zeker wist hoe alles in elkaar zat. De versie die uren achter een computer verdween. De twijfelende versie. De vermoeide versie. En waarschijnlijk ook een behoorlijk irritante versie die fysiek wel aanwezig was, maar in gedachten nog ergens midden in een hoofdstuk zat.

En toch was je er.

Je hebt me de ruimte gegeven om dit te doen, maar je hebt me vooral steeds opnieuw laten zien waarom die ruimte ertoe doet.

Niet vanwege een titel.

Niet vanwege een boek.

Niet vanwege wat er straks voor of achter mijn naam staat.

Maar vanwege wat daarbuiten ligt.

Jij bent de liefde van mijn leven. Dank je wel dat je mij, juist terwijl ik zo hard bezig was iets te begrijpen over ontwikkeling, steeds opnieuw liet zien wat werkelijk belangrijk is.

Dit proefschrift gaat over mensen die zich ontwikkelen en over de omgeving die we voor die ontwikkeling kunnen creëren. Over het vertrouwen dat nodig is om te proberen, te vallen, opnieuw te beginnen en uiteindelijk misschien ergens te komen waar je aan het begin nog helemaal niet aan had gedacht.

Wanneer ik terugkijk op mijn eigen reis, besef ik dat precies hetzelfde voor mij gold.

It is through interactions that we grow.

Ik heb dit proefschrift geschreven.

Maar jullie hebben mij geholpen de persoon te worden die het kon schrijven.

Dank jullie wel.

Curriculum Vitae

Jeroen Loef was born on 24 March 1980 in the Netherlands. His professional and academic career has been shaped by a longstanding fascination with entrepreneurship, education, and, above all, how people develop.

He studied Marketing at Hanze University of Applied Sciences, graduating with a Bachelor of Science in 2006. He subsequently completed an MBA at Edinburgh Business School, specialising in Marketing and Organisational Behaviour, followed by a Master of Education at NHL University of Applied Sciences. His master's research focused on the co-creation of the Zone of Proximal Development and marked an important shift in his work: from designing entrepreneurship education towards understanding how educational environments can support individual development.

Jeroen began his professional career in Groningen's entrepreneurial ecosystem, first as director of the YEAH! Incubator and, from 2007 onwards, at Hanze University of Applied Sciences. Over the following years, he worked as an educator, curriculum developer, researcher and educational innovator in entrepreneurship and innovation. He was closely involved in the development of entrepreneurship programmes, student companies and experiential learning environments.

Since 2023, he has worked as Strategic Advisor for Entrepreneurship Education at Hanze, supporting educational programmes and institutions in strengthening the quality and impact of entrepreneurship education. He is currently associate professor in New Entrepreneurship.

His work increasingly expanded from individual educational programmes to regional, national and European entrepreneurial ecosystems. Among other roles, he has coordinated the education theme within the Dutch City Deal Impact Ondernemen, contributed to the European STARS EU alliance, and worked on international entrepreneurship-education initiatives such as BECEE – Balanced & Enhanced Collaboration for an Entrepreneurship Ecosystem

In 2018, Jeroen started his PhD research at the University of Groningen. His research grew from a question rooted deeply in his own educational practice: *why does the same entrepreneurship education work so differently for different students?* His doctoral research examines the development of entrepreneurial mindsets and the role of scaffolding in supporting different developmental journeys. The work combines his interests in entrepreneurship, education, individual development and the interactions through which learning takes place. His research has also contributed to international scholarly work on entrepreneurial mindset and scaffolding, including research presented through the Academy of Management.

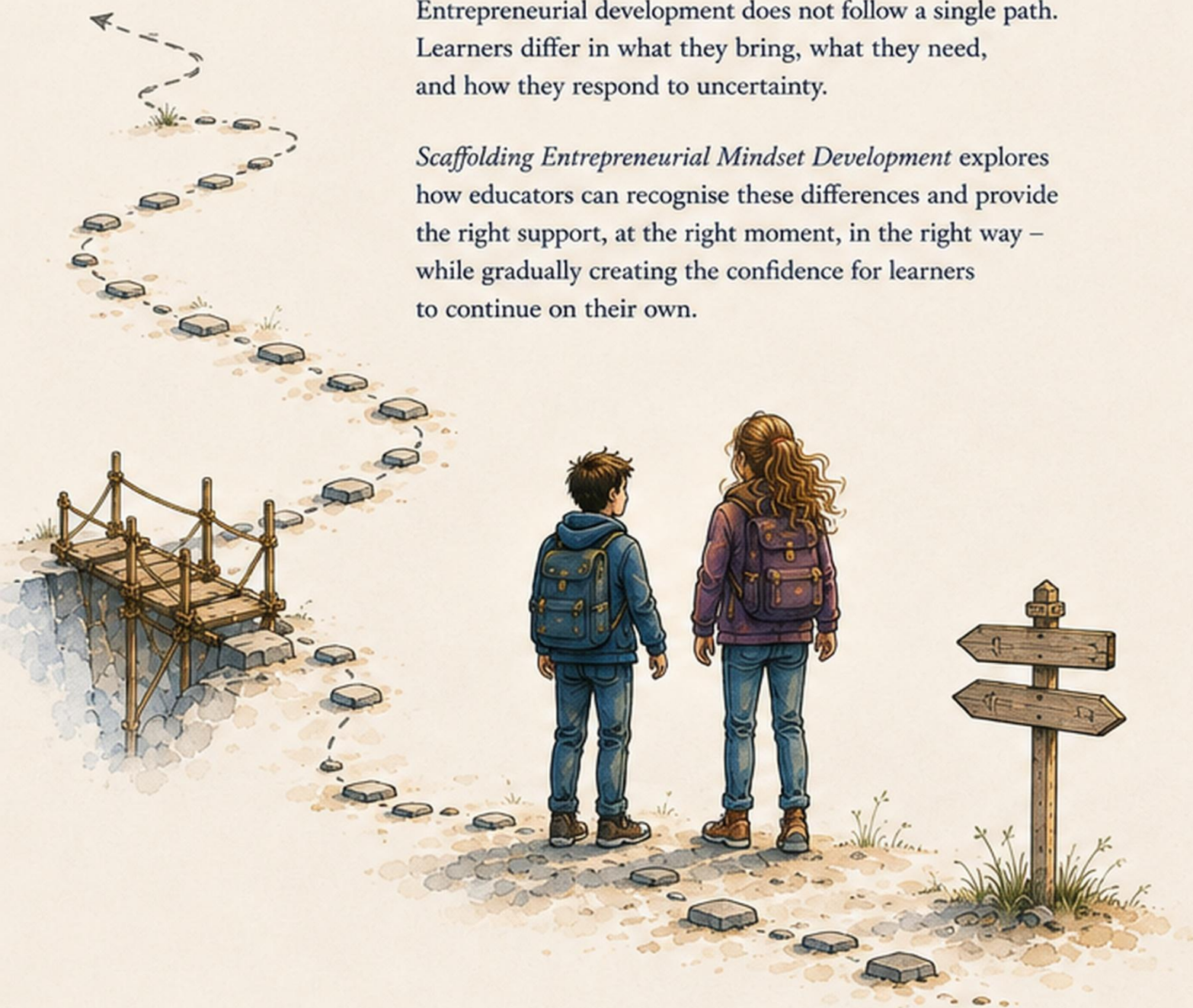
Across his roles as educator, researcher, advisor and programme developer, a consistent principle has guided his work: education should not prescribe a single pathway towards development but create environments in which people are given the confidence and support to discover and pursue their own. This principle ultimately became central to this dissertation and to what Jeroen describes as the **Gift of Confidence**.

Jeroen lives in Groningen with his wife Heidi and their children, Fay and Benja.

Different starting points. Different journeys.

Entrepreneurial development does not follow a single path. Learners differ in what they bring, what they need, and how they respond to uncertainty.

Scaffolding Entrepreneurial Mindset Development explores how educators can recognise these differences and provide the right support, at the right moment, in the right way – while gradually creating the confidence for learners to continue on their own.



Jeroen Loef

University of Groningen

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