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How self-directed experiential learning shapes the development of entrepreneurship competences: insights from reflective practice in an internship context

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Abstract

Purpose – The purpose of this study is to explore the development of entrepreneurship competences (EC) shaped by self-directed experiential learning (SDEL) within business and entrepreneurship studies internships.
Design/methodology/approach – The investigation applied deductive qualitative research guided by SDEL framework. Students' weekly reflections on entrepreneurship internships were analyzed to identify enabling and constraining behavior, affecting EC development. Seventeen undergraduate students provided their written consent to the use of their reflections for this study. Lists of keywords were then inductively derived from the coded data to characterize empirically confirmed SDEL patterns. Keyword distribution was analyzed throughout the reflections on EntreComp-defined competences.
Findings – The study identified distinct patterns through which self-directed learning (SDL) would either enable or limit the progression across Kolb's experiential learning (EL) phases in the development of EC. SDL manifested unevenly across EL phases, with strengths in dealing with concrete experience and reflective observation, along with notable limitations in engaging with conceptualization and experimentation. Contextual factors, task design and learner readiness had significantly shaped these outcomes.
Originality/value – The research advances a theoretical understanding of SDEL by mapping the emergence of its enabling and limiting elements in the SDL-EL interaction. Lists of keywords, assigned to the SDEL framework, propose a replicable tool for analyzing reflective texts, offering a way to anticipate, support and evaluate learning behaviors in educational contexts. The findings occurred in a natural learning environment, as students were not prompted to consider SDL or EL concepts. The disclosures represent authentic and spontaneous manifestations of SDEL occurrence in actuality.

Keywords Business and entrepreneurship education, Entrepreneurship competences, Self-directed experiential learning, Internship, Reflection

Paper type Research article

Introduction

A current economic environment demands skills, closely related to entrepreneurship, such as the ability to identify opportunities, to propose innovative solutions or to deal with uncertainty. Companies increasingly recognize the importance of entrepreneurship competences (EC) for their employees, which poses certain challenges for higher education.

Developing EC requires more than classroom-based instruction or passive knowledge transfer to students (Daniel *et al.*, 2024; Rahman *et al.*, 2024; Ribeiro *et al.*, 2022). It is in the

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nature of entrepreneurship education and training to cultivate entrepreneurial capacities and mindsets that contribute to economic and social growth by nurturing creativity, fostering innovation and encouraging self-employment (European Commission, 2015). Thus, entrepreneurship education extends beyond the transmission of knowledge to encompass behavior, mindset and real-world problem-solving. It involves the integration of experiential, interdisciplinary and learner-centered approaches when addressing the dynamic nature of EC development by challenging traditional pedagogies and calling for innovative educational designs or progressive strategies to foster self-direction, critical reflection and adaptability in authentic learning environments.

Inherent to the present investigation, experiential learning (EL) (Kolb, 1984) has been broadly recognized as a foundational approach to developing EC, particularly in practice-oriented and higher education settings (Hägg and Kurczewska, 2016; Neck and Greene, 2011; Pittaway and Cope, 2007). The European Entrepreneurship Competence Framework, EntreComp (European Commission, 2016), also aligns with experiential principles, advocating competence development through action and reflection.

Self-directed learning (SDL) has been acknowledged as a prerequisite for meaningful engagement in EL environments, enhancing learner agency in navigating EL phases (Loyens *et al.*, 2008). The interaction between SDL and EL has also been substantiated in literature, particularly, in the lifelong learning and adult education contexts (Illeris, 2007) as well as in higher education (Lim *et al.*, 2025; Mayombe, 2024; Morris and König, 2020). On that ground, self-directed experiential learning (SDEL) is being increasingly established as a self-sustaining theoretical construct, explored across various educational contexts through multiple disciplinary approaches, for instance, utilizing social media to engage in informal learning (Jim *et al.*, 2024), or enhancing entrepreneurship education (Morris and König, 2020), or examining the impact of the learning management system (Zainuddin and Perera, 2018).

SDEL's nature, specific and unique in every context, reflecting the manifestation of SDL within and across EL processes and specific phases, remains empirically underexplored in the context of EC development during students' internships. While both SDL and EL have been found to be interrelated constructs, little is known about how this integration unfolds in learning environments during a business and entrepreneurship studies (BES) internship. A need emerges to reveal how students' SDL-EL interaction behaviors enable or constrain EC development in work-based learning settings. This study addresses the identified gap by using reflective practice as an evidentiary lens to investigate how SDEL contributes to or limits the development of EntreComp-defined EC.

The purpose of this study is to clarify how, within business internships, SDEL shapes the development of EC. Our study advances a research track exploring diverse conceptual paradigmatic approaches to EC development (Aluthgama-Baduge *et al.*, 2024; Daniel *et al.*, 2024; Iarmosh *et al.*, 2024).

The present research applied a deductive qualitative (DQ) research design, guided by a theory-informed SDEL framework. Students' weekly reflections, completed during entrepreneurship internships, were analyzed to identify behaviors, enabling and/or limiting EC development, conceptualized by the SDEL framework. The reflections were produced at Kaunas University of Technology (KTU), Kaunas, Lithuania, in spring and fall semesters, 2024, by 33 enrolled students. Seventeen students provided written consent permitting the use of their reflections for this study.

Lists of keywords were then inductively derived from coded data to characterize empirically confirmed SDEL patterns. Keyword distribution was analyzed across EntreComp-defined competences.

In the following sections, we elaborate on SDEL as a conceptual approach to EC development, based on the SDL-EL interaction, which allows us to complete initial steps of the DQ research design (Fife and Gossner, 2024), formulating a research question and operationalizing a guiding theory by breaking down SDL and EL into their core dimensions, then mapping their interactions as a structured analytical framework.

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This analysis establishes a foundation for coding and analyzing the data, aimed at empirically testing the guiding theory by systematically examining the data for supporting, contradicting, refining or expanding the evidence (Fife and Gossner, 2024), related to the SDL-EL interaction model and its proposed role in EC development. Before deep diving into the data, we present the research context – the BES program, the internship framework and the EC reflection assignment. The theorizing step of the DQ research design involves deriving SDEL framework-linked keywords, proposed as semantic indicators for a replicable reflective text analysis, thereby contributing to the advancement of investigation on SDEL in the BES internship context. The results of the analysis are summarized by discussing a proposed keyword frequency count distribution across EC reflections.

Approaching the development of entrepreneurial competences from a self-directed experiential learning perspective

Varied approaches to the SDL-EL interaction explain the SDEL phenomenon. SDL might be seen as a result of EL (Lim *et al*., 2025; Mayombe, 2024), or SDL may be perceived as one of the EL factors (Jim *et al*., 2024; Seherrie, 2023). In the present research, we regard SDEL as occurring when learners apply SDL knowledge and competence in contexts established for active learning through gaining experience; they reflect on it and engage in active conceptualization and experimentation. We argue that students gain knowledge about SDL, develop SDL competence, and become ready for SDL during their studies at the university. The occurrence of SDEL, shaping EC, is then expected as students move to their BES internships at business companies. This conceptual approach stands in line with Morris and König (2020), who argue that SDL and EL function synergistically cultivating adaptability, essential for EC development. As such, the development of SDEL is to be recognized as a key objective within entrepreneurship education.

Analytical dimensions of SDL

Key aims of entrepreneurship education – equipping learners with essential knowledge, skills and the capacity to navigate complex, uncertain or dynamic environments – can be effectively achieved by fostering autonomy, critical thinking and continuous personal growth through SDL (Tseng, 2013). This claim is supported by extensive research on SDL, carried out by Knowles (1975), Brookfield (1985), Candy (1991), Garrison (1997), and others.

When learners assume responsibility and ownership of their development, they do not merely acquire knowledge but cultivate the ability to learn effectively across contexts. In research, SDL is conceptualized by such core dimensions as the learning process control, learner's characteristics, contextual factors and responsibility (Morris, 2023). Contextual factors, creating a favorable environment for SDL, are essential for empirical research, defining the research context. Learner's characteristics dimension is split into learner's SDL competence and SDL readiness. Thus, our SDL analytical framework includes three elements: *first*, learner's engagement in the SDL process (Knowles, 1975; Loeng, 2020; Morris, 2023); *second*, learner's SDL competence – essential skills, abilities and attitudes which enable effective SDL (Brockett and Hiemstra, 2018; Candy, 1991; Garrison, 1997); *third*, learner's SDL readiness (defined by Loeng (2020). Recent theoretical developments further reinforce the rationale for conceptualizing SDL as a structured and multi-layer construct. A systematic review by Morris *et al*. (2025) highlights that SDL is best understood as an integrated framework comprising behavioral processes, learner capabilities, and dispositions that shape how individuals engage in, navigate and benefit from educational environments. The review conclusions indicate that SDL encompasses interconnected elements that support learners' autonomy, meaning-making and capacity for purposeful engagement. This adds coherence for structuring SDL into process, competence and readiness dimensions. This layered structure

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provides the conceptual continuity needed to examine how SDL interacts with EL contexts. This relationship is explored in the following section.

EL environments required to unlock the SDL potential through SDEL

To realize its full learning potential, SDL requires both external conditions that provide meaningful opportunities for autonomy and decision-making as well as internal ability to manage those choices effectively (Brockett and Hiemstra, 2018; Candy, 1991; Garrison, 1997). External conditions, or contextual factors, as defined by Morris (2023), are conceptualized here from the EL perspective.

EL extends the SDL approach by emphasizing a critical role of real-life context experience in developing new knowledge. EL theory (Kolb, 1984) defines four learning cycle stages. This presents learning as a recurring and dynamic interaction between experience, reflection, conceptualization and experimentation. Effective EL involves movement throughout the four stages. This classical model features the importance of both grasping experiences through feeling or thinking and transforming them via reflection or action. It supports the idea that knowledge is not passively received but actively constructed through cycles of completing hands-on activities and reflecting (Kolb, 1984), which extends the SDL approach.

Morris and König (2020) and Morris (2019) highlight the integrative role of SDL and EL. SDL competence and actual practice not only enable individuals to navigate the uncertainties of entrepreneurial contexts but also enhance their capacity to respond constructively to broader organizational and societal changes. In this sense, SDL is positioned as a foundational capability for resilience and proactive behavior not only within entrepreneurial ventures but also in broader conduct of one's personal and professional life (Jim *et al.*, 2024; Lim *et al.*, 2025; Mayombe, 2024; Seherrie, 2023; Zainuddin and Perera, 2018).

Building on previous conceptual and empirical research (Illeris, 2007; Jim *et al.*, 2024; Lim *et al.*, 2025; Loyens *et al.*, 2008; Mayombe, 2024; Morris and König, 2020; Zainuddin and Perera, 2018), this investigation approaches SDEL as students' active learning, emerging in the EL environment in internships at business companies, expected to follow the EL phases of experience, reflection, conceptualization and experimentation. It roots SDEL in the SDL process principles, applying students' SDL competences, encouraged by students' SDL readiness.

The role of SDEL in student internships, fostering EC development

Entrepreneurial mindset and EC development are increasingly seen as a dynamic, experiential and reflective process rather than a linear acquisition of skills. Tan *et al.* (2024) emphasize the role of EL in developing EC. Practice-based engagement within entrepreneurship education enhances learning outcomes and supports the formation of an entrepreneurial mindset. As Slettli (2019) points out, entrepreneurship education and learning occur most effectively when learners are engaged in meaningful practice, exposed to critical events and supported in reflecting on their responses to uncertainty, risk or failure. BES students' internships underpin these conditions. However, in addition to having experience, learners must be encouraged to recognize disruption moments and use reflection to question their assumptions, behaviors, and emotional responses (Supe *et al.*, 2024), which is provided by fostering SDL in EL environments.

In internships, SDL and EL do not function as parallel processes. SDL elements act as driving forces for EL, mutually supporting the development of competences (Morris and König, 2020), essential for entrepreneurial success in rapidly evolving contexts, as demonstrated in the integrated conceptual model (see Figure 1). Conceptual and empirical studies support the integration of SDL and EL in the EC development. The systematic review by Motta and Galina (2023) shows that entrepreneurship courses using EL methods are most effective when learners take ownership of their learning and engage in reflective, self-initiated actions. EL approaches positively influence entrepreneurial

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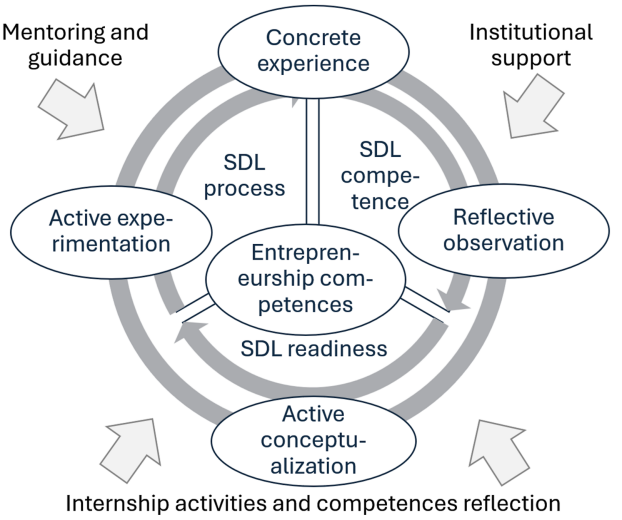


Figure 1. SDL-EL interrelation, forming SDEL for EC development in the context of BES internships. Source: Authors' own work

intention and the development of EC. Complementing this, Sonkar *et al*. (2026) found that learners' internal readiness factors and experiential engagement jointly shape social EC.

The provided stylized representation of the conceptual approach to the development of EC from the SDEL perspective clarifies that SDL–EL interaction (here defined as SDEL), shaping EC development, is expected to occur in students' internship environments, equipped with institutional support. Learners, though expected to engage in the SDEL process and apply SDL competence, are mentored and guided through their internships. Reflecting on internship activities and the identified EC is another essential element of the learning context. The presentation of these contextual elements is important for defining, from a conceptual point of view, a scene where the research object is expected to occur (Figure 1). Even though this investigation does not explore the characteristics of these contextual elements, awareness of those helps discern the nature of SDEL, which is our primary research object in this investigation.

Our guiding theory states that EC develop in the BES internship context through the EL cycle, driven by student engagement in SDL processes, utilizing SDL competence and support from personal SDL readiness (see Figure 1). This SDL–EL interaction, together with its empirical nature in the above-defined contextual environment, is the primary object of empirical research here. For now, the underlying theoretical framework should be perceived as a matrix, composed of SDL dimensions intersecting with the established EL phases. Each cell in this matrix defines respective theory-informed students' attitude-driven learning behavior. Full details will be discussed in the findings section.

To proceed with the DQ research design that aims at empirical testing of a theoretical approach, we subsequently operationalize the theory by defining theory-informed students' learning behavior and attitudes to learning, likely to enable or constrain EC development in an internship context. According to the DQ terminology (Fife and Gossner, 2024), we use sensitizing constructs which present a "useable version of the guiding theory that includes descriptions of its relevant components and mechanisms, as well as statements of relationship". To maintain consistency and clarity, we operationalize the guiding theory, also providing empirical evidence.

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Research context, data source and research method

Research context

Students of the BES program at KTU are encouraged to engage in SDEL throughout the two-semester internships at two different business companies. Internships are undertaken during the spring (third year of studies) and fall (fourth year of studies) semesters at organizations, selected through strategic collaboration with social partners of the study program.

Organizations actively contribute to the educational process by providing mentoring support, thereby fostering students' SDEL. During their internship, students operate within a supportive and dynamic learning ecosystem, embedded in an institutional environment, acquiring knowledge both from a company mentor, who provides structured guidance through the internship, and in collaborative interactions with colleagues within the organization. Each intern is not only granted organizational mentorship but is also assigned a university mentor who oversees his/her internship experience from both institutional and individual perspectives. This dual mentorship approach ensures that students receive comprehensive guidance, enabling them to effectively navigate and complete a full SDEL cycle.

Each internship comprises approximately 660 h of full-time engagement and lasts for four months. Student progress is assessed by means of weekly self-reflections, based on student's identified EC, outlined in the EntreComp framework, as well as through three interim evaluation interviews, conducted jointly by the student, his/her university mentor and the company mentor.

Weekly reflections are structured and substantiated with specific examples from internship activities, demonstrating how the selected EC were applied or challenged in a real-world context. In addition, students prepare a targeted plan for the further development of each reflected competence, promoting purposive learning and professional growth. University mentors assess these reflections using a predefined rubric that ensures consistency and alignment with the intended learning outcomes.

Reflective practice as an evidentiary lens to explore SDEL patterns. Reflection assignment

Reflective practice provides a scientifically grounded and methodologically robust lens for exploring how learners experience, interpret and internalize learning processes. It enables capturing learners' voices, perceptions and meaning-making in authentic settings (Moon, 2004; Schön, 1983; Tan *et al.*, 2024). Systematic reflection encourages deeper engagement with content and fosters change, essential for adaptive expertise in complex learning environments (Supe *et al.*, 2024). Feedback complements the process, helping learners monitor their development, identify gaps and continuously refine their learning strategies (Supe *et al.*, 2024).

Reflection plays a critical role in facilitating deep learning within SDEL frameworks, enabling learners to critically analyze their actions, draw meaningful insights, and reconstruct understanding in a way that supports long-term cognitive and professional development. In the context of SDEL, reflective practice offers direct insights as to how EC develop in practice-based internships, namely, students' exercise of autonomy, engagement in real-world challenges and process learning outcomes across Kolb's EL cycle stages.

The above-stated conceptual considerations shape the internship reflection assignment. Every week, interns select two EntreComp-covered (European Commission, 2016) competences, aligned with their activities, performed at the company over that week. Purposive and context-driven selection ensures relevance to real-time tasks and internship activities.

Open answers to structured reflection questions, aiming at explaining and justifying the given assessments of the evaluated competence threat, are sought. The reflection structure is adapted from established reflective learning models, such as Gibbs's reflective cycle (Gibbs, 1988). It incorporates three open-ended questions: "What happened? How did you recognize the selected competence during the last week in the internship company?",

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"How did the activities at the internship company reveal your existing competence or a perceived lack thereof?" and "How do you plan to strengthen or further develop this competence?"

To find evidence, over 900 reflections, each evaluating two competences, were collected during the spring and fall semesters of 2024. Reflections were created by 33 enrolled students. Seventeen students provided written consent to the use of their reflections for the present study. More than 500 reflections were analyzed. The word count of the analyzed text exceeded 450 thousand words.

Research design

Based on SDEL conceptualization, introduced in the first section of this article (see Figure 1), we continue our research following the established DQ research design (Fife and Gossner, 2024) and the DQ content analysis tradition (Mayring, 2014; Schreier, 2012).

This empirical research aims at uncovering student behaviors and attitudes that either enable or constrain EC development in the BES internship context. The results of the qualitative data coding are to inform the formation of a list of keywords, aligned with the SDEL framework and intended to support replicable analysis of reflective texts, providing a basis for anticipating, supporting and evaluating learning behaviors in educational settings.

To operationalize the guiding theory, we formulate conceptual definitions of students' learning behaviors and attitudes that are expected to enable or constrain EC development within the BES internship context. These definitions serve as an analytical lens for subsequent qualitative data analysis, which seeks empirical confirmation and refinement of, or contradiction to, the theory-informed constructs. These two stages of the research process are summarized in the supplemented table and commented on in the findings section.

The research concludes by presenting keywords, inductively derived from the coded data to characterize empirically confirmed SDEL patterns. Keyword frequencies and their distribution across competence reflections are analyzed to estimate the extent and prominence of the observed learning patterns within the internship context investigated.

MaxQDA software dictionary-based analysis function has been used to search and count keyword appearances and retrieve texts around the discovered keywords.

To establish trustworthiness in this study, we align with parallel criteria, proposed by Guba and Lincoln (1985), applying them across all research stages. The credibility of the findings is ensured through the theoretically grounded operationalization of the SDEL framework and careful alignment with the Kolb EL model. The coding process is guided by clearly defined theoretical constructs. Multiple examples from the data are provided and interpreted to verify the findings.

The following principles are secured in this investigation:

(1) Transferability: by providing a detailed description of the context, the BES internship and its structured reflective learning tasks, we allow readers to assess the applicability of findings to similar internship-based entrepreneurship education settings.

(2) Dependability: ensured by a structured DQ design of the research (Fife and Gossner, 2024).

(3) Confirmability: researcher bias minimized by basing all interpretations on predefined theory-informed constructs and allowing only empirically supported evidence (coded quotes) to define the enabling or constraining patterns. The derivation of keywords is inductive, emerging from repeated patterns in the coded data rather than preconceived assumptions.

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Findings: the patterns of self-directed experiential learning enabling and constraining the development of entrepreneurship competences

Before deep diving into the data analysis-based exploration and observations, we note that supplemented table, discussed in this section, contains a summary of the guiding theory operationalization along with the DQ content analysis, based on the provided operationalization. In this study, operationalization involves translating the guiding theory into specific observable student behaviors and attitudes, situated at the intersections of SDL dimensions and EL phases. Also, behaviors and attitudes which either enable or constrain EC development are distinguished. For example, the SDL process dimension is operationalized within the concrete experience (CE) phase of EL through behaviors, such as identifying learning needs, setting initial learning goals, seeking resources and actively participating in internship activities. These behaviors reflect how students initiate and direct their learning in real-world contexts. Similar theory-informed operational definitions are formulated for all SDL dimensions across each phase of Kolb's EL cycle, providing a structured framework for empirical analysis (see supplemented table).

Operational definitions are supported by illustrative data quotes that provide empirical confirmation. As presented in the supplemented table, the analysis first verifies the presence of the expected SDEL patterns on a general level, without reference to specific EC. Subsequently, it establishes associations with particular EC by aggregating frequencies of all keywords linked to respective SDL-EL interactions. This allows us to examine the extent to which specific patterns of SDEL contribute to or constrain the development of EC in the studied case.

It is important to emphasize that all empirical confirmation of SDEL behavior patterns emerged from a genuine learning environment. Students, enrolled in internships, produced reflections on EC, framed by the EntreComp model. They had not been specifically prompted to consider or apply any concepts from SDL or EL paradigms. Thus, the findings represent authentic and spontaneous manifestations of SDEL occurring in real-world entrepreneurship education contexts.

Next, we present SDEL patterns defining keywords, based on data coding and review. Frequency counts of the derived keywords are presented afterward in Table 1.

Although "planning" is a characteristic of the SDL process, we cannot conclude that the CE phase went smoothly. Planning should involve setting goals or defining learning strategies, but these aspects of the SDL process were not evident in the collected data at all. Evidence on intensive learning planning only occurred due to the requirement to plan and state subsequent learning steps to maintain and improve competences. Forthright planning turned into superficial attempts to declare learning initiatives without clear goals and personally perceived implementation strategies.

SDL process-based Reflective Observation (RO) enablers (referred to by keywords "observed", "watched") were rather passive. Processes, enabling an active interaction-oriented EL, could possibly extend the set of benefits captured through the RO phase.

Within the SDL process, students described abstract conceptualization (AC) phase of EL by "describing" and "explaining" their internship activities as well as EC. However, low observed keyword frequencies (see Table 1) suggest limited progression through this phase of the EL cycle. This limitation may have arisen from students perceiving the internship primarily as routine work rather than a structured learning opportunity, thereby reducing the likelihood of abstraction and conceptualization beyond daily tasks.

Most of the quotes illustrating SDL process factors constraining the AC were associated with the EC, formally provided for students' reflecting, evaluating, and discussing, but not with actual, practical business operations-related activities. This suggests the necessity of a sufficient theoretical background, defining all EC in granular detail, to support ongoing practical experience-based conceptualization.

The CE phase in an internship was based on the "application" of knowledge and skills as SDL competence. The RO from the SDL competence perspective was enabled by "evaluation"

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Table 1. Keywords and relative frequency values (% in keywords pool), defining SDEL patterns enabling and constraining EC development, inductively derived from qualitative content analysis

	Concrete experience	Reflective observation	Active conceptualization	Active experimentation
SDL process: keywords referring to SDEL behavior enabling/limiting EC development	planned (10.28) started (1.83) participated (1.71) I've taken (0.52) organized (0.23)	observed (6.40) watched (1.69) asked (0.51) made notes (0.26)	explained (0.21) discussed (0.11) described (0.10) summarized (0.01)	convinced (1.51) tried (0.65) experimented (0.17) tested (0.10)
	didn't have (1.28) unclear (0.43) waited (0.29)	didn't analyze (0.03) not interested (0.03)	didn't know (1.17) didn't find (0.15)	avoided (0.21) didn't try (0.11)
SDL competence: keywords referring to SDEL behavior enabling/limiting EC development	applied (4.93) learned (1.07) followed (0.32) trusted (0.14) guessed (0.12)	evaluated (7.53) made insight (1.15) recognized (0.45)	understood (12.70) knew (3.01) solved (2.88) analyzed (1.80) created (1.53)	I can (0.73) is mine (0.67) was mine (0.34) repeated (0.21) adapted (0.06)
	needed help (0.25) didn't do (0.11) missed (0.11)	didn't notice (0.37) didn't evaluate (0.06)	lack of knowledge (1.06) didn't understand (0.19) didn't recognize (0.03)	I am not learned (0.21) didn't utilize (0.07)
SDL readiness: keywords referring to SDEL behavior enabling/limiting EC development	actively (5.71) initiative (3.47) enthusiasm (0.83) curiosity (0.18)	was interesting (1.72) would like to learn (0.18) would like to know (0.02)	belief (3.91) intent to get to know (0.76)	suggested (1.22) wasn't afraid (1.15) showed (0.56) shared (0.33)
	didn't search (0.11) didn't interest (0.04)	didn't want (0.40) didn't go deeper (0.04)	was not able (2.30) didn't believe (0.02)	was afraid (0.21)

Source(s): Authors' own work

activities. The perception of "understanding" was a core SDL competence-based pattern for the AC phase to happen.

Frequent use of the terms "initiative" and "actively" in the reflections highlighted students' proactive stance in learning. Readiness to gain experience was further supported by evidence, obvious in the keywords "enthusiasm" and "curiosity", indicating strong internal motivation to embrace EL and gain the most from it.

The RO from the SDL readiness perspective was found to be activated when students discovered "interesting" things in their internship context. The provided citations, illustrating SDL readiness-based RO constraints, indicated that the "I didn't want" keyword led to other important limiters, like fear or lack of self-awareness, associated with other SDL-EL intersections.

Empowering AC, from the SDL readiness perspective, was associated with learners' "believe", which reflected both emotional engagement and deep confidence in their ability to process and learn from experience. Often, the "I am not able" keyword referred only to student's inability to provide appropriate examples justifying some particular EC that was

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being considered. Both interpersonal initiatives (referred to by the keywords “suggested”, “shared”, “showed”) and personal courage (associated with the “I am not afraid” key term) would drive active experimentation (AE) during internships.

Table 1 presents a condensed quantitative synthesis of the qualitative content analysis, detailed in the supplemented table, illustrating how the identified SDEL patterns manifest within the studied case. The proposed set of keywords, grounded in empirically confirmed SDEL patterns, serves as a replicable analytical tool for examining reflective texts. This tool enables educators and researchers to anticipate, support and evaluate SDEL behaviors across varied educational settings. By making implicit learning processes visible, the keyword set contributes to more targeted instructional design, enhanced feedback strategies and data-informed approaches to monitoring competence development in practice-based learning environments, such as internships.

As the SDL process and competence-based learning enablers were somewhat equally exposed across all competences, the learning enablers, grounded by SDL readiness, were rather unevenly distributed (see Table 2). The figures represent frequency distribution, in percent, among all the keywords found; stylized visuals indicate the extent of the role the pattern plays in shaping the development of a respective competence.

Development of some specific competences (i.e. creativity, mobilizing others, taking the initiative, working with others) seems to benefit from learners’ SDL readiness in CE. Empirically grounded SDL readiness in the CE phase pattern suggests that students get more interested and actively engage in developing these particular competences due to their attractiveness and delightfulness, compared to others which are less appealing.

Table 2. The extent of the discovered SDEL patterns based on assigned keyword frequencies distribution across EntreComp competences

	SDL process				SDL competence				SDL readiness			
Extensiveness of enabling patterns	CE	RO	AC	AE	CE	RO	AC	AE	CE	RO	AC	AE
1.1. Spotting opportunities	0.70	1.10	0.08	0.17	0.74	0.63	1.69	0.18	0.87	0.06	0.28	0.22
1.2. Creativity	1.20	0.85	0.03	0.50	0.83	0.67	1.78	0.15	1.35	0.40	0.40	0.70
1.3. Vision	0.73	0.30	0.01	0.18	0.51	0.39	1.43	0.10	0.72	0.06	0.22	0.17
1.4. Valuing ideas	0.58	0.32	0.03	0.04	0.14	0.29	0.98	0.03	0.29	0.07	0.06	0.11
1.5. Ethical and sustainable thinking	0.78	0.76	0.08	0.12	0.47	0.61	1.36	0.18	0.41	0.11	0.15	0.14
2.1. Self-awareness and self-efficacy	1.39	0.54	0.04	0.37	0.52	0.44	1.61	0.23	0.47	0.10	1.09	0.11
2.2. Motivation and perseverance	1.09	1.10	0.00	0.08	0.62	0.63	1.54	0.11	0.73	0.17	0.44	0.47
2.3. Mobilizing resources	0.95	0.40	0.04	0.25	0.44	1.10	1.58	0.11	0.23	0.04	0.21	0.22
2.4. Financial and economic literacy	0.96	0.19	0.01	0.06	0.21	0.41	2.01	0.06	0.25	0.06	0.28	0.03
2.5. Mobilizing others	0.99	0.41	0.01	0.18	0.47	0.44	1.35	0.11	1.36	0.26	0.30	0.36
3.1. Taking the initiative	0.73	0.25	0.03	0.06	0.22	0.74	1.14	0.08	1.71	0.10	0.25	0.34
3.2. Planning and management	1.42	0.63	0.01	0.21	0.70	0.81	1.69	0.25	0.36	0.19	0.37	0.22
3.3. Coping with uncertainty	0.85	0.48	0.04	0.21	0.25	0.52	0.98	0.10	0.30	0.07	0.23	0.34
3.4. Working with others	1.50	1.22	0.06	0.23	0.36	0.91	2.12	0.21	1.58	0.17	0.44	0.48
3.5. Learning through experience	1.05	0.78	0.03	0.10	0.37	0.52	1.22	0.18	0.12	0.12	0.21	0.19
Extensiveness of limiting patterns	CE	RO	AC	AE	CE	RO	AC	AE	CE	RO	AC	AE
1.1. Spotting opportunities	0.08	0.00	0.11	0.01	0.04	0.10	0.15	0.01	0.03	0.07	0.25	0.01
1.2. Creativity	0.11	0.01	0.18	0.03	0.00	0.04	0.18	0.04	0.00	0.00	0.32	0.01
1.3. Vision	0.07	0.00	0.04	0.01	0.00	0.03	0.15	0.00	0.00	0.00	0.07	0.01
1.4. Valuing ideas	0.07	0.00	0.01	0.00	0.00	0.00	0.04	0.01	0.01	0.01	0.06	0.00
1.5. Ethical and sustainable thinking	0.06	0.01	0.14	0.03	0.03	0.06	0.18	0.01	0.01	0.06	0.17	0.00
2.1. Self-awareness and self-efficacy	0.11	0.00	0.11	0.01	0.03	0.06	0.18	0.03	0.01	0.01	0.12	0.00
2.2. Motivation and perseverance	0.23	0.03	0.18	0.01	0.03	0.04	0.12	0.01	0.07	0.10	0.18	0.06
2.3. Mobilizing resources	0.23	0.00	0.07	0.01	0.03	0.04	0.12	0.01	0.01	0.03	0.14	0.04
2.4. Financial and economic literacy	0.21	0.00	0.06	0.01	0.00	0.00	0.11	0.00	0.00	0.03	0.19	0.03
2.5. Mobilizing others	0.15	0.00	0.08	0.01	0.03	0.00	0.10	0.00	0.00	0.03	0.08	0.00
3.1. Taking the initiative	0.11	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.01	0.07	0.14	0.00
3.2. Planning and management	0.12	0.01	0.10	0.00	0.07	0.03	0.10	0.00	0.00	0.01	0.28	0.08
3.3. Coping with uncertainty	0.12	0.00	0.03	0.00	0.03	0.01	0.06	0.01	0.00	0.01	0.10	0.37
3.4. Working with others	0.19	0.03	0.12	0.12	0.07	0.03	0.06	0.06	0.01	0.03	0.25	0.07
3.5. Learning through experience	0.12	0.00	0.06	0.04	0.01	0.03	0.08	0.10	0.00	0.03	0.00	0.06

Source(s): Authors’ own work

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The competence of self-awareness and self-efficacy was distinctive due to a relatively high frequency of SDL readiness in the AC phase enabler (see Table 2). The pattern description (see supplemented table) explains that readiness to conceptualize in the context of self-awareness and self-efficacy competence is based on students' beliefs referring to both emotional engagement and deep confidence in their ability to learn from experience.

Across all SDL dimensions, the AE phase was less prominent as an enabling pattern. This indicates a potential gap in transferring learning into experimentation based on conceptual insights, often due to a lack of prior conceptual grounding, especially based on internship experience rather than knowledge delivered at the university.

The above-discussed results of the study align with and extend recent conceptual works, which highlight that entrepreneurship education emerges from the dynamic interplay of SDL and EL (Lim *et al.*, 2025; Morris *et al.*, 2025; Morris and König, 2020; Motta and Galina, 2023; Tan *et al.*, 2024). Our findings provide empirical evidence on how SDEL patterns manifest in authentic internship settings and how specific SDL-driven behaviors support movement through EL phases. This empirical grounding clarifies the SDL and EL integration operating in practice, thereby strengthening the conceptual foundations of SDEL as a mechanism for EC development.

Discussion: SDEL as a complementary perspective on EC development

Our study advances the research track exploring complementary conceptual paradigmatic approaches to EC development. Conceptual integration of SDL and EL, as evidenced in reflective student narratives, provides novel insights into micro-level learning processes that often remain underexplored in entrepreneurship education research.

Our findings resonate with Aluthgama-Baduge *et al.* (2024), who explore the integration of practitioner experience into academic environments through entrepreneur-in-residence initiatives. While their work reveals the role of external experts in bridging academic-practice divides and facilitating entrepreneurial learning through trust-building and structural navigation, our study provides a learner-side perspective of how such experiential context, internship, in particular, is internalized through SDEL mechanisms. While Aluthgama-Baduge *et al.* (2024) highlight tensions between academics and practitioners as well as the fragmented positioning of entrepreneur-in-residence in the university ecosystem, our data indicate that learners themselves often face internal fragmentation in terms of engagement with the SDL process, competence, and readiness capabilities. These internal divides mirror institutional gaps, discussed by Aluthgama-Baduge *et al.*, further reinforcing the need for coordinated and pedagogically grounded approaches to entrepreneurship education.

The findings of our study also intersect meaningfully with the work of Daniel *et al.* (2024), who explore how game-based learning supports the development of EC. While methodological research foundations differ, both studies underscore the role of learner agency in driving EC development. Game-based learning environments simulate autonomy and challenge, enabling students to "try out" entrepreneurial roles. Similar effects are achieved at internships, encouraging students to learn not just by trying but by engaging in business operations. Both studies contribute to a growing awareness that entrepreneurship education has to transcend traditional instructional models, and, instead, cultivate adaptive situated learning environments where learners can exercise self-direction within meaningful entrepreneurial scenarios.

Our study also directly contributes empirical depth to the theoretical framework proposed by Morris and König (2020). With their work being rooted in theoretical synthesis, the present research offers data-driven exploration of how SDEL actually unfolds in practice. Morris and König emphasize SDEL value for adaptivity, resilience and entrepreneurial action. Our research responds to this framework by identifying specific enabling and constraining learning patterns with evidence on how they manifest themselves through student reflections, which demonstrate how learners operationalize

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SDEL in real workplace settings. We provide empirical granularity by revealing how SDEL-based enablers and limiters manifest differently across the four stages of the Kolb learning cycle and how those affect the development of the specific EntreComp-defined EC. In doing so, we provide a more nuanced understanding of how and when SDEL fosters adaptivity in authentic learning environments, thereby reinforcing the importance of embedding structured reflection, autonomy-supportive pedagogy and tailored guidance in entrepreneurship education design.

While a significant amount of educational literature is prescriptive and outlines occurrences of learning in pursuing desired outcomes or avoiding pitfalls (Jim *et al.*, 2024; Lim *et al.*, 2025; Mayombe, 2024; Seherrie, 2023), there has been notably less attention paid to empirically observed constraints that hinder these learning processes. Our research addresses this imbalance by foregrounding naturally occurring limiters within authentic internship settings, enriching the academic discourse on entrepreneurship education.

By incorporating negative and context-rooted insights, our study enhances a theoretical SDEL construct and provides a more balanced and realistic pedagogical roadmap. Educators and BES program designers are offered not only enablers to cultivate, but also natural risk points to anticipate, thus improving the interventions in higher education, particularly in the entrepreneurship education contexts.

Conclusions

This study explored SDEL, shaping the development of EC in the context of BES student internships. Grounded in the integration of SDL dimensions and Kolb's EL cycle, the research employed a DQ content analysis of students' reflective narratives.

The findings revealed that SDEL was not a uniform process. Rather, it manifested through diverse, learning phase-specific patterns influenced by students' SDL readiness, engagement with the learning process, and competence levels. The interplay between SDL and EL was both nuanced and context-dependent. SDEL enablers often operated implicitly, for instance, initiative expressed through participation or belief.

SDEL patterns were not consistently present across all the EL phases and EntreComp competences. Engagement in the AE phase was frequently underdeveloped and limited by gaps in prior knowledge, lack of intentionality or the absence of strategically oriented learning initiatives. Conversely, observable and concrete phases, like CE and RO, were commonly enabled by SDL evidence, such as starting, watching or applying specified skills.

The observed learning patterns suggested that students tended to engage in internships more as functional workplace participants than as reflective learners, unless guided otherwise.

The study also pointed out that learning assignments and institutional structures significantly shaped the SDEL display. In some cases, reflective practice served more as a reporting mechanism than a tool for deep engagement, limiting the potential of SDEL to drive conceptual transformation. Therefore, the design of reflection tasks, supervisor guidance and alignment between competence goals and learning contexts appeared to be critical for activating the full potential of SDEL.

In conclusion, this research offers two key contributions. First, it advances the theoretical understanding of SDEL by mapping how its enabling and constraining behavior patterns align with EL stages and the EC range. Second, it provides actionable insights for educators and practitioners aiming at fostering EC development through internships. The identified SDEL patterns offer a framework for anticipating, supporting and evaluating learning behaviors in similar applied education contexts.

Future research should deepen this exploration by applying the proposed analytical framework across diverse educational settings, learner profiles and disciplinary domains. Quantitative validation, longitudinal tracking and intervention-based designs may also enrich the understanding of SDE dynamics in EC development.

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Theoretical implications

This study contributes to the theory of entrepreneurship education by linking SDL and EL, showing that SDL, conceptualized by learning process, competence and readiness elements, interacts systematically with the phases of Kolb's EL cycle to shape EC development. Our study extends recent works that underscore the centrality of learner engagement and self-direction in EL settings for entrepreneurship education (Motta and Galina, 2023). The findings expose micro-level granularity of SDEL patterns, offering a matrix for future deductive quantitative testing. These SDEL patterns, presented as enabling and constraining antecedents of EC development, serve as an empirically proven framework for future revision and development. Together, these insights position SDEL as a coherent, layered construct that can guide future theorizing and comparative research on how learners transform internship experience into EC.

Practical implications

The results of the study suggest an explicit structure for internship-based experiential entrepreneurship education. First, supervisors and mentors in BES programs, applying the results of this study, can design the SDL process to help students progress beyond experience to observation, conceptualization, and experimentation cycle, which ensures EC development and professional advancement gained from internships. Second, targeted support for SDL readiness, based on the discovered SDEL enabling and constraining patterns, can be timed before high-stakes experiential tasks to strengthen EC development. Third, educators may use analytic prompts and lightweight analyses by applying the provided textual indicators to monitor SDEL trajectory and tune it accordingly. These practical directions translate the outcomes of our study into actionable guidance for educators seeking reliable gains in students' EC through internships.

Limitations

A primary limitation of the study lies in the qualitative content analysis-guided keyword selection process, which, while grounded in theoretical constructs, may introduce interpretive bias and risk omitting important but unanticipated expressions. The data source, consisting of student reflections from a single internship case, may limit generalizability and lead to context-specific insights. Broader and more diverse data would be required to validate and extend the findings.

Nevertheless, this study should be viewed as a preliminary step in a broader research agenda. While a full reflection corpus contained over 455,000 words, the current analysis was limited to approximately 7,300 keyword instances. This highlights the need for further refinement and expansion of the semantic framework, as well as the development of more systematic and scalable analysis procedures. Future research should aim at validating and extending this approach across broader datasets and varied educational contexts to strengthen its methodological robustness and practical applicability.

Supplementary material

The supplementary material for this article can be found online.

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