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Transformative Education: New Educational Models for Entrepreneurship and Innovation

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| 01 | Executive Summary

The growing economic, technological, and social complexity has exposed the limitations of traditional education models in preparing entrepreneurial profiles capable of generating value in real-world contexts of uncertainty. This monograph analyses emerging educational models based on experiential learning, real-world challenges, and ecosystem collaboration, integrating perspectives from both the public and private sectors.

Based on documentary analysis and the contributions of four experts in entrepreneurial education, it examines their pedagogical foundations, observed outcomes, impact metrics, and the main challenges associated with their implementation.

The study concludes that these models foster the development of key entrepreneurial competencies; however, their consolidation requires overcoming institutional, cultural, and resource-related barriers, as well as progressing towards evaluation systems that are more closely aligned with outcomes and value creation.

| 02 | Introducción

The ability to **undertake entrepreneurial initiatives, innovate, and adapt to changing contexts has become a strategic competency in contemporary societies**. Technological acceleration, the transformation of production models, and the growing complexity of social and environmental challenges are redefining the skills required to generate economic and social value. In this scenario, education systems face a key question: are they truly preparing individuals to operate in uncertain environments, make decisions with incomplete information, and transform knowledge into actionable solutions?

According to The Future of Jobs 2025 (2025) report by the World Economic Forum, competencies such as analytical thinking, creativity, continuous learning, complex problem-solving, and collaborative leadership rank among the most in-demand skills in the short to medium term

OECD reports highlight that **education systems continue to show a significant gap between what they provide and the real needs of today's societies and economies**. On the one hand, *Fostering Students' Creativity and Critical Thinking* (2019) underscores that, although creativity and critical thinking are increasingly in demand in innovation-driven economies, educators still find it challenging to translate these concepts into clear and systematic teaching practices, which limits their effective development among learners.

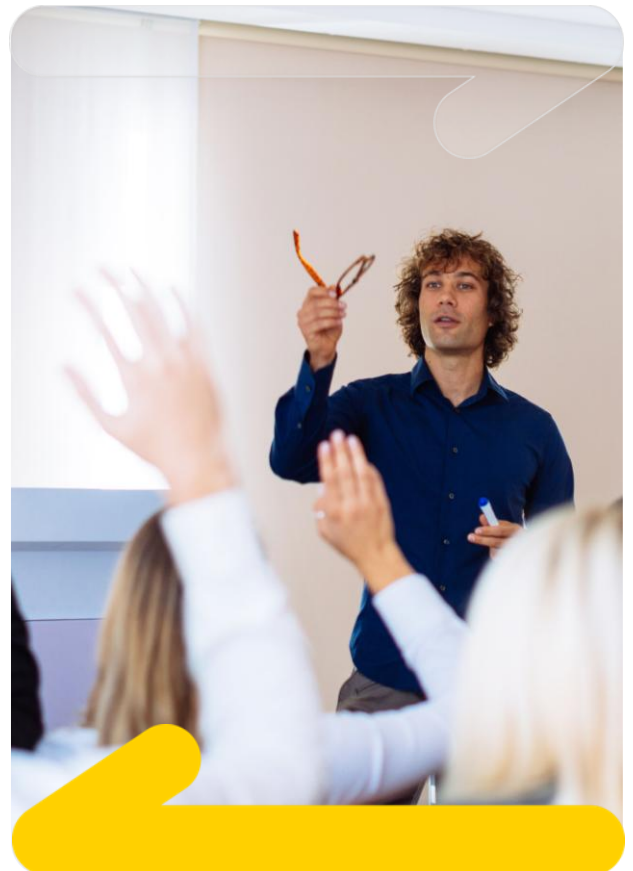
On the other hand, Education at a Glance 2024 (2024) shows that, despite certain improvements in educational participation and labour market outcomes for some groups, the skills acquired do not always align with labour market demands, and inequalities persist that affect learners' performance and opportunities depending on their socioeconomic background.

Taken together, both reports highlight that the insufficient integration of advanced cognitive skills and quality learning outcomes constrains education systems' ability to prepare learners for increasingly complex professional and social environments.

In this context, **education for entrepreneurship and innovation has evolved** from approaches centred on content transmission and the simulation of business processes towards models that prioritise experience, action, and engagement with the surrounding environment. Entrepreneurial education is no longer **understood solely as training for business creation but is instead conceived as a set of competencies applicable across multiple career pathways**, as reflected in the European Commission's EntreComp framework (2016).

Entrepreneurship entails identifying opportunities, mobilising resources, working collaboratively, managing uncertainty, and learning from failure—competencies that can only be fully developed within authentic learning environments.

This monograph is situated at that turning point. Through the analysis of emerging educational models and the experience of five institutions and experts in entrepreneurial education, it examines **how approaches based on real-world challenges, experiential learning, and expert guidance are transforming the way entrepreneurial and innovative profiles are developed**. The study integrates perspectives from both the public and private sectors, with the aim of providing a critical and applied view of the pedagogical foundations of these models, their observed outcomes, and the challenges associated with their large-scale implementation.



The following are the expert individuals who have contributed to this MONOGRAPH:



Sonia Rodríguez Incubation Manager at LEINN (Entrepreneurial Leadership and Innovation), leads programmes grounded in the Team Academy methodology, where learning is built through real, collaborative projects. Her work focuses on supporting entrepreneurial teams through coaching and evidence-based assessment.



Juan Campos Professor and former Director of the MBA in Entrepreneurship at UAM (Autonomous University of Madrid), has led challenge-based entrepreneurial education in both university and executive settings, fostering academia-industry partnerships and methodologies oriented towards practical application.



Lorena Pedrós Senior Startup Advisory Specialist at IDEAS UPV (Polytechnic University of Valencia), leads the strategy and coordination of the IDEAS UPV programme, promoting university entrepreneurship through a comprehensive, holistic approach. She has supported hundreds of projects throughout their development, from initial validation to growth, combining applied training, expert advisory services, and a strong connection with the Valencian innovation ecosystem.



Óscar Boluda Ivars a Vocational Education and Training (VET) instructor specialising in active learning methodologies, is a recognised expert in challenge-based learning and cross-modular project-based approaches within VET. He works on the continuous improvement of vocational education through innovative, challenge-driven methodologies aligned with employability outcomes.

2.1 Transformation of the educational landscape

The transformation of the educational landscape reflects a profound shift in the nature of work and innovation processes. According to the OECD Education 2030 Position Paper (2018), education systems that continue to prioritise the accumulation of theoretical knowledge and rote-based assessment struggle to develop competencies that are genuinely transferable to real-world contexts, particularly in environments defined by uncertainty and constant change.

In this context, faced with an unpredictable future shaped by rapid globalisation and technological advancement, education can no longer be confined to the transmission of factual knowledge; it must instead equip learners to confront unprecedented challenges, address unforeseen problems, and navigate complex situations with confidence.

Against this backdrop, new models are emerging that place active learning, experimentation, and real-world problem-solving at the heart of the educational process. In this regard, Juan Campos, an expert in entrepreneurship and former Director of the MBA in Entrepreneurship at the Autonomous University of Madrid, captures this shift by stating that *“education has evolved to focus on real impact”*.

This shift is reflected in the adoption of methodologies such as **experiential learning, project-based learning, and challenge-based learning**, all of which foster a closer alignment between education and the practical needs of the productive, institutional, and social environment. Within these models, learners take on a central role in shaping their own development, working in diverse teams, engaging with real stakeholders, and making decisions that carry tangible consequences. **Assessment is no longer focused exclusively on content reproduction but is instead grounded in performance-based evidence, achieved outcomes, and learning processes.**



2.2 Limitations of Traditional Educational Models

Despite these advances, a significant proportion of entrepreneurship education continues to rely on traditional educational models, centred on lecture-based teaching, rote memorisation, and the simulation of business plans detached from real-world contexts.

According to analyses by the OECD and the GEM (Global Entrepreneurship Monitor) (2025), this approach constrains the development of key entrepreneurial competencies, such as opportunity recognition, risk management, decision-making under conditions of incomplete information, and learning from failure.

The report *The Future of Jobs 2025* (2025) further highlights that the rapid obsolescence of technical knowledge and the pace of technological change render traditional curriculum update cycles inadequate, creating a structural mismatch

between educational provision and labour market demands. In this regard, the prioritisation of theoretical content over practical experience hinders the transfer of learning to real entrepreneurial and innovation contexts.

As Sonia Rodríguez notes, drawing on her experience at LEINN, *“traditional education rewards memorisation, whereas LEINN rewards action and value creation”*. These limitations are compounded by organisational constraints, including difficulties in integrating interdisciplinary projects, fostering collaboration with industry, or implementing assessment models based on performance evidence. Such gaps underscore the need to adopt approaches that place experience, real-world challenges, and ecosystem collaboration at the centre of the learning process.

| 03 | Fundamentals of Emerging Educational Models

New educational models for entrepreneurship and innovation do not emerge as a short-term response; rather, they are grounded in well-established pedagogical traditions that have, for decades, challenged approaches focused exclusively on content transmission. Understanding these foundations is essential to explaining why methodologies such as challenge-based learning, teamwork, and evidence-based assessment are more effective in developing competencies.

This section examines the main theoretical underpinnings of these models, beginning with experiential learning, which stands as the cornerstone of this transformation in education.

3.1 Experiential and Situated Learning

Experiential learning constitutes one of the core theoretical pillars underpinning emerging educational models. According to Kolb's model (1984), individuals learn most effectively when they actively engage in concrete experiences, reflect on them, conceptualise their insights, and reapply what they have learned in a continuous cycle. In the context of entrepreneurship, this approach is particularly relevant, as projects typically unfold within environments characterised by uncertainty and ambiguity.

Situated learning, developed by Lave and Wenger (1991), reinforces this perspective by emphasising that knowledge cannot be separated from the context in which it is applied. Learning entrepreneurship therefore involves participation in communities of practice, including interaction with clients, collaboration among peers, and guidance from experienced practitioners. Within this framework, working on authentic challenges accelerates the development of transferable competencies.

In practice, this theoretical foundation translates into learning by doing. Sonia Rodríguez captures this idea succinctly, noting that *"working on real challenges, with real clients and actual financial stakes, transforms theory into competencies and skills"*, such as resilience, self-management, and decision-making, thereby strengthening the link between pedagogical principles and real-world performance.

3.2 Real-World Challenge-Based Methodology

Real-world challenge-based methodology places authentic challenges from the business, institutional, or social environment at the centre of the learning process. It is characterised by starting from complex problems, with no single correct solution, that require research, experimentation, and validation with external stakeholders. This approach combines elements of project-based learning, design thinking, and lean start-up, and aligns with the EntreComp framework (2016) by fostering applied and observable entrepreneurial competencies.

Operationally, these models are structured in stages: **challenge definition with criteria and metrics, context analysis, prototyping, user validation, and iterative refinement**. Assessment shifts away from traditional examinations towards performance-based evidence, including portfolios, deliverables, validation indicators, and impact metrics.

Drawing on his experience in vocational education and training, Óscar Boluda, a specialist in active methodologies and challenge-based learning, emphasises that projects grounded in real-world challenges *"require learners to go through the full entrepreneurial cycle"*, thereby strengthening competencies such as planning, communication, and adaptability to change.

In the university context, challenge-based methodology is structured through a **coherent sequence of approaches**. According to the experience at UAM, the most impactful programmes combine discovery phases grounded in design thinking—aimed at identifying real problems and user needs—with iterative validation methodologies such as lean start-up.

This approach enables the use of tools such as the Business Model Canvas, MVP design, and metrics systems that help minimise risk and accelerate learning. The key lies not only in creativity, but in the ability to continuously test hypotheses against real market conditions.

3.3 Collaborative and Team-Based Learning

Collaborative learning is another structural component of these models. Diverse, self-managed teams replicate real-world innovation dynamics, including shared responsibility, role distribution, conflict management, and decision-making under uncertainty. Research in organisational studies shows that teams operating in environments of trust—where individuals can propose ideas, make mistakes, and learn without fear of being penalised—tend to be more adaptive and capable of innovating.

In models such as Team Academy and LEINN, the team is conceived as a learning enterprise from day one. According to Sonia Rodríguez, learners form *“a Team Company (a real business) from the very beginning and work collectively to develop it”*. Assessment combines team outcomes with individual evidence, striking a balance between collaboration and personal accountability.

3.4 Competency Synthesis: The EntreComp Framework as an Integrative Axis

The models analysed do not operate in isolation; rather, they converge in the development of the competencies outlined in the European EntreComp framework (2016).

This European Commission standard provides a structured lens through which to understand how challenge-based education transforms theoretical knowledge into tangible capabilities.



The following mapping outlines the relationship between the key areas of the EntreComp framework and the methodologies and institutional experiences examined in this study:

EntreComp Area	Key Competency	Applied Methodology	Application within the Educational Model
Ideas and Opportunities	Creativity, vision, and needs identification.	Design Thinking and context analysis.	UAM and IDEAS UPV use these tools to enable learners to identify real problems before proposing solutions.
Resources	Financial literacy and resource mobilisation.	Team Companies and real budget management.	At LEINN , the use of “real money” requires teams to develop financial and self-management skills from day one.
Into Action	Resilience and managing uncertainty.	Challenge-Based Learning (CBL).	The ETHAZI model in vocational education and training develops the ability to pivot and solve both technical and social challenges in autonomous working environments.

Transformative education is not merely about learning by doing; it is a structured system designed to develop profiles capable of creating social and economic value in contexts of high uncertainty.

| 04 | Implementation of Innovative Educational Models

The translation of these pedagogical foundations into educational practice takes diverse forms depending on the institutional context, available resources, and intended objectives.

Models based on challenge-driven and experiential learning are now being successfully implemented across vocational education and training, undergraduate education, and executive programmes, demonstrating how entrepreneurial education can be adapted to different institutional settings while maintaining shared core principles: active learning, strong engagement with real-world environments, and competency development. The analysis that follows is structured around where and how these models are applied, considering both the educational contexts in which they operate and the methodological configurations they adopt in each case.

The following section examines a range of experiences that illustrate this diversity of approaches and their practical application.

4.1 Vocational Education and Training: Challenge-Based Learning in Technical Contexts (ETHAZI/VET Model)

In vocational education and training (VET), challenge-based learning has an established track record and is further reinforced by recent regulatory frameworks, which incorporate **cross-modular projects**. Its application is oriented towards solving real problems within the productive sector, reorganising time, spaces, and assessment around authentic challenges drawn from the professional environment.

The ETHAZI model (Etorkizuneko Trebakuntza Aurreratua Zikloetan Ikaskuntza – Advanced Learning in Future-Oriented Programmes), promoted by VET Euskadi (Basque Country), stands as a benchmark in this field. ETHAZI proposes a different way of understanding vocational education: rather than an organisation based on independent modules, it introduces **integrated learning environments** in which learners construct knowledge through the resolution of challenges and demonstrate competencies through tangible outcomes. **Assessment is oriented towards the full learning process**, incorporating iteration, continuous improvement, and reflection, in line with the dynamics of professional environments.

Óscar Boluda highlights that Challenge-Based Learning (CBL) in vocational education effectively integrates both technical and entrepreneurial competencies, preventing qualifications from being perceived as merely a collection of isolated modules. As he explains, *“in VET, we typically design approaches where learners work in teams to address a challenge or problem set by the teaching staff, with the aim that, in an autonomous manner, they develop specific learning outcomes while also gaining a coherent understanding of their qualification, rather than seeing it as a sum of disconnected modules”*.

4.2 Undergraduate Education: The Company as the Classroom (the LEINN case)

LEINN represents an **innovative formal education model** inspired by Team Academy. Its approach places the creation of real value at the centre of the learning process, replacing traditional lectures with team-based projects. Learners are organised into **real companies** (team companies), with clients, budgets, and defined responsibilities. The teaching role evolves into that of a team coach, facilitating the process and supporting reflection.

The model also incorporates **international learning experiences** (“learning journeys”) across different entrepreneurial ecosystems, enabling learners to understand global market dynamics and develop an entrepreneurial mindset within diverse cultural contexts.

Assessment is conducted through a **360-degree, multidimensional system**, combining real economic objectives (revenue generation), project-based evidence, evaluation of theoretical foundations through applied readings in training sessions, peer feedback on commitment and leadership, and a competency portfolio in which learners demonstrate their skills through evidence. As Sonia Rodríguez explains, *“as there are no conventional exams, assessment is 360-degree and multidimensional”*.

The model delivers **significant outcomes in terms of employability and entrepreneurial continuity**. Specifically, in LEINN International, *“the employability rate stands at 89%”, and “40%–50% of graduates”* continue with their projects. However, its implementation typically requires specialised team coach profiles and careful institutional design to sustain its assessment framework.

4.3 Higher Education and Executive Education: Hybridisation and Corporate Engagement (UAM and IDEAS UPV)

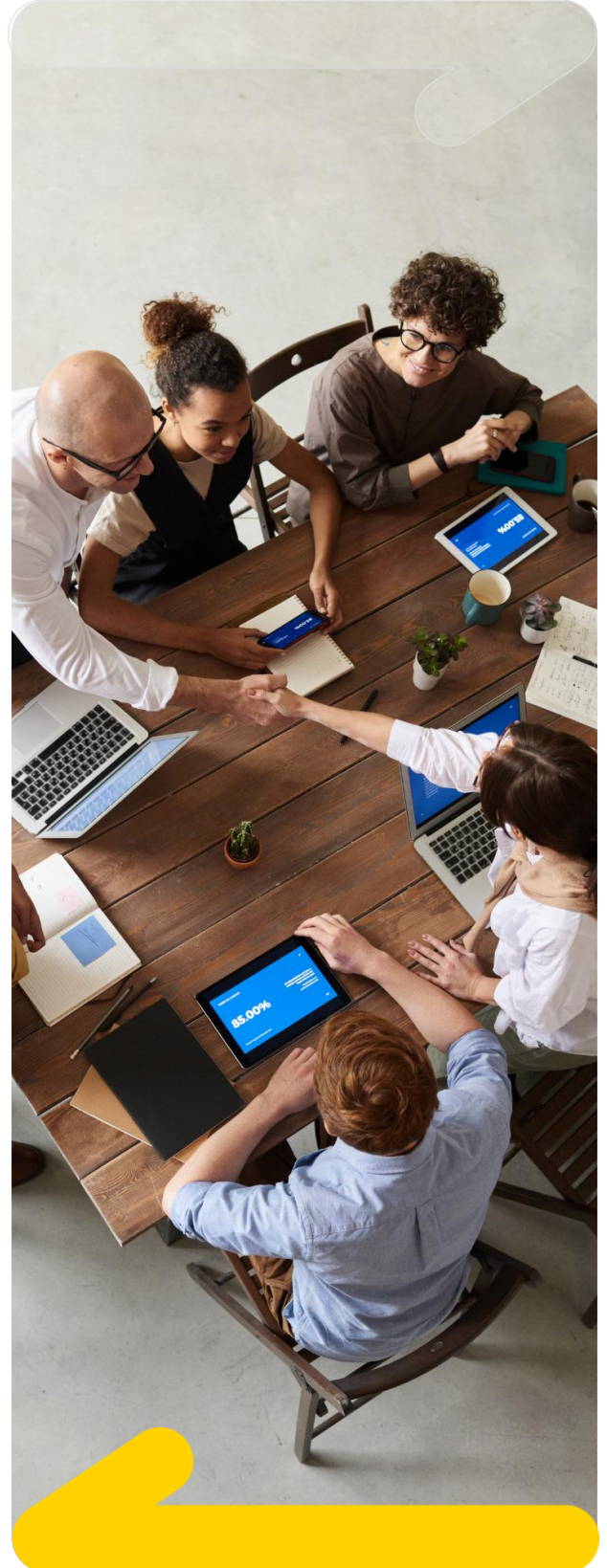
The cases presented below illustrate how public universities are opening up to the market through complementary pathways: **UAM**, through **executive programmes and corporate challenges**, and **IDEAS UPV**, as a **comprehensive support ecosystem** that democratises access to innovation. Both experiences share a hybrid approach that connects **education, research, and knowledge transfer with the real needs of the productive environment**.

4.3.1 Executive Education: UAM

Executive education in **entrepreneurship represents a particularly fertile space for the application of models based on real-world challenges**. At the Autonomous University of Madrid, these programmes are structured around a deliberately hybrid balance, in which theory serves as a framework for decision-making rather than as isolated content.

Conceptual frameworks in strategy, innovation, marketing, or finance are immediately applied to real projects, allowing learning to take shape as a continuous cycle of action, reflection, and learning. Through structures such as UAM Emprende, the **university operates as a laboratory for applied innovation, integrating bootcamps, hackathons, personalised mentoring, and corporate challenges**.

Collaboration with companies is articulated through a **hybrid model**: integration within the curriculum and participation in cross-cutting initiatives. Organisations define challenges, provide spaces for validation, and take part in evaluation panels, ensuring alignment with real market needs and a clear focus on impact. In this regard, Juan Campos emphasises that *“we have moved from planning businesses to experimenting with them, ensuring that every strategic decision is supported by empirical validation through direct engagement with the market”*, thereby reinforcing executive education that is oriented towards informed decision-making in highly uncertain environments.



4.3.2 Public University Entrepreneurship: IDEAS UPV

IDEAS UPV exemplifies the role of public university entrepreneurship in democratising access to innovation. It represents a clear example of how entrepreneurial education can be integrated within a polytechnic university through a public service-oriented approach. It offers open pathways that combine practical training, advisory support, and mentoring, connecting university talent with real-world needs. **The programme structures pathways from idea to consolidation, supported by real-world challenge-based methodologies (challenge-based learning), design thinking and lean start-up, and evidence-based assessment** (prototypes, validation, and external review panels).

Lorena Pedrós, project coordinator, highlights that *“IDEAS UPV has as its main purpose to foster and develop an entrepreneurial culture within the community of the Universitat Politècnica de València. Its mission is to raise awareness, energise, and support the creation and development of business initiatives, particularly those with an innovative and technological focus, thereby promoting an entrepreneurial mindset among students, graduates, and UPV staff”*.

Among the reported outcomes, IDEAS/StartUPV stands out for its **sustained trajectory, the volume of initiatives supported, and a strong survival rate among mentored projects**. As a public university, it faces administrative and resource-related challenges; however, its integration within the regional ecosystem strengthens knowledge transfer and territorial impact.

4.4 Cross-Cutting Methodologies: Mentoring and Expert Guidance

The models analysed share, in different forms, a common structural element: **expert guidance as personalised support throughout the learning process**—from **team coaching in LEINN to mentoring within UAM Emprende, the phased support model of IDEAS UPV, and instructional guidance in VET**.

In this regard, structured mentoring complements challenge-based models, particularly during more advanced stages of project development. This approach combines personalised guidance, milestone tracking, and ongoing follow-up with access to professional networks and peer learning. International evidence, including findings from the OECD and GEM, indicates that high-quality mentoring is associated with higher project survival rates and significantly stronger entrepreneurial performance.

Collaboration with companies within the sector enhances both relevance and motivation. The primary **challenge in scaling lies at an organisational and cultural level: teacher training, time to co-design high-quality challenges, and the development of sustainable internal structures**.

| 05 | Challenges and Limitations in Implementation

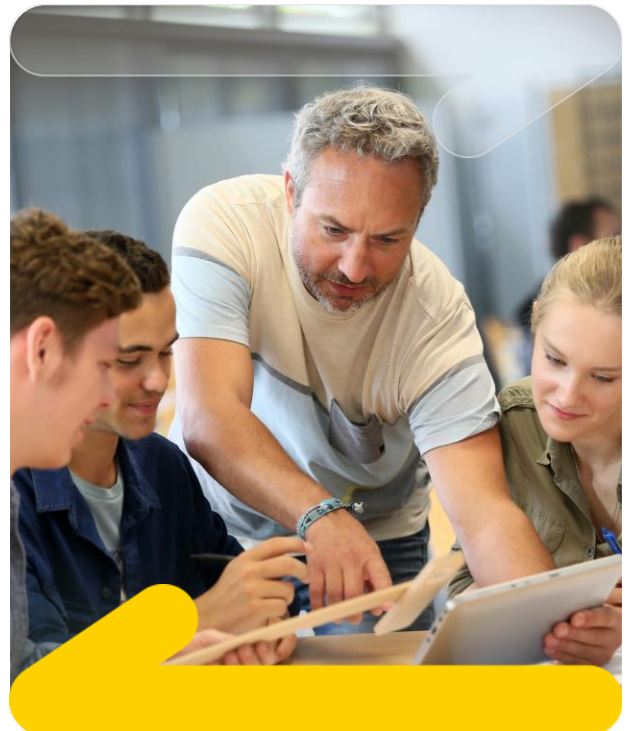
The widespread adoption of these educational models raises a number of **challenges** that go beyond the pedagogical dimension. Identifying these limitations is essential to understanding the difficulties involved in implementing and scaling challenge-based approaches. Although these barriers manifest across different contexts, their nature and intensity vary depending on the level of education, making a differentiated, context-specific analysis necessary.

5.1 Vocational Education and Training: Teaching Capacity, Regulation, and Organisational Inertia

In vocational education and training (VET), barriers are primarily concentrated in **teacher training and the interpretation of regulatory frameworks**. Although recent regulation incorporates instruments such as the **Cross-Module Project**, their practical implementation is often constrained by organisational inertia and limited interpretative flexibility. Óscar Boluda describes this tension by noting *that “there is a tendency to interpret educational regulations too literally, overlooking the spirit of legislation that is intended to foster innovation while still achieving specific learning outcomes”*.

This limitation is compounded by the **need for technical teaching staff to be trained in active methodologies**. The challenge is not purely technical; it also entails a **transformation in the teaching role**—shifting from subject-matter expert to facilitator capable of managing team-based uncertainty. This cultural shift, which Boluda also highlights when emphasising that *“a change in mindset is needed in how*

institutions are organised, as well as in working culture, to ensure that these types of projects are sustainable over time”, requires not only individual commitment but also strong institutional support structures.



5.2 Undergraduate Education: Accreditation, ECTS Credits, and Assessment Friction

In the context of formal undergraduate education, the main challenges lie in the **compatibility between challenge-based learning models** and the systems used for accreditation and verification of official degrees. Curriculum structures based on ECTS credits are built around a logic of workload, predefined content, and standardised learning outcomes, which can give rise to **tensions with approaches where learning is developed iteratively, openly, and through real-world projects** whose scope is not always predictable.

This tension becomes particularly evident in assessment systems, as Sonia Rodríguez explains in relation to the LEINN model: *“as there are no conventional exams, assessment is 360-degree and multidimensional”*. This approach, grounded in **competency portfolios, peer feedback, and project outcomes**, may create friction with quality assurance frameworks for official degrees, which require more standardised and comparable grading criteria. Reconciling the richness of evidence-based assessment with the formal requirements of accreditation bodies remains a key challenge which, if unresolved, may hinder the broader adoption of these models within formal undergraduate programmes.

5.3 Executive and University Education: ROI, Market Alignment, and Resource Constraints

In executive education and university entrepreneurship, the main challenges revolve around **demonstrating return on investment, ensuring effective market alignment, and managing expectations**. Companies and professionals participating in these programmes typically demand direct, practical outcomes applicable to their businesses, which can at times conflict with the time required for deep learning and genuine experimentation. Juan Campos notes that *“the current market demands profiles capable of transforming uncertainty into informed decisions”*, which reinforces the relevance of these approaches, while also requiring clear evidence of their effectiveness and careful management of expectations regarding returns.

In public university entrepreneurship, Lorena Pedrós identifies institutional challenges linked to academic culture and engagement with the productive environment. On the one hand, she observes that *“traditional university culture prioritises research or teaching over business creation”*. On the other, she highlights that *“public universities sometimes face difficulties in connecting research with local companies and the market”*.

5.4 Scalability and Resources: A Cross-Cutting Challenge

Beyond the specific barriers associated with each educational model, **scalability** represents a shared structural challenge. These models are highly intensive in terms of time, mentoring, and specialised human resources, making them significantly more costly than traditional education. Unlike a lecture-based setting, where a single lecturer can address a large group, the expert guidance that defines these approaches requires **low ratios and sustained engagement, representing a level of human resource investment that hinders large-scale implementation in institutions with limited budgets.**

In VET, Óscar Boluda directly links the challenge of scaling to the **lack of organised and shared resources** that would prevent each teacher from having to design complex technical challenges from scratch. He highlights that *“resource banks are needed both within educational institutions and at regional and national level, to inspire and equip educators with the necessary knowledge to implement these types of projects and methodologies”*.

At undergraduate level, the scalability of the LEINN model is constrained by the **need for team coach profiles with a very low student-to-mentor ratio**, which entails significantly higher operational costs than conventional education and represents the main barrier to wider adoption. The difficulty lies not only in the cost, but also in identifying and training such profiles: **the system lacks a sufficient number of educators prepared to move beyond subject expertise and take on a facilitative, team-oriented role.**

In executive education and university entrepreneurship, resource constraints are concentrated around the **intensity of personalised and sustained support**. Lorena Pedrós explains that *“the programme offers personalised support to entrepreneurs at every stage of the project, from initial idea to business creation and consolidation”*, a level of support that becomes difficult to sustain at scale without stable structures and multi-year funding. Complementing this view, Juan Campos notes that the methodological sequence *“is reinforced by UAM Empeñe, which brings these concepts into practice through bootcamps, hackathons, and personalised mentoring”*, requiring significant organisational capacity and the availability of expert support to maintain quality as programmes expand.

5.5 Cultural Resistance to Change

These limitations are further compounded by **cultural resistance** operating at different levels of the education system.

Among teaching staff, the challenge extends beyond methodological updates and requires a **redefinition of the teaching role**. The shift from a model based on the transmission of expert knowledge to one centred on **facilitating team processes and managing uncertainty** represents a profound cultural transformation.

In VET, Óscar Boluda emphasises that *“a change in mindset is needed in how institutions are organised, as well as in working culture, to ensure that these types of projects are sustainable over time”*. At undergraduate level, **the shortage of team coach profiles** reflects this same difficulty at a systemic scale.

In the executive context, resistance takes a different form, namely the management of **expectations of immediate return**.

Participating companies and professionals tend to demand direct outcomes for their businesses, which can create tension with the time required for deep learning and genuine experimentation.

Among learners, a significant proportion arrive with a **culture of the ‘right answer’** and may feel blocked when faced with models where iteration and decision-making under incomplete information are central to the learning process. Overcoming this barrier requires not only a methodological shift but also structured support that normalises failure as an integral part of learning.

Addressing these forms of resistance requires strong pedagogical leadership, ongoing teacher development, and clear communication regarding the objectives and value of these models, supported by evidence of impact and medium-term outcomes.



5.6 Synthesis of Challenges by Educational Level

The following table provides an overview of the main challenges identified across each educational context:

Educational Model	Regulatory / Institutional Barriers	Scalability and Resources	Cultural Resistance to Change
Vocational Education and Training (ETHAZI/VET)	Literal interpretation of regulations, limiting the effective implementation of innovative projects	Lack of shared resources at regional and national level; individual teachers must design challenges from scratch	Need for in-depth training of technical teaching staff and a shift in organisational mindset within institutions
Undergraduate (LEINN)	Friction between 360-degree, evidence-based assessment and accreditation frameworks (ECTS credits, quality assurance agencies)	Very low student-to-team coach ratio; high operational costs compared to large-scale education; shortage of professionals trained for this role	Difficulty in identifying and training educators capable of transitioning from “subject expert” to “team process facilitator”
Executive / University (UAM, IDEAS UPV)	Academic culture prioritising research and teaching over business creation; difficulty in connecting with the market	Personalised and sustained support difficult to maintain without stable structures and multi-year funding	Managing expectations of immediate ROI; tension between deep learning processes and demand for direct outcomes
Learners (cross-cutting)	—	—	Culture of the “right answer”; blockage when faced with models where error, iteration, and uncertainty are central to learning

| 06 | Impact Measurement and Outcomes

Impact assessment has become one of the critical pillars underpinning the sustainability of innovative educational models. Moving beyond basic indicators such as activity or participation, there is a growing need to develop measurement systems capable of capturing **competency development, real-world transfer, and the creation of tangible value**, thereby providing evidence that supports institutional and strategic decision-making.

This approach is particularly relevant in contexts where challenge-based models require greater resources and organisational flexibility, making it essential to demonstrate their economic, social, and territorial return.

6.1 Training Effectiveness Metrics

Impact measurement is critical for legitimising and scaling programmes. According to joint analysis by the OECD and the HEInnovate platform, assessing effectiveness requires a performance framework that is comparable across public and private contexts, aligned with the EntreComp framework and with established evaluation best practices.

The recommended approach combines different levels of analysis to provide a comprehensive view of impact:

- **The four levels of Kirkpatrick:** reaction, learning, behaviour, and results.
- **Phillips' return on investment model**, focused on evaluating the value generated by programmes.
- **NESTA's evidence standards**, which assess the robustness and maturity of achieved outcomes.

Where possible, it is also advisable to **incorporate quasi-experimental designs and comparison groups** in order to strengthen the validity of causal inferences and enhance the overall quality of the evaluation.

In practice, these evaluation approaches are already reflected in various educational models, where learning is assessed through applied evidence and observable outcomes.

In models such as LEINN, effectiveness is observed through the evolution of learners' behaviour across real-world projects, economic objectives, and competency portfolios that provide evidence of acquired skills.

At the Autonomous University of Madrid, learning is validated through continuous testing against data and market conditions, ensuring that each decision is grounded in real evidence obtained through direct interaction with the environment, rather than untested assumptions. Meanwhile, IDEAS UPV incorporates indicators of project maturity and transfer into real start-ups, directly linking education with observable outcomes.

Similarly, vocational education and training assesses learning through the resolution of challenges connected to the productive environment, enabling learners to understand their education *“as a coherent whole rather than as a sum of disconnected modules”*.

In this way, the measurement of training effectiveness evolves from an assessment of learning to an assessment of impact, integrating competency-based, professional, and economic dimensions within a single analytical framework.

In this regard, it is imperative that these measurement frameworks continue to evolve to incorporate indicators related to the **Twin Transition (Digital and Green)**. Measuring commercial success alone is no longer sufficient; impact metrics must now capture the contribution of projects to sustainability and to the country's strategic autonomy.

6.2 Success Cases and Transformational Impact

The educational models analysed demonstrate that the development of entrepreneurial competencies goes beyond the acquisition of knowledge and is instead embodied in projects capable of generating economic, social, and technological impact. The following **cases illustrate how specific competencies have been decisive across diverse educational contexts**.



Gravity Wave: radical adaptability from the LEINN degree

The case of Julen Rodríguez and his project **Gravity Wave** exemplifies how radical adaptability—one of the core competencies developed within the LEINN degree—can make the difference between a failed initiative and a company with international impact.

In 2019, after observing the plastic crisis in Southeast Asia, Julen and his sister Amaia launched a project focused on manufacturing mobile phone cases made from recycled marine plastic. However, they soon encountered significant limitations: product personalisation proved logistically unfeasible, the material did not meet the required quality standards, and the 2020 pandemic brought their sales channels to a standstill.

Rather than rigidly adhering to their initial idea, **they applied the mindset of continuous learning and pivoting developed during their training.** The team **redefined the problem and transformed the business model into a large-scale circular economy system.**

Today, Gravity Wave collaborates with more than 7,000 fishers to remove discarded nets and plastic waste from the Mediterranean, Cantabrian Sea, and Atlantic, transforming these materials into solutions for businesses. The initiative has enabled the removal of over 518,000 kg of plastic from the ocean and led to its founder being recognised in the Forbes 30 Under 30 list in 2024.

This case exemplifies **antifragility**: the ability of an organisation to strengthen and improve through uncertainty—such as the 2020 crisis—by means of strategic pivoting grounded in **Green Skills** and the blue economy.

The defining factor was not the initial idea, but the ability to interpret the context and strategically adapt the project towards a more scalable and sustainable model.



UAM Emprende: academia–industry collaboration as a driver of impact

In the context of executive education, initiatives developed through UAM Emprende illustrate how **collaboration between academia and industry** can act as a catalyst for projects with real impact. The programme combines applied training, mentoring, and direct engagement with the market, creating an environment in which learning is validated within professional contexts.

Among the most representative experiences are **knowledge transfer programmes for researchers**, where complex scientific outputs are transformed into companies with industrial potential through expert support. Direct engagement with industry is further reinforced through **pitching sessions with investors and open innovation corporate challenges, such as the hackathon** organised in collaboration with Vodafone, in which multidisciplinary teams—including both undergraduate and postgraduate participants—work on real challenges with the support of mentors and business modelling tools.

These experiences, together with the integration of entrepreneurship into UAM's sector-specific programmes, demonstrate how systematic interaction with companies and institutions enhances project quality, accelerates validation processes, and ensures greater scalability and impact orientation.

**TALENT****Talent Clinics: sector-specific expertise from Vocational Education and Training**

Within the context of **vocational education and training**, the development of entrepreneurial competencies is closely linked to the practical application of technical and sector-specific knowledge. A representative example is that of **Carlos Dolz**, a graduate of the Higher Vocational Programme in International Trade and co-founder of **Talent Clinics**, a company established in 2024 specialising in headhunting for dental clinics, as well as in training programmes designed to facilitate professional integration from day one.

The origins of the project illustrate how **the ability to identify opportunities can become the starting point for a business initiative**. The idea emerged during a conversation held as part of a podcast interview on dental clinic management, where the founders identified a structural challenge within the sector: many professionals wish to focus on clinical practice but lack specialised support for managing the business side of their practices.

Building on this need, they developed a model that combines specialised talent recruitment with training aligned to real market demands. In doing so, Talent Clinics introduces an **innovative approach** within the healthcare sector by **linking training, employability, and concrete business needs**.

This case highlights how competencies developed through vocational education—such as environmental awareness, a practical orientation, and the ability to transform operational challenges into business solutions—can translate into entrepreneurial projects with a high degree of sector-specific specialisation and significant impact potential.



SharingAway

Artikode Intelligence and SharingAway: from academic knowledge to competitive startups (IDEAS UPV)

The **IDEAS UPV ecosystem** provides multiple examples of how specific entrepreneurial competencies enable the transformation of academic knowledge into competitive start-ups.

One such case is **Artikode Intelligence, a technology spin-off specialising in artificial intelligence** applied to advanced image analysis from satellites, drones, or medical environments. Its development was underpinned by a key competency: critical thinking applied to solving complex problems.

The team identified a real need related to the **large-scale analysis of visual data in sectors such as precision agriculture or healthcare**, integrating research in computer vision with practical validation and the development of commercial applications. This process enabled the transformation of a highly complex technological challenge into a scalable solution with a strong competitive positioning.

Initiatives such as Artikode demonstrate how **research within public universities serves as a fundamental pillar of technological sovereignty**, transforming advanced knowledge in artificial intelligence into solutions that support the strategic autonomy of critical sectors.

Another example is **SharingAway**, a start-up incorporated into the **StartUPV** programme, focused on Spanish-language no-code digital education. In this case, the defining competency was user-oriented communication and a strong understanding of real market needs.

The team designed an accessible proposition for individuals without a prior technical background and successfully validated its model through clear communication of the solution's value in evaluation, networking, and investment environments.

These initiatives demonstrate that sustained interaction with companies and institutions accelerates project validation, enhances market orientation, and increases the potential for scalability and impact.

6.3 Return on Investment (ROI) of Innovative Education

The return on challenge-based education must take into account both **economic returns** (employment, funding, project survival) and **social and systemic returns** (knowledge transfer, ecosystem strengthening, employability). Beyond traditional academic indicators, these models generate observable effects in job creation, access to funding, project continuity, and the consolidation of entrepreneurial initiatives, while also contributing to knowledge transfer, employability, and the strengthening of innovation ecosystems.

In practice, **the return is reflected in the ability to transfer learning into real-world contexts**. As demonstrated by the LEINN experience, direct exposure to market conditions –with clients, budgets, and real responsibility– is what enables theoretical learning to be translated into transferable and observable capabilities beyond the classroom.

Similarly, approaches based on continuous validation enhance the quality of decision-making, ensuring that *“each strategic step is supported by empirical validation”*, which increases both project viability and the depth of learning achieved.

This return is also evident in **a broader transformation of the educational process itself**. Challenge-based methodologies allow learners to perceive their qualification as an integrated and coherent whole, where each module gains meaning in relation to the others and to the real needs of the productive environment, fostering deeper and directly transferable learning.

Ultimately, the value generated is not limited to the direct creation of businesses but is distributed across multiple levels –individual, organisational, and territorial– consolidating innovative education as **a strategic national investment** that strengthens human capital and supports sustainable, inclusive, and competitive development in the medium to long term.



| 07 | Emerging Trends and Future Directions

The joint analysis of the experiences gathered in this MONOGRAPH makes it possible to identify a set of shared trends that are already reshaping education for entrepreneurship and innovation. **These trends do not stem from abstract theoretical frameworks, but from established practices across diverse contexts** –formal education, executive training, mentoring, and vocational education and training– **which point towards a coherent evolution of the educational ecosystem.**

7.1 Convergence of Educational Models and Flexible Pathways

Firstly, **vocational education and training** reinforces this **convergence from a perspective that is particularly closely aligned with the productive environment.** The incorporation of challenge- and project-based learning, together with the cross-cutting “Cross-Module Project”, enables approaches in which learners work in teams and understand their qualification *“as a coherent whole rather than as a sum of disconnected modules”*. **Entrepreneurship is here closely linked to specific sectors** and to practical implementation, addressing key dimensions such as costs, suppliers, clients, and quality.

Secondly, there is a **progressive convergence between learning and professional practice within undergraduate education.** Models such as LEINN place students in real-world projects from the outset, with teams operating as companies and assuming direct responsibility for outcomes. In this model, experience is not acquired after training but is developed simultaneously with learning, turning each team decision into an opportunity for competency development with tangible consequences.

Thirdly, entrepreneurial education increasingly relies on **hybrid methodologies that combine creative exploration with evidence-based validation.** UAM has consolidated an approach in which education evolves from theoretical planning towards continuous experimentation with the market. This model integrates tools such as **Design Thinking and Lean Start-up** within intensive formats such as bootcamps, hackathons, and mentoring, creating pathways where theory acts as a decision-making framework that is immediately applied and tested against real projects.

Structured mentoring adds **a complementary layer to these learning pathways**, providing long-term support, accountability, and access to networks—elements that are critical for the sustainability of projects.

These flexible pathways also point towards a **transformation of the certification model**. The future of accreditation is no longer confined to traditional long-form degrees; rather, it is **increasingly supported by university and VET micro-credentials capable of validating specific competencies acquired in real-world challenge environments**. This certification model enables the agile recognition of concrete capabilities—such as market validation, team management, or technical prototyping—which challenge-based pathways naturally develop, yet which conventional qualification frameworks do not always capture with the same level of precision.

Taken together, these experiences highlight a significant shift: **the focus is moving away from linear and standardised models towards more flexible pathways, where learning is built around stages of project maturity, accumulated evidence, and the individual’s capacity to adapt**. The convergence of methodologies, stakeholders, and settings—classroom, company, ecosystem, and market—is shaping an educational framework in which entrepreneurial competencies provide a common foundation for multiple professional trajectories.

7.2 Educational Institutions as Laboratories for Applied Innovation

Another relevant trend is the transformation in the role of educational institutions, which are evolving from spaces centred on knowledge transmission into **active platforms for applied innovation**.

In university executive education, Juan Campos explicitly reflects this shift by stating that *“the university not only provides knowledge, but also acts as a laboratory for solutions to real corporate challenges”*, reinforcing a model in which learning is validated within professional contexts and generates direct impact.

This perspective aligns with the experience of IDEAS UPV, where Lorena Pedrós positions **entrepreneurship as a mechanism for connecting the university’s mission with knowledge transfer**, describing it as *“a strategic axis that links education, research, and the transfer of knowledge”*.

In the same direction, universities increasingly rely on infrastructures and experimental environments that enable the prototyping and validation of solutions, thereby strengthening the focus on applied innovation.

From the vocational education and training perspective, the ETHAZI model and the experiences described by Óscar Boluda reinforce this same logic at a different scale: educational centres working on real problems from the local productive environment, generating prototypes, technical solutions, and learning with immediate value for companies and the surrounding territory. This role as a laboratory for applied innovation is particularly significant in vocational education, where institutions act as hubs for technological transfer to SMEs in their ecosystem, ensuring **territorial cohesion** and the modernisation of the local productive fabric.

These innovation laboratories are also increasingly incorporating a dimension that is becoming ever more critical: **green skills**. Within the context of the so-called Twin Transition –digital and sustainable– educational institutions are not only addressing technological or market challenges, but **are also beginning to tackle issues related to the circular economy, decarbonisation, and territorial sustainability**. According to CaixaBank Dualiza reports on green skills in VET, the ability of institutions to integrate these competencies into their challenges and projects is key to aligning education with the demands of a transitioning economy. This integration further strengthens the role of educational institutions as active agents of productive transformation, rather than merely providers of technical profiles.

This convergence between universities, vocational education and training, and the productive ecosystem **points towards a scenario in which the boundary between education and practice is progressively blurred, reinforcing the social and economic relevance of education systems.**

7.3 Centrality of Expert Guidance and Evidence-Based Assessment

A third shared trend is the shift away from lecture-based teaching towards **expert guidance, coaching, and mentoring**, combined with assessment systems grounded in real evidence of performance.

In LEINN, the role of the team coach replaces that of the traditional lecturer, **prioritising reflection on action**. At UAM, **assessment is structured around project outcomes, metrics, and strategic decisions** validated through direct engagement with the market. At IDEAS UPV, validation with users, external review panels, and functional prototypes serve as key evidence of learning.

In vocational education and training, Óscar Boluda highlights that performance-based assessment transforms the learner's relationship with learning: rather than asking what will be included in the exam, the focus shifts to whether the solution works in a real-world context. **Structured mentoring** reinforces this trend at more advanced stages, incorporating accountability, milestones, and systematic follow-up.

Taken together, this orientation reinforces the alignment between learning, practice, and value creation, while enabling a more rigorous measurement of educational impact. However, its scope goes beyond resilience: the ultimate aim of these systems of guidance and evidence-based assessment is not merely to prepare entrepreneurs to withstand uncertainty, but to cultivate what Nassim Nicholas Taleb—essayist, mathematician, and Professor of Risk Engineering at New York University—defines as antifragility: the capacity to grow stronger and improve precisely through disorder, error, and unpredictable environments. An educational model that assesses through real performance evidence, that normalises pivoting, and that supports reflection on failure does not produce profiles that simply survive uncertainty, but rather profiles that develop and thrive through it.



7.4 Technology as an Enabler of Learning, Not an End in Itself

Finally, technology emerges as a \ **cross-cutting enabler** of these models, rather than their central focus. Digital platforms, learning analytics, and artificial intelligence tools make it possible to personalise pathways, improve monitoring, and free up time for strategic guidance.



Sonia Rodríguez points to the automation of operational tasks as a way to strengthen decision-making and strategic learning, stating that \ *“there will be a strong influence and integration of Artificial Intelligence (AI), as operational aspects can be better automated, allowing each entrepreneur to focus on strategic decisions, which is where this model becomes particularly meaningful”*

Juan Campos emphasises that technology should serve to \ **accelerate validation and testing against the market, rather than replace critical judgement** . From the public sector perspective, there is also a clear emphasis on ensuring \ **accessibility, ethics, and equity** in the use of these tools, preventing digital transformation from widening existing gaps.

| 08 | Conclusion

The evidence gathered in this MONOGRAPH confirms that education for entrepreneurship has moved beyond being a peripheral discipline to become the core of a transformative approach to learning capable of addressing global challenges. Models based on challenge-driven learning and immersion in real-world ecosystems demonstrate greater effectiveness in developing resilient profiles capable of leading in highly uncertain environments.

| 01 | A shared framework of principles for the future : there is no single model, but there is a clear roadmap that transcends institutions. The cases analysed (the VET network, LEINN, UAM, IDEAS UPV and) converge around fundamental pillars: active learning through real-world problems, expert guidance (coaching and mentoring), and evidence-based assessment of performance. This approach goes beyond employability to foster learner antifragility: the capacity not only to withstand market changes, but to grow stronger and evolve through them.

| 02 | A new public-private symbiosis : from a public policy perspective, the success of this model lies in close collaboration that goes beyond traditional divides.

- Public sector as a strategic driver: the public sector, through universities and vocational education and training, acts as a guarantor of equity and territorial cohesion, ensuring that innovation leaves no one behind. At the same time, it is consolidating its role as a key driver of technological sovereignty, providing long-term research capacity and the institutional scale required to transform the productive fabric.
- Private sector as a catalyst for disruption: privately led models operate as laboratories of methodological agility, testing new pedagogical approaches and enabling rapid, granular connections with the most dynamic niches of the global market.

| 03 | The 2030 horizon: sustainability and recognition: the future of transformative education in Spain must be grounded in the consolidation of the Twin Transition (digital and green). It is essential that curricula fully integrate green skills, aligning with the demands of a decarbonised and circular economy..

For this impact to become systemic, it is necessary to move towards regulatory frameworks that enable more flexible certification through micro-credentials, allowing individuals to validate specific competencies acquired in real-world challenge environments.

Ultimately, transformative education today represents a strategic national investment: a fundamental tool to ensure robust, sustainable economic growth, deeply rooted in talent and social equity.

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