IBERO4JOBS
DELIVERABLE NAME: D3.2 Report Methodology for the Articulation of Partner Universities

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Dissemination Level	Sensitive

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EXECUTIVE SUMMARY

In this phase of the project, the delegates from the Ibero-American universities carried out several activities, such as: (1) they attended an online training program, for three months, related to the latest trends in the methodologies used for the articulation with the productive sector, (2) they spent two weeks in the European institutions learning about their Best Practices and the relationship with the enterprises (3) the members from the LA Universities, prepared a documents and a toolkit which included the work methodology to be implemented in the pilot program. (Annexes II, III, IV, V)

METHODOLOGICAL GUIDE FOR THE DESIGN OF THE PILOT PROJECT

Description

U Vigo and P Porto designed the template 'Methodological Guide for the Design of the Pilot project', (Annex I), which is a comprehensive document aimed at structuring and guiding the methodology or development of an educational pilot focusing on university-business connection. The guide is structured in several **key sections** specifying the methodological approach, implementation and evaluation of the pilot project. (Part 6 to 9 to be filled in after pilot)

The following were the items to be completed by each university:

1.Introduction and Rationale: Provides a detailed context of the current educational environment, highlighting the need for better university-business linkages to improve student employability. It clearly defines the problem to be addressed, the objectives of the pilot, and justifies the relevance of the project.

2.Theoretical Framework: Reviews similar initiatives and educational theories that underpin the project. It identifies a specific gap that the pilot aims to close, based on previous studies and theories of university-business linkages.

3.Methodology: Describes precisely the methodological design of the pilot, including the type of educational innovation and the approach adopted. Details the participants, the planned interventions and the implementation schedule.

4.Implementation: Explains the implementation phases of the pilot (timeline), resources required and adjustments made. It also identifies potential risks and strategies to mitigate them.

5.Evaluation and Impact Measurement: Establishes success criteria and indicates evaluation methods to measure the results of the pilot. It explains the data collection and analysis needed to evaluate the impact of the pilot.

6.Results and Discussion: Presents and analyses the most relevant findings of the study, discussing how these results align with the objectives of the pilot. In addition, the limitations of the study are acknowledged.

7.Conclusions and Recommendations: Assesses the impact of the pilot on student employability and suggests areas for future innovation. It offers practical recommendations for replication or scaling up of the pilot.

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8.Bibliography: Lists all bibliographic and web references used in the preparation.

9.Annexes: Includes additional materials such as guides, surveys, interviews, evaluation tools, among others, that support the innovation project.

The guide also specifies the required deliverables as a result of the pilot, which are:

- *Completed Template:* Document finalized and validated by the university.
- *Work Agenda with the Productive Sector:* Includes evidence of visits and presentations of the pilot methodology to companies in the region.
- *Evidence of Awareness and Alignment of the Working Methodology:* Documentation of the commitment and understanding of the methodology by teachers, administrators and students.

CONCLUSION

The information submitted by the four universities reveals a commendable effort by each institution to design a realistic roadmap tailored to their strategic interests and capabilities.

- Each university meticulously crafted these plans, ensuring they not only align with their operational environments but also integrate best practices gleaned from recent study visits in Europe (Spain and Portugal, WP 3.1).
- This synthesis of external insights with local realities enabled a thoughtful adaptation of strategies that are both innovative and appropriate for each context.

UCaldas: has developed a comprehensive template that clearly outlines its pilot's objectives, connecting them effectively to the broader sustainable development goals (SDGs). The university has provided a detailed institutional linkage section, which reflects a deep understanding of the importance of integrating academic efforts with industry needs. The template also includes a well-developed toolkit that supports the pilot's implementation, alongside a robust system for both process-based and final evaluations, ensuring that each phase of the pilot is monitored and adjusted as needed.

UAM: its template excels in its clear depiction of the problem to be solved, backed by substantial data and visual aids like graphs that enhance understanding and provide a solid basis for the pilot's objectives. This university has effectively updated and adapted the European methodologies observed during their study visits, resulting in a pilot that is both innovative and highly relevant to their specific academic and regional context. Their toolkit is thoughtfully assembled, offering practical tools and resources essential for effective implementation and evaluation.

UAN: also stands out with a well-structured approach to addressing the identified problem. The university has not only provided a clear description but has also supported it with relevant data. This approach facilitates a deeper understanding of the challenges and enhances the pilot's framework. The inclusion of a comprehensive toolkit and a detailed evaluation system underscores the university's commitment to continuous improvement and effectiveness throughout the pilot's lifecycle.

UTN: has shown a strong commitment to institutional linkage, offering extensive information that demonstrates a proactive approach to integrating with business and industry. Like the others, this university has effectively translated the learnings from European study visits into actionable strategies that fit their unique circumstances. The provided toolkit is tailored to support these

strategies, and the dual-layer evaluation system ensures that the pilot's outcomes can be meticulously assessed and refined.

In conclusion, each university has not only embraced the challenge of developing a pilot project but has done so, with a clear focus on realism, strategic alignment, and practical application. The roadmaps/pilots provided are not just theoretical constructs but are actionable plans equipped with the necessary tools and evaluative measures to ensure success and sustainability. This collective effort demonstrates a significant step forward in enhancing educational practices through international collaboration and local adaptation.

If these roadmaps and pilot projects prove successful, there is a high likelihood that they could be replicated in similar environments across Ibero-America, as shown above:

- The tailored approaches taken by each university demonstrate a deep understanding of both the local context and the global best practices, providing a robust framework that other institutions can adapt to their own specific needs and conditions.
- This potential for scalability is particularly promising for enhancing educational and institutional outcomes across the region, fostering a broader impact that could significantly advance academic and industry collaborations throughout Ibero-America.

In table 1, there is a detailed description of the information submitted by each LA university:

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TABLE 1 – SUMMARY

UNIV.	IDENTIFIED GAPS	PLANNED INTERVENTION	OBJECTIVE	TARGET PROGRAMMES	PARTICIPANTS	PERFORMANCE INDICATORS	SUPPORTING THEORIES
UCaldas	• The growing demand for experts in AI and cybersecurity requires intensive and practical training • To consolidate the University-Business relationship, the development of soft skills – and entrepreneurship in students.	• Challenge-Based Learning Pilot • Pilot to be implemented in internships in the productive sector • Proposal for Strengthening Entrepreneurship Skills • Bootcamps (AI and Cybersecurity)	• Promote an entrepreneurial mindset and action in the students involved • Extend the open innovation platform to the Ibero4jobs consortium • Train students in collaboration with secondary education or other interested parties in AI and cybersecurity	• Food Engineering • Technology in Logistics • Technology in Occupational Health and Safety Processes	• Students • Professors • Companies • LATAM Universities (Open Innovation Platform)	• Nº of students, teachers, and companies participating in the pilot. • Nº of challenges, internships, or other types of academic activities. • Nº of participants in the " EAIFI 2024-II event". • Nº participant trainings in soft skills. • Nº challenges in the open innovation platform.	• Dual education Work-integrated learning (WIL) programs • PBL Professional practice • Capstone project
UAM	• To strengthen the strategies of linkage with the business sector in terms of the training of professionals	• UAM-Dual-Skills program (Bootcamps)	• To contribute to the development of professional competencies through the training of soft skills oriented to favor employability through the solution of business challenges	• Industrial Engineering • Industrial Design • Fashion Design	• Students • Professors • Business experts • Graduates	• Level of progression of competencies in participating students according to a rubric • Linkage of companies in terms of identifying business challenges • Linkage of subject matter experts in the pilot • Training of mentoring-oriented teacher • % students who start and finish the pilot.	• PBL • Socio-constructivism

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UNIV.	IDENTIFIED GAPS	PLANNED INTERVENTION	OBJECTIVE	TARGET PROGRAMMES	PARTICIPANTS	PERFORMANCE INDICATORS	SUPPORTING THEORIES
UAN	• UAN has not detonated the knowledge-based economy in collaboration with local companies that allow university talent to provide solutions to real problems.	• INTEGRA-UAN	• To pilot, through the University-Business linkage model (business challenges), dual training strategies for the development of soft skills in university students	• BA Computer Science • BA Tourism Management and Innovation	• Institutional authorities (UAN) • Professors • Students • Business chambers and productive sector	• Nº participants (Phase 1: Socialize the pilot to 200 people) • Deliverables (minutes, proposal of curricular design, thematic content of softskills training for teachers, design of the Bachelor's Degree in Computer Science congress, design of integrating projects)	• Dual education • PBL
UTN	• Strengthen the Business-University link	• Pre-Ocupate Project	• CONECTA UT (soft skills) • INCUBAEMPRENDORES (entrepreneurship) • DIGITAL SKILLS TRAINING for teachers and students	• Gastronomy • Business Management	• Educational authorities • Professors • Students • Chambers of commerce	• Nª businesses operating 1 year after opening • Students employed upon graduation • Performance through behavioral traits • Performance through digital skills in practice	• Active learning methodologies • PBL

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Annex I

TEMPLATE FOR THE DESIGN OF THE PILOT

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1. Introduction and Justification

Context Brief description of the current educational environment (university/centre/curriculum/study programme) and the need for university-business linkages.
Institutional linkage: Relation to university/faculty strategic plan, SDGs, etc.
Problem to be solved: Specify the specific gap or problem that the pilot seeks to address.
Pilot objectives: Clearly define the objectives, both general and specific, that the project aims to achieve.
Justification: To explain why this pilot is relevant and necessary to improve students' employability.

2. Theoretical Framework

Background: Review of similar initiatives or previous related studies.
Supporting theories: Description of the educational theories or models of university-business linkage that underpin the project.
Identified gap: Detail the specific or prioritised gap that the pilot intends to close, based on the theoretical framework and background, by choosing one or more issues prioritised in the previous diagnostic phase:

-Inclusion of the business challenge methodology in training practice.
-Creation of a strategy to consolidate the University-Business relationship.
-Construction of a strategy oriented to the development of students' soft skills.
-Development of a strategy for teacher training (including, among others, how to improve interaction with the company and the development of soft skills for teachers).
-Incorporate student-oriented entrepreneurship strategies.
-Innovation and Knowledge Transfer

3. Methodology

Pilot design: Detailed description of the methodological design, including the type of educational innovation and approach.
Participants: Identification of the stakeholders involved (students, teachers, the university, companies, all).
Planned interventions: Details of activities, tools or resources to be used during the pilot.
Timeline: Establish a clear *timeline* for the implementation of the pilot.

4. Implementation

Pilot development: Describe the implementation phases and any adjustments or modifications made.
Resources required: List the material, human, technological, organizational resources required.
Risks and mitigation: Identify potential risks and strategies to mitigate them.

5. Impact Assessment and Measurement

Success criteria: Define how the success of the pilot will be measured (performance indicators).
Evaluation methods: Describe the methods and tools that will be used to evaluate the results of the pilot. Alternative evaluation!
Data collection and analysis: Explain how data will be collected and analyzed to assess the impact of the pilot.

6. Results and Discussion

Main findings: Present the most relevant results obtained.
Interpretation of results: Analyze and discuss the results in the context of the pilot's objective.
Limitations of the study: Acknowledge the limitations and how they might affect the results.

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7. Conclusions and Recommendations

Impact on employability: To assess the potential impact of the pilot on learners' employability.
Suggestions for future innovations: Propose areas for future innovations based on the findings, in your faculty/department/university.
Recommendations for implementation: Provide recommendations for replication or scaling up of the pilot.

8. Bibliography

Sources cited: Include all bibliographical references used in the preparation of the project. Also webgraphy.

9. Annexes

Additional materials: Provide any supplementary materials that support the innovation project, such as guides, surveys, interviews, evaluation tools or any other tools developed.

DELIVERABLES REQUIRED AS A RESULT OF THE PILOT

FILL IN THE FILLED IN FORM, by university

Work agenda with the productive sector

Visit companies in the region and present the pilot methodology to them.

Evidence of awareness raising and alignment of the working methodology with the university community

With teachers, administrative staff and students

TIMETABLE FOR IMPLEMENTATION AND DELIVERY

Deliverables	Date	Addressee
Template completed from 1 to 5		
Template completed from 6 to 12		
Fully completed and approved/validated template + evidences		
Work agenda with the productive sector (Report/evidence of visits to companies in the region to present the pilot methodology).		
Evidence of awareness-raising and alignment of the work methodology with the university community (with teachers, administrative staff and students).		

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Annex II

Work Methodology for the Pilot Program

UNIVERSITY OF CALDAS

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Work Methodology for the Design of the Pilot project - UCaldas

1. Introduction and Justification

1.1 Context

In Colombia the evolution of higher education institutions towards a more relevant academic offering that focuses on regional and national development is crucial; to achieve this, it is necessary to design strategies that link the universities with productive sector. This requires the collective construction of curricular activities to identify and develop the skills demanded by the business sector in the students.

In Colombia, the National Ministry of Education (MEN) has implemented the dual modality, which combines academic training with practical business learning. This modality allows young people to develop technological skills and gain their first certified professional experience, (Law 2039 of 2020). The goal is to offer technical and technological education, improve students' employability, and strengthen the relationships among the academia, the productive sector, and the state.

In the second semester of 2021, in collaboration with Nestlé, a dual education pilot program was launched with technological programs, involving different universities in Colombia, and about 20 private organizations, including Adecco, Pfizer, Grupo Éxito, Sodexo, Cargill, and SGS Colombia.

According to data from MEN, due to the collaboration with national and international government entities, higher education institutions, and more than 20 Colombian companies, 21 dual education programs are now offered in the country, representing a 62% increase compared to 2018. Additionally, dual education encounters with private companies and higher education institutions have been held, with nearly 200[1] delegates participating.

The University of Caldas and six accredited universities in Manizales, stand out for its educational excellence, outstanding researchers, and for fostering a highly educated population. The institution promotes research and innovation through partnerships with businesses and government entities, driving economic growth and competitiveness. However, the region faces challenges such as dependence on traditional sectors, migration of talented individuals, and the lack of a solid-based industry to transform ideas into successful businesses, affecting employability. In the region, there are opportunities to diversify the economy and promote cultural tourism, but also threats such as economic fluctuations, competition from larger cities, and regulatory challenges.

At the UCaldas, there are no academic programs in a dual modality, but strategies are being implemented to bring students closer to their future professional lives through company visits, internships, and academic practices. However, these activities are carried out in the last semesters and in traditional programs, which do not allow for curricular flexibility to adapt to the changing business world.

For the Faculty of Engineering, the relationship among the university, the productive sector, the state, and the society is essential to guarantee the quality in education and to promote innovation.

[1] https://www.mineducacion.gov.co/portal/salaprensa/Noticias/411273:Gobierno-y-sector-privado-avanzan-en-la-formacion-y-educacion-dual-en-Colombia-un-trabajo-en-equipo-para-fortalecer-el-talento-humano

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Three programs were prioritized for the implementation of the ibero4jobs pilot, considering their relevance in various economic sectors: Food Engineering, Technology in Logistics, and Technology in Occupational Health and Safety Processes. at UCaldas the name of the pilot is "*Closing Gaps Pilot Program"*

The strengthening of the ties between the university and the productive sector benefits academia and industry. This connection provides students with opportunities to apply theoretical knowledge, develop practical skills, gain work experience, and access employment and internship opportunities.

Each prioritized academic program faces specific challenges and strategies according to its object study. Therefore, specific implementation tools will be developed.

Some challenges identified in the programs are the following:

1. **Curriculum updating:** The programs must be kept updated with technological advancements, changing regulations, and market trends. This involves periodically reviewing of the curriculum to ensure that students acquire the skills and knowledge necessary to address the current challenges of the industry.
2. **Practical focus:** The programs should include practical experiences, such as internships, research projects, and laboratory practices so that students can apply their knowledge in real-world settings and develop practical skills relevant to the productive sector.
3. **Industry Engagement:** To understand the needs and challenges of the companies, it is necessary to establish solid partnerships. These can facilitate collaboration in research, development of joint projects, and internship programs, which can provide students with a deeper understanding of the industry.
4. **Soft skills training:** There is a need to develop soft skills in the students, such as teamwork, effective communication, leadership, and critical thinking. It is relevant to integrate activities in the academic program that promote these skills to prepare graduates for the workforce.
5. **Emerging technology:** The programs must integrate topics related to new technologies, such as artificial intelligence, the Internet of Things (IoT), and virtual reality, which enhance occupational risk prevention and emergency management.
6. **Interdisciplinary approach:** There is a need to have an interdisciplinary approach, which involves Engineering, Psychology, Occupational Medicine, and Business Management, to provide a holistic understanding of occupational risks and prevention strategies.
7. **Internationalization:** it is important for the program to offer internationalization opportunities such as academic exchanges, collaborations with foreign institutions, and dual degree programs. This enables students to develop a global perspective and adapt to multicultural environments.
8. **Employability of graduates:** it is necessary to establish strategies to improve the employability of the graduates of the different programs.

This pilot seeks to close the gaps between the University of Caldas and the business sector by establishing partnerships for the implementation of joint projects that allow the development of hard and soft skills in students of different programs through interaction with the company during their educational training stage.

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1.2 Institutional Linkage

Development Plan

For UCaldas, it is important to align academic-administrative processes with the productive and community needs. Its Institutional Development Plan for 2020-2030 emphasizes in the connection with the productive sector to enrich education, prioritize research, and enhance university outreach. The participation and commitment of the university administration are relevant to consolidate the university as an emblematic institution, guided by the principles of accessibility, equality, social benefit, and relevance, to improve equity in Colombian society.

Faculty of Engineering

The Faculty of Engineering establishes strategic pillars that are aligned with the objectives of the pilot proposal, which include:

- **Regional and Public University** "The Well-Being in the Region" program aims to establish alliances and institutional practices for permanent actions in the region with business actors and social or community leaders.
- **Teaching for Integration**: Increase the number of students in the region by improving their adaptation, comprehensive education, and retention through public-private partnerships that bring students closer to the educational system and the productive sector; generate institutional guidelines and directives to facilitate the offering of special academic programs in the region, including programs in complementary cycles and in coordination with high schools and provide comprehensive training for teachers in areas that strengthen their teaching practice (pedagogical skills, soft skills, knowledge in their field, refresher courses, advanced training).

Sustainable Development Goals

Higher education institutions must promote projects that contribute to the Sustainable Development Goals (SDGs) and improve the quality of life of communities and regional development.

This pilot aims to fulfill the following SDGs:

- **Sustainable Development Goal 4**: Ensures inclusive and equitable quality education and promote lifelong learning opportunities for all.
- **Target 4.1**: By 2030, ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes.
- **Target 4.4**: By 2030, increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.
- **Target 4.7.c**: By 2030, substantially increase the supply of qualified teachers, including international teacher training in developing countries.

1.3 Problem to be solved

The *Closing Gaps Pilot Program* aims to address various issues and need in the academic programs, mentioned previously. The main challenge is the need to implement methodologies and strategies within the courses of the different programs that aim for the development of both hard and soft skills demanded by the labor market. This also implies that the university must strengthen its ties

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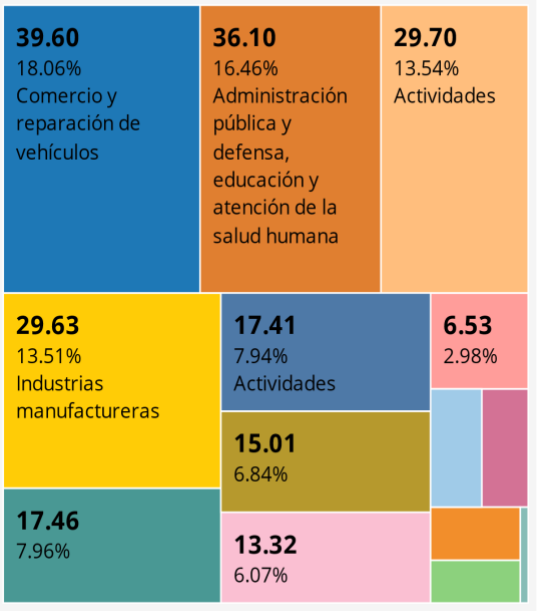
with the business sector for both to decide collectively the role of students and their participation within the companies. This will allow to have a more relevant academic offer that contributes to the improvement of the employability rates of graduates.

On the other hand, it is important to highlight that the employability rate in the regions, according to figures from the Manizales Chamber of Commerce (CCMPC) and the National Administrative Department of Statistics (DANE), for the year 2023, the main employment activity in the city of Manizales was wholesale and retail trade and vehicle repair, which represents around 18% of the total employed population, followed by public administration, defense, education, and health with 16%, and the manufacturing industry with 13.51%, as shown in Table 1. This suggests that business dynamics must be considered if there is a need to improve the employability rate of graduates from our programs.

Table 1. Total Employment by Industry. Jan-Mar 2023

	Ene - Mar
Ocupados	219.3
Actividades artísticas, entretenimiento recreació..	17.4
Actividades financieras y de seguros	4.2
Actividades inmobiliarias	3.4
Actividades profesionales, científicas, técnicas y ..	29.7
Administración pública y defensa, educación y at.	36.1
Agricultura, ganadería, caza, silvicultura y pesca	2.7
Alojamiento y servicios de comida	15.0
Comercio y reparación de vehículos	39.6
Construcción	17.5
Explotación de minas y canteras	0.5
Industrias manufactureras	29.6
Información y comunicaciones	6.5
No informa	0.0
Suministro de electricidad gas, agua y gestión de.	3.8
Transporte y almacenamiento	13.3



Fuente: Estudios Económicos y Competitividad CCMPC con base en GEIH DANE

According to these figures, Manizales does not have high unemployment rates compared to other cities, as shown in Graph 1. However, there are still challenges to face since some cities in our country still have very high youth unemployment rates, which may include many of our university graduates who return to their places of origin once they have completed their studies.

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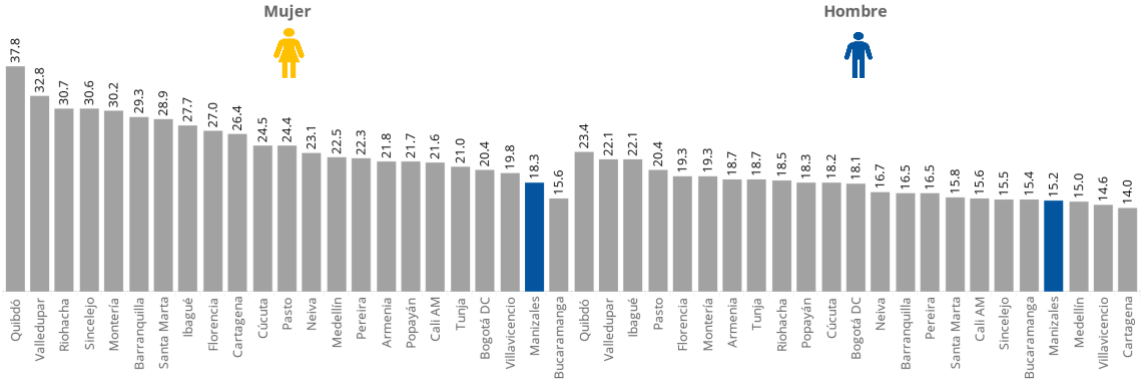
Graph 1: Youth Unemployment Data by Gender in Colombian Cities

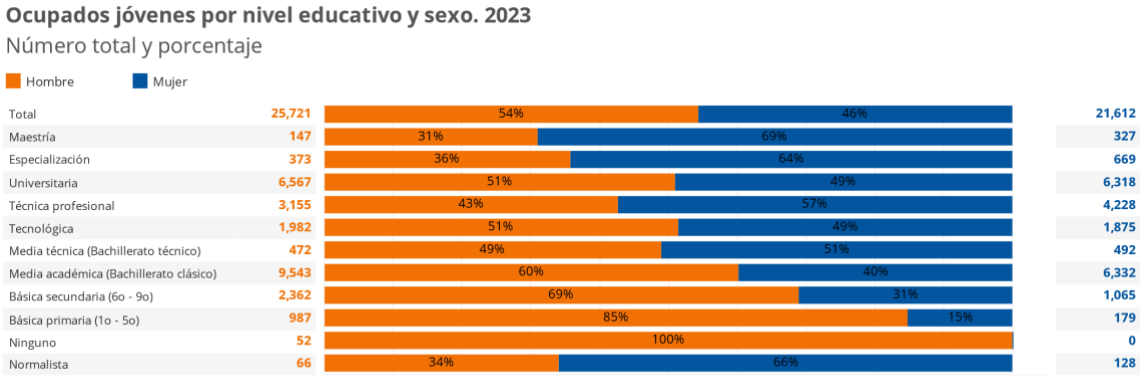


Fuente: DANE, 2023

In the last years, The Faculty of Engineering has implemented workshops and training sessions with students to strengthen job skills and personnel management. However, there has been a failure to include regional business leaders in these initiatives to contribute with their experiences and ideas.

On the other hand, the programs prioritized for this pilot were chosen considering the focus of the Faculty of Engineering at the University of Caldas, but, at the same time, addressing the need to replicate these initiatives at other educational levels beyond the university professional level, such as technical and technological programs. This was considered necessary due to existing gaps in employability across different educational levels and according to gender (see Graph 2), which in some cases, hinders equal access to job opportunities for young graduates of the programs.

Graph 2: Number of Employed Youth



Fuente: DANE, GEIH

Based on the previous information, it is necessary for universities and companies to develop tools and strategies to strengthen technical and soft skills, such as teamwork, problem-solving, effective communication, and leadership, so that students can be successful in their professional careers.

1.4 Pilot Objectives

1.4.1 General Objective

Consolidate the dual efforts of the university and the business sector to address challenges and to strength the skills of university students to prepare them for the labor market.

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1.4.2 Specific Objectives

- Establish partnerships with companies to offer internship opportunities, mentorships, and collaborative projects that promote the development of soft skills.
- Promote the implementation of learning methodologies that foster the development of skills through the resolution of business challenges.
- Foster an entrepreneurial mindset in the students involved in the pilot through cooperative activities among the participants.
- Raise awareness among the various stakeholders and participants about the importance of soft skills for professional success.

1.5 Justification

Youth unemployment is a global problem, and developing skills to improve the employability of graduates is essential for their success and regional development. It is necessary to implement university-business connection strategies, including internship programs, apprenticeships, and collaborative research projects, as well as the updating the curriculum according to business trends and demands.

By addressing this issue, the employability and professional performance of graduates will improve. It will also strengthen the university-business relationship, promoting mutually beneficial collaboration, which will contribute to the growth and development of the region.

The institutionalization of entrepreneurship in higher education institutions is crucial. It fosters innovation, economic development, and job creation, and it prepares students with entrepreneurial skills. Moreover, it strengthens the university-business-state relationship, promoting collaboration and knowledge transfer. In summary, it is crucial for the socioeconomic development and success of students and communities.

2. Theoretical Framework

2.1 Background

Dual education systems, based on apprenticeship models, prepare students for the workforce by combining education and practical training. Despite challenges like aligning curriculum with industry standards and securing resources, these systems improve employability, reduce youth unemployment, and strengthen education-industry connections. As technology reshapes the labor market, flexible, skill-oriented education models are increasingly needed. Policymakers, educators, and industry stakeholders can collaborate to create robust dual education systems that empower students and drive economic growth, fostering innovation, collaboration, and lifelong learning. Muhambetaliev, S. & Kasymova, A.. (2016)

Jackson (2015) explores challenges and strategies in developing employability skills within work-integrated learning (WIL) programs. The study identifies barriers such as mismatched expectations, lack of support, and limited skill development opportunities. Best practices for enhancing employability skills include clear learning outcomes, supportive supervision, reflective practices, and collaborative academia-industry partnerships. Addressing these barriers and adopting best practices can better prepare students for the job market and ease their transition into the workforce.

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2.2 Supporting Theories

Challenge Based Learning

The foundational definition of Challenge Based Learning in the Apple Inc´s white paper is the following:

- *"Challenge Based Learning is an engaging multidisciplinary approach to teaching and learning that encourages students to leverage the technology they use in their daily lives to solve real-world problems. Challenge Based Learning is collaborative and hands-on, asking students to work with peers, teachers, and experts in their communities and around the world to ask good questions, develop deeper subject area knowledge, accept and solve challenges, take action, and share their experience"* (Nichols & Cator, 2008, p. 1)
- Challenge-based learning (CBL) is recognized as a significant trend in higher education for several reasons. It aligns with modern educational goals of fostering critical thinking, collaboration, and real-world problem-solving skills. The NMC Horizon Report: 2015 Higher Education Edition." highlights how enterprises are collaborating with educational institutions to implement CBL programs that prepare students for the workforce by solving real business problems. (Johnson, L., Adams Becker, S., Estrada, V., & Freeman, A. (2015))
- Various collaborative learning methods in the workplace, including CBL are used in Higher education. Additionally, some case studies and theoretical insights into how CBL can be integrated into corporate training programs. (Gamble, J. (2018).)

Professional practice

Professional practice curriculum prepares students for real-world work in specific professions by combining theoretical knowledge with practical skills and experiences. These curricula emphasize hands-on learning through internships, co-op programs, lab work, or simulated projects. Shulman (2005) discusses the distinctive pedagogical approaches used in various professions and their implications for curriculum design.

Industry-relevant projects involve students working on real-world challenges to bridge the gap between theory and practice, often using case-based learning (CBL) or in professional practice courses. Industry partnerships, including guest lectures, workshops, and sponsored projects, enhance curriculum relevance and provide networking opportunities for students.Capstone project

Capstone project

A capstone project is a comprehensive, multidisciplinary academic endeavor typically required in the final year of a degree. It involves applying knowledge and skills to address real-world problems, often in collaboration with industry partners, and producing solutions or recommendations with practical implications.

Bannister and Williams (2020) provide an overview of effective strategies for developing and delivering capstone courses in higher education, covering course design, pedagogical approaches, assessment methods, and student outcomes. The review highlights successful capstone models across disciplines, emphasizing alignment with program goals and learning objectives. It discusses challenges in designing capstone experiences and offers recommendations for enhancing their effectiveness, serving as a valuable resource for educators aiming to promote student engagement, learning, and success.

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Capstone projects at top engineering universities emphasize interdisciplinary focus and real-world problem-solving, often involving industry collaboration. They foster teamwork, communication, research, and innovation through design and implementation phases. Students present findings to faculty, industry sponsors, and peers, honing their presentation skills. These projects prepare students for professional practice, lifelong learning, and problem-solving. Ward (2013) outlines common elements of capstone projects in top-ranked engineering universities. European Journal of Engineering Education, 38(2), 211–218. https://doi.org/10.1080/03043797.2013.766676.

Identified Gap

Among the specific gaps that the pilot aims to address, include the insertion of business challenge methodology in the training practice, the creation of a strategy to consolidate the University-Business relationship, and the construction of a technique oriented towards the development of soft skills in students. Additionally, it seeks to develop a teacher training tool to improve interaction with companies and the development of soft skills, as well as incorporating entrepreneurship strategies aimed at students.

3. Methodology

3.1 Pilot Design

The *Closing Gaps Pilot Program* will be developed with the Food Engineering, Logistics Technology, and Occupational Safety and Health Technology programs that are part of the Faculty of Engineering. For this purpose, teachers and students from different courses will be involved, carrying out activities in cooperation with the participants of the business sector, focusing on challenge resolution and the development of soft skills.

The pilot stages are the following:

- **Preparation**: In this stage, the strategies, the methodologies and activities for the pilot are defined.
- **Awareness**: This stage includes different activities for socializing the methodologies with the various actors and participants of the pilot, in which with feedback sessions are considered to adjust and promote collective construction. Sessions are planned with faculty groups, administrative staff, students, and business representatives.
- **Training**: In this stage, training sessions will be conducted for the teachers and students involve in the pilot implementation to acquire the methodological proposal. These sessions are carried out through Bootcamps, workshops, and collaborative work sessions.
- **Implementation**: This involves applying the methodologies and developing activities in the various courses of the programs in collaboration with different business actors involved in the pilot. The aim is to apply tools for Challenge-Based Learning (CBL) in solving business problems, business practices, co-creation workshops, and other activities focused on developing students' soft skills.
- **Evaluation**: In this stage, the pilot results will be analyzed, and the impacts will be evaluated in terms of the appropriation of methodologies and the development of soft skills in the participating students.

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The methodologies and strategies for the implementation of the *Closing Gaps Pilot Program* are below:

1. Challenge-Based Learning Methodology Implemented in the three programs

Use of the Challenge-Based Learning (CBL) methodology for the joint resolution of challenges or problem proposed by the bossiness sector.

The following activities will be carried out:

- Workshops with the lead professors of the courses to develop the strategies and methodologies to be used in the project.
- Work sessions between teachers and students for the socialization, implementation, development, and evaluation of the project's methodologies and activities.
- Work sessions with students and delegates from companies to prioritize challenges and opportunities.
- Co-creation sessions (workshops) with stakeholders.
- Two sessions during the academic period (in-class sessions) for "feedback": (1) Initial submission of the preliminary challenge plan and (2) submission of the final challenge proposal.
- Analysis and socialization of results at an academic event "EAFI Engineering Training Research Activities Meeting" as presenters (poster), additionally they must submit a final report.

2. Internships in the Productive Sector

It aims to improve the collaboration and communication among the university and companies for the development of the Internship. Currently, internships do not have proper control and monitoring. In collaboration with companies, tools will be developed to track and verify the activities performed by the students, and to assess the development of competencies and skills. At the end of the semester, a space will be organized for the intern students to present their experiences and achievements to other students.

Items to be considered the Internship:

- Each student will have a tutor professor, they will meet weekly.
- The student must complete a practice initiation and tracking form, reviewed by the tutor.
- The tutor will make one visit to the company or use an alternative communication channel. The tutor must keep control minutes.
- There will be a final visit to ensure objectives were achieved.
- The tutor will evaluate the student's performance and check the final report.
- At the end, control minutes, evaluations from tutor and company and final report must be submitted to the program director.

Finally, training and activities on soft skills will be carried throughout the course.

3. Entrepreneurship Skills

Activities related to entrepreneurship will be carried out to motivate the students to consider business creation. In this sense, U Caldas with the support of professors which belongs to the

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region's entrepreneurial ecosystem, will work with students to create the necessary conditions for starting and growing businesses.

Activities to be developed:

- Conceptualization sessions to address topics and myths about entrepreneurship.
- Work sessions to appropriate tools for entrepreneurship
- Workshops on Design Thinking and rapid prototyping tools.
- Business or entrepreneurial ideas.
- An event will be held to present the ideas to the academic community and business leaders.

4. Bootcamps

The Bootcamps are Intensive training programs that enable participants to acquire the skills and knowledge necessary to enter a specific professional field in a short period of time, which focuses on providing practical and applied training to prepare participants for real-world challenges. The development of Bootcamps aims to combine efforts to train young people and individuals interested in different areas of knowledge through a practical approach, focused on immersive student work, with the support of virtual education guided by experts from academia and the productive sector. These experts will provide the foundations for effective learning in high-demand disciplines.

In addition, as Artificial Intelligence (AI) is rapidly transforming the world around us, enabling high-impact activities for the community, at the same time cybersecurity is also gaining more relevance as the use of technology increases globally. These two highly important areas currently demand more training for experts who can participate in and lead workgroups to contribute to societal development. Therefore, these topics will be included since they are of attractive to the programs, teachers, students, and businessman.

The structure of the Bootcamps and their duration for each module will be determined based on the topics and it will include didactic material on the platform and guidance from subject matter experts. It is estimated that participants will have 10 hours per week for 8 weeks.

5. Open Innovation Platform

This tool was developed to facilitate dual innovation processes of all the universities involve in the project and the business sector. It available for to be used during Challenge-Based Learning activities and the identification of future opportunities for executing cooperative projects. In this regard, the platform's structure will be shared, and training videos will be provided to the leaders of each institution to promote the alignment of business needs with institutional strengths.

3.2 Participants

The participants for the implementation of the Closing Gap Pilot Program are the following:

- Programs: Students, professors, and the business sector.
- Entrepreneurship: academic community from University of Caldas.
- Open Innovation Platform: Latin American Universities from ibero4jobs and companies.

3.3 Planned interventions

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The activities that will be carried out during the “Closing Gaps Pilot Program are the following:

Activity 1: There will be a presentation of a prototype and a poster of the solution to the challenge proposed. This activity is framed within the “Meeting of Research and Training Activities in Engineering (EAFI)”, There will be an additional opening space (pilot inauguration) and closing space (pilot closure) with all the participants, where entrepreneurs, teachers, and students can give their opinions regarding the experiences and conclusions of the pilot.

Activity 2: During the Meeting of Research and Training Activities in Engineering (EAFI)”, there will be a space to present some business ideas developed by students during the implementation of the workshops for entrepreneurship skills.

Activity 3: There will be a 'Safety Fair,' in which university community and city entrepreneurs will present the occupational health and safety elements of the university. This aims to emphasize the importance of occupational health and safety in employee well-being and business productivity."

Activity 4: For the design of the bootcamps, contents for each of the training courses will be designed and the progress of the students will be monitor to detect dropout rates and improve the learning activities.

3.4 Timeline.

Phase	***Deadline***
Enlistment	*May 30, 2024*
Contextualization	*June 15, 2024*
Awareness and dissemination of the methodology	*July 30 to August 15, 2024*
Training	*July 3 to August 15*
Implementation	*July 15 to November 30, 2024*
Experiences learned	*November 30, 2024*
Final Report	*November 30, 2024*

4. Implementation

4.1 Development of the pilot in the programs:

There will be 4 phases for the development of the *Closing Gaps Pilot Program*

- Phase 1: Workshops with Companies
  Purpose: Define Challenges
  Activities: Collaborative workshops with companies to identify and define challenges.
- Phase 2: Feedback Sessions
  Purpose: Receive Feedback on Proposed Solutions
  Activities: Two feedback sessions to gather input and feedback on proposed solutions to the challenges identified in Phase 1.
- Phase 3: Soft Skills Training
  Purpose: Enhance Soft Skills

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Activities: Training sessions focused on developing soft skills relevant to the field.

- Phase 4: Participation in EAIFI 2024-II
  Purpose: Closing Activity
  Activities: Participation in the closing activities of the "Encounter of Research and Training Activities in Engineering - EAIFI 2024-II".

4.1.1 Development of the entrepreneurship

The Innovation Office and the High Potential Professors (PAP) will hold conceptualization sessions and provide entrepreneurship tools. The schedule will be defined according to the academic calendar of the U Caldas.

During the "Encounter of Research and Training Activities in Engineering - EAIFI 2024-II" event, the business ideas generated from the skills and entrepreneurship tools workshops will be presented to entrepreneurs and other participants for feedback and potential collaboration.

4.2 Required resources for the pilot in the programs

The required resources for the implementation of the Closing Gap Pilot Program are the following:

- Support to encourage the active participation of companies in the pilot.
- Generate recognition and awards for entrepreneurs and professors (for their commitment) as well for the students (for the best proposals).
- Support for dissemination activities in social media and other channels.
- Training in Soft Skills for students and professors.
- Financial resources to engage thematic experts in structuring content in a virtual format.
- The LMS platform of U Caldas will be used to involve designers, engineers, and pedagogical experts for this content creation.
- Training videos for the use and interaction with the platform.
- A blockchain system for process traceability, that will be developed with the university of Salamanca.

4.3 Risks and mitigation

Some of the risk and mitigation identified are the following:

- Non-participation of companies, in this sense there will be a database with more companies.
- Institutional or social movements, requiring a strong commitment from participants to move the pilot forward regardless of the situation.
- Low attendance and motivation in entrepreneurship workshops. A good dissemination of the workshops.
- Does not cover the number of students with an estimated commitment of 10 hours per week for training and students dropping out from the program. Follow up the progress of each student.
- Transfer of knowledge about the open innovation platform. Support partners in the use of the platform.

5. Evaluation and Impact Measurement

5.1 Success criteria

Some aspects to measure the success criteria are the following

- Number of students, teachers, and companies participating in the pilot.
- Quantity of challenges, internships, or other types of academic activities included in the

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pilot.

- Number of participants in the " EAIFI 2024-II event".
- Awards and recognitions.
- Attendance lists.
- Number of participant trainings in soft skills.
- Number of challenges in the open innovation platform

5.2 Evaluation Methods

The following evaluation methods are proposed:

- A rubric for the presentation and final document submission at the EAIFI event
- Collect evidence from the proposed formats for the pilot in the practices.
- A final report with details of the experiences and overall results of the pilot.
- For bootcamps, more than 60% of the 40 students who started the process.
- Conduct a survey after each module to assess the impact of the content.
- A specific evaluation tools for entrepreneurship module, such as the business model template *"CANVAS"*, value proposition construction template and the template to build the empathy map.

Data Collection and Analysis

There will be folders on Google Drive categorized by programs.

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Annex III

Work Methodology for the Pilot Program

AUTONOMOUS UNIVERSITY OF NAYARIT

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1. Introduction and Justification

1.1 Context

According to the Mexican Institute for Competitiveness (IMCO) (2022), young people in Mexico, between 15 and 24 years of age, work between 38 to 48 hours per week and their salary is lower than what they should be earning. This reflects a deficient labor situation and reality, although even in current times, university education can be considered a strength that contributes to young people having greater possibilities of entering the labor market.

For its part, the National Development Plan for Mexico for the period 2019-2024 raises the importance of having productive, permanent and well-paid jobs. Likewise, the National Plan for Innovation (2019) mentioned that national development can only be achieved with the joint participation of universities, people, scientists and companies.

In relation to the State Development Plan for the State of Nayarit for the period 2021-2027, strategic objective 5.3 aims to ensure that students acquire the knowledge, skills and competencies necessary for their professional development and to implement training practices linked to productive activities, for this purpose, it proposes the following mechanisms:

- Strengthen the participation of the educational sector with the productive sector.
- Promote job skills.
- Link productive sectors with universities for the development of applied research projects.

1.2 Institutional Linkage

The Institutional Development Plan (PDI) of the Autonomous University of Nayarit (period 2022-2028) states as a priority "to promote the formation of human beings committed to social environments, with the skills to act ethically based on the common good". It also mentions that the UNESCO International Institute for Higher Education in Latin America and the Caribbean (IESALC) has set objectives to lay the foundations for the transition from the current model to the future, so that higher education should emphasize the human dimension through training processes that include problem solving, project work, entrepreneurship, the development of curiosity and well-being, creating a comprehensive education, in which the new axes of learning are "learning to transform and learning to be". Therefore, the University must find the balance between basic research and applied research to solve real life problems, as well as with the rest of activities, practices and responsibilities, by addressing the local and global challenges embodied in the Sustainable Development Goals (005)".

In this way, and in accordance with Axis 2: Social innovation, research and social participation, as well as Axis 3: Integral and professional training for citizenship of the IMP, it is established as an objective to promote actions that foster professional development and employability, for which it will be of vital importance to build strategic alliances for international cooperation, collaboration networks that coincide with our university social responsibility.

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Figure 1 - Institutional Development Plan (PDI) of the Autonomous University of Nayarit

1.3 Problem to be solved.

The UTN has faced a growing mismatch between the competencies of graduates and the requirements demanded by companies. Despite efforts to keep curricula updated, employability reports show a low percentage of employability of graduates. The main complaints of employers focus on the lack of practical skills. In addition, a gap is evident in soft skills, such as effective communication, teamwork and adaptability to constantly changing environments.
In this context and from the results of the diagnosis, deliverable D2, the problem is stated as follows:

> " The Autonomous University of Nayarit has not detonated the knowledge-based economy in collaboration with local companies that allow university talent to provide solutions to real problems".

This situation represents a significant challenge for the maximum house of studies of our entity and, concretely, for the Academic Programs that participate directly in this pilot project: the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation. Therefore, the design and implementation of business challenges and their incorporation into the curriculum represent a great challenge, which is expected to provide better guarantees for students to acquire the technological and professional skills demanded by the current and future labor market.

1.4 Pilot Objectives

1.4.1 General Objective

To strengthen the relationship of the university with the productive and business sector of the region by formulating and evaluating a University-Business linkage model that includes business challenges and other dual training strategies for the development of soft skills in university students of the Bachelor of Computer Science and the Bachelor of Tourism Management and Innovation.

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1.4.1 Specific objectives

- **Diagnose** the soft skills required by the productive and business sector, associated with the professional profiles of the bachelor's degrees in Computer Science and Tourism Management and Innovation of the UAN.
- **Identify** the soft skills to be developed under the University-Business linkage model.
- **Define** the companies that will participate in the piloting of dual training strategies for the development of soft skills of university students of the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation.
- **Manage** the collaboration between the University and the Company to pilot dual training strategies for the development of soft skills of undergraduate students of the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation.
- **Design**, jointly (University-Business), the Dual Training Strategies (business challenges) for the development of soft skills of university students of the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation.
- **Monitor** the implementation of dual training strategies for the development of soft skills of undergraduate students of the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation.
- **Evaluate** the application of dual training strategies for the development of soft skills of undergraduate students of the Bachelor's Degree in Computer Science and the Bachelor's Degree in Tourism Management and Innovation.

1.5 Justification

According to the Organization for Economic Cooperation and Development (OECD) (2019), if the economy and the trajectories of growth and innovation in the main sectors continue along the same path, 26% of young people in Mexico will obtain a higher education degree during their lifetime, which is expected to result in better job opportunities, higher remuneration and, in addition, a better quality of life for these people and their families. However, in order for this to happen, several factors come into play, among them; the alignment between the educational offer that Higher Education Institutions can provide and the needs of the environment. This influences access to the labor market for young people with higher education to be reduced, generating an increase in the rate of informality, inadequate working conditions, low wages and short-term contracts or under schemes of low worker protection.

The collaboration between the university and companies by linking students, and through the generation of projects that allow the resolution of real problems, gives students the opportunity to put into practice the competencies, acquired knowledge and soft skills in a real environment and in a practical way, which strengthens their learning and provides them with a complete vision of their field of study.

2. Theoretical Framework

2.1 Background

Dual education is an educational model that combines theoretical training in the classroom with practical training in the work environment. This model has been widely implemented in several countries internationally, particularly in Germany, where it originated (Euler, 2013). At the international level, the OECD has promoted the development of dual education, recognizing it as an effective strategy to facilitate the transition of young people from the education system to the

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labor market (OECD, 2010). Likewise, the European Union has promoted initiatives to encourage the implementation of dual education in its member countries, such as the European Dual Apprenticeship Program (European Commission, 2018). In the Latin American context, some countries such as Chile, Colombia and Peru have adopted dual education models, adapting them to their realities (Espinoza et al., 2017; Ministry of National Education of Colombia, 2019; Ministry of Education of Peru, 2020).

In the case of Mexico, dual education has been consolidated as a strategy to improve the transition of high school students to the labor market. In 2013, the Dual Training Program was implemented nationwide, promoted by the Ministry of Public Education (SEP) and the Ministry of Labor and Social Welfare (STPS) (SEP-STPS, 2013). Subsequently, in 2019, the General Education Law was published, which recognizes dual education as an educational modality at the national level (DOF, 2019).

This is why the Mexican Undersecretary of Public Education identifies the Project Based Learning methodology ABP or PBL as the ideal methodology to prepare the new global citizens, what does it consist of? This methodology allows the creation of learning through the realization of a concrete production. Through a series of stages, students collaborate, guided by the teacher, to respond to a problem, solve a situation or answer a question, based on a topic that arouses their interest. It is very important that students face a real problem to be solved by following an action-research process, mobilizing knowledge, skills and attitudes in an interdisciplinary and collaborative way. It is an active methodology, in which students are the protagonists of their learning: they investigate, create, learn, apply what they have learned in a real situation, share their experience with others and analyze the results. They will choose, as far as possible, the problem they wish to address (among several options or completely freely, depending on their level), and will work as a team to solve it. An interesting and motivating challenge makes students learn because they need new knowledge to solve a problem that interests and affects them. If the project also has a social utility, a result that benefits other people, there will be a positive impact on the self-esteem of the participants and the motivation will be even greater.

In the case of the Autonomous University of Nayarit, dual education has not been established as part of the educational model, but there are academic programs that have incorporated in their curricular designs, strategies based on the dual model with the objective of providing their students with skills that respond to the labor context.

3. Methodology

3.1 Pilot Design

The proposed methodology is based on the incorporation of business challenges, which is supported on project-based learning and leads to a transformation in the conventional approach to teaching-learning that should be taken into account in the curricula. This will require close collaboration between academia and the business sector, as well as the identification of real cases suitable for students. Likewise, it is essential to provide the necessary support to teachers through training, follow-up and evaluation actions so that they can guide students in such projects and, as a result, foster soft skills in students.

This methodology also contributes to strengthen the relationship between the University and the enterprises, through the establishment of instances of interaction and communication between both entities, the implementation of strategic alliances that make possible the collaboration in

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cooperative projects, the execution of applied research, the provision of continuing education programs and the facilitation of the labor insertion of students. It is expected that the orientation of this methodology will strengthen (locally, regionally and internationally), the linkage and strategic alliances with the productive and business sectors.

For these reasons, the design of the pilot is based on two strategic lines:

- Business challenges in training practice
- Promotion of soft skills

Both strategic lines will require a permanent agenda with the business sector, as well as the design of a training program for teachers to encourage and promote soft skills in students.

3.2 Participants

- Institutional authorities (UAN)
- Professors
- Students involved in the academic programs involved in the project (Bachelor's Degree in Computer Science and Bachelor's Degree in Tourism Management and Innovation).
- Business chambers and productive sector.
    - Graduates

3.3 Timeline

Based on the project timeline, the phases for the development are the following:

Phase	***Deadline***
1. Business Linkage	*August 24th*
2.Curriculum Analysis	*September 24th*
3.Soft Skills Training	*October 24th*
4.Learning by doing strategies	*October 24th*
5.Final Report	*November 24th*

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4. Implementation

4.1 Development

For the implementation of the pilot, the following phases and activities are distinguished:

			MES			
			AGO	SEP	OCT	NOV
	PHASE	**ACTIVITIES**				
PHASE 1	**BUSINESS LINKAGE**	Identify allies				
		Implement vinculation councils				
		Socialize the pilot				
PHASE 2	**CURRICULUM ANALYSIS**	Revision of curricular designs				
		Input design				
		Implementation				
PHASE 3	**SOFT SKILLS TRAINING**	Aligning content and strategy with UAM				
		Communication to teachers, form groups				
		Execution of the training cycle				
PHASE 4	**LEARNING-BY-DOING STRATEGIES**	Identification of strategies by academic program				
		Design implementation				
		Identification of suitable companies and updating of agreements				

In phase 4, each academic program has chosen an independent strategy; in the case of the Bachelor's Degree in Tourism Management and Innovation, it opted to implement "Integrating Projects".

An integrative project is understood as a didactic strategy that consists of carrying out a set of a problem of the context, and thus contribute to form one or several competencies of the graduate profile, taking into account the approach to a significant problem of the disciplinary-research, social, labor-professional context, among others (López Rodríguez, 2012). Under this perspective, integrative projects are incorporated into education as a curricular strategy that allows generating a new way for students to develop competencies, which means that it must contemplate opportunities to learn to act in an integral and not individualized way. Every project seeks to address problems in the context, and in this sense, it is the most comprehensive strategy for the formation and evaluation of competencies (Tobón S. y., 2010b).

Based on the previous information, the Integrating Project is configured as the strategy that will allow the different phases of the student's formation to be evidenced.

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In the case of the Bachelor Degree in Computer Science the choice is to design a Congress in technologies that includes:

- Employability event
- Multidisciplinary hackathon
    - Include a challenge based on a real situation where teams integrated by different members of the academic unit (teachers and students) are formed and collaborate in the solution proposal using and at the same time developing soft skills.

Steps for the implementation of phase 4 according to the chosen strategy:

HANDS-ON LEARNING

STEPS	SPECIFIC ACTIVITIES
1	Call for actors
2	Focus groups with businessmen
3	Focus groups with graduates
4	Detection of business challenges
5	Formulation of the work strategy
6	Formation of teams with students
7	Presentation of proposals by the teams
8	Evaluation and feedback

4.2 Resources

- Human capital,
- Physical infrastructure for meetings, auditorium, meeting rooms
- Technological resource, laptop, printer
- Transportation, mobility
- Digital material, presentations, templates
- Printed material, registration forms, attendance lists.

4.3 Risks

- Abandonment of participation
- Lack of stakeholder commitment
- Little time for the business sector
- Communication difficulties
- Suspension of work at the Institution due to environmental contingencies, climatological or political factors, among others;

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5. Impact Evaluation and Measurement

The products to be generated in each phase are as follows:

	PRODUCT	
PHASE	Degree in computer science	Bachelor's Degree in Tourism Management and Innovation
1.- BUSINESS LINKAGE	Attendance list and minutes of the 1st council meeting with Institutional autorities,	
2.- CURRICULAR ANALYSIS	Incorporations to the curricula	Incorporations to the curricula
3.- SOFT SKILLS TRAINING	Thematic content, attendance lists	Thematic content, attendance lists
4.- LEARNING BY DOING	Congress Design	Design of integrative projects

5.1 Criteria to measure

- Number of participants (students, teachers, companies, graduates) in each phase.
    - Socialize the pilot to 200 people.
- Number of APs that concluded the pilot (successful=2).
- Number of companies involved. (successful>6)
- Number of students participating. (successful>40)
- Number of teachers participating in the training cycle (successful>20).
- Number of strategies designed (successful>2)

5.2 Evaluation Methods

Method	Phase or activity	Criteria
Rubric	Soft Skills Training cycle	Measure knowledge at the beginning and the end of the soft skills training cycle
Rubric	Learning by doing, bussiness challenge	Satisfaction of the students, teachers and companies participating in business challenge.

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Annex IV

Work Methodology for the Pilot Program

TECHNOLOGICAL UNIVERSITY OF NAYARIT

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1. Introduction and Justification

1.1 Context

The Technological University of Nayarit is a decentralized public organization that belongs to a national higher education subsystem and has legal personality and its own assets. The University's current educational offer consists of 12 Higher University Technician study programs and 11 Bachelor's and Engineering study programs, with an educational model based on professional skills.

The educational model of the University is based on professional competences, with more depth on practice than on theory, strengthens the comprehensive training of students throughout the contents of the study plans, the subject programs, always taking care of the congruence between their contents and general objective, their continuity and their interrelation.
In addition, the study plan must be consistent with the mission and vision of the institution and the study programs, because it talks about training competitive professionals through quality scientific and technological educational programs, based on values and a humanistic approach, committed to their personal and professional growth and the sustainable development of their environment, offering the productive sector the development of technological services, technical assistance and technology transfer.

Although there is a Liaison Coordinator at University, where the departments of University extension, student mobility, an evaluation and certification labor competencies center and a business incubator are concentrated, it is urgent to develop strategies to strengthen the articulation university-business sector, taking advantage of institutional areas.

The University has carried out diverse activities and projects throughout educational programs to strengthen this relationship, that include collaborative projects and the participation of students and teachers in internships.

1.2 Institutional linkage

Technological Universities are structured to work in continuous communication and feedback with the social and Economic environment. The University's Strategic Plan lies on its ability to collaborate with the productive sector, since the implementation of careers is determined in accordance with the regional industry requirements. The study plans are towards the solution of socioeconomic problems, this ensures the students training quality and an approach to the labor market. Therefore, since the moment of its creation and in order to ensure the relevance of the educational programs, the Technological University invites business managers and Government staff to share their lines of work and participate in the proposal of professional profiles.

By integrating the Sustainable Development Goals (SDG) into higher education, the University contributes to the achievement of these goals and prepares students to be agents of change, focusing mainly on the following:

- Sustainable Development Goal 4th.- Guarantee an inclusive and equitable quality education and promote lifelong learning opportunities for everyone.
- Sustainable Development Goal 8th.- Promote an inclusive and sustainable economic growth, full and productive employment and suitable work for everyone.

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1.3 Problem to be solved

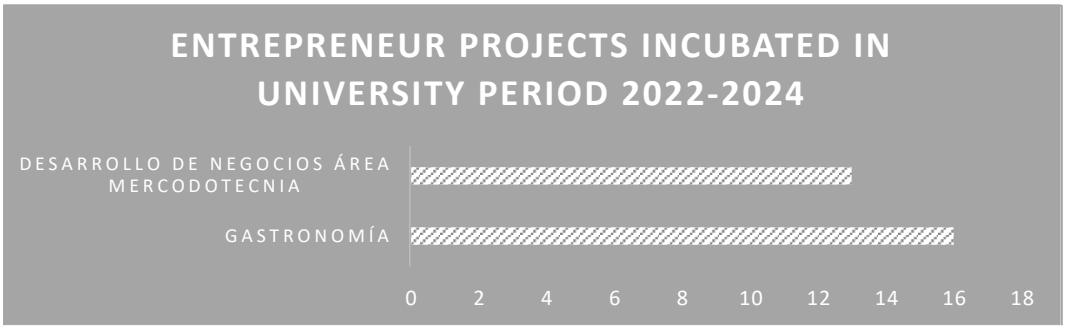
Within the Current Institutional Development Plan (PIDE) the following opportunity areas have been identified:

- Rate of students employed six months after graduating, below the National Average.
- Students lack Digital technologies skills, which limits their academic performance.
- Low participation of the University in International Collaboration Networking.
- Technological equipment and software need to be updated or replaced, due to its obsolescence. Besides the University faces the limited budget that owns to cover these expenses.
- Academic Programs must incorporate methodologies and strategies to develop soft skills in students to align content with the productive sector needs.

The University currently lacks a business cartography that allows to strengthen a relationship with the productive sector that are interested on the students' skills. To know in the first instance what the University can offer and in what the possible strategical partners, such as companies, chambers or associations, are able to offer to the University for the growth of both. And even more to develop student's skills to solve problems in workplace.

Another problem that University faces is that entrepreneurship is not of the interest of students, only a few projects are developed and formalized into successful business ideas with the help of University Business Incubator. Fostering an entrepreneurial mindset among students is crucial.

Graph 1: Project Incubated in the University by students of the programs



Source: Business Incubator department TNAY.

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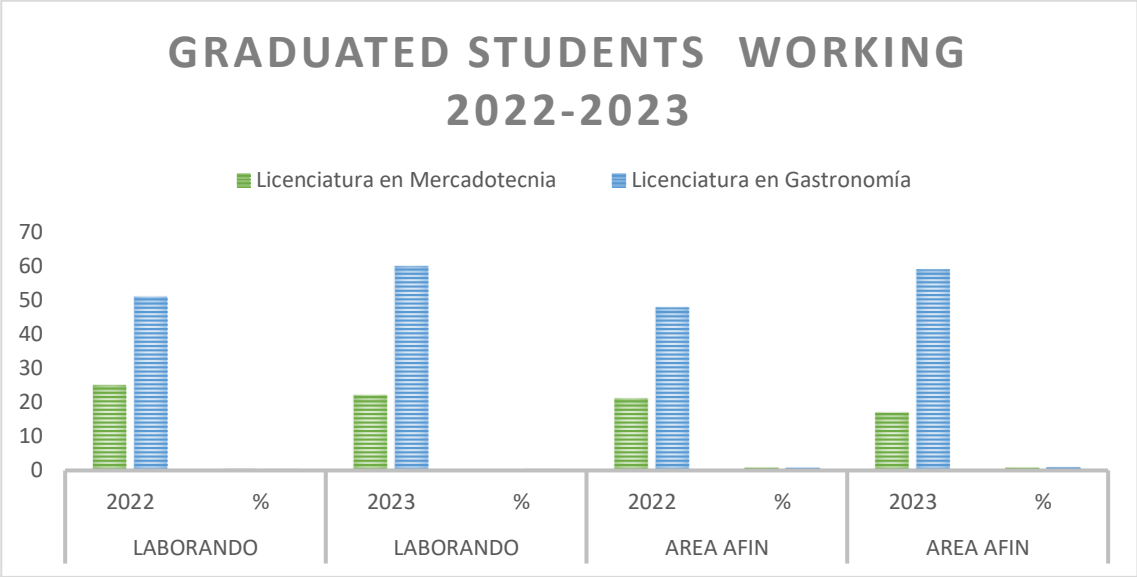

Source: Linking department TNAY

Graph 2: Percentage of graduated students working.

The Methodology Pilot Implementation aims to enhance the relationship between Academia and the Business sector by promoting Entrepreneurship and Employability good practices at university. In addition, it's necessary to create and apply permanent programs to develop softs kills, digital competencies for work and entrepreneurial tools development among the students through Institutional initiatives.

1.4 Pilot Program objectives

1.4.1 General objective

To reinforce the soft skills, digital competencies and entrepreneurship abilities in the students, through a theoretical-practical methodology in order to contribute with the employability and the region development.

1.4.2 Specific Objectives

- Implement strategies that encourage creativity and development of entrepreneurship and self-employment actions.
- Develop a program to promote soft skills through a permanent program in the university community
- Develop strategic alliances with the academic sector, government and industry

1.5 Justification

At the UTN different strategies have been applied to develop the employability of students in the particularities of each generation of graduates. The methodology presented through the Ibero4jobs Project will allow in a more efficient way to define the path to follow to obtain best results.

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The identification of talents, capacities and soft skills in each student will be a priority to establish activities that are related to their career profiles and in turn develop skills that allow them suits with the business sector. It is important to mention that the link with the business community will encourage the insertion of young people into new business entities, in addition to positioning the Institution as an organization that seeks the development of the region through relationships with strategic allies in the sector.

2. Theoretical Framework

2.1 Background

Nowadays there is no doubt about the importance of the link between universities and the business sector, because it leads to multiple benefits, including the transfer of current and high-level knowledge and technology.

In Mexico, linkage models such as the "Triple Helice" stand out, which involve the joint work of universities, companies and the government, carrying out a sum of efforts first with individual transformations and later with collective actions with the main objective of promoting development and technology transfer, where innovation is the key in the process.

In accordance, the Technological University has as part of its mission to "Link the institution with the public, social and private sectors to strengthen educational programs and contribute to the development of specialized services, technical assistance and technology transfer, through the applied research to promote the development of the region."

Therefore, several programs and strategies have been applied to establish these links, among them the following stand out:

Entrepreneurship fairs (Emprende UTNay)

They seek to identify ideas that arise from the student community and that are both social and business, that present potential for technological and market development, with local or regional impact. These fairs seek to create a space where different actors in the entrepreneurial ecosystem meet and help promote entrepreneurship at a regional level.

Business Micro Immersions

Students visit different companies to learn not only their operations and dynamics, but also the challenges the companies face, as well as the resources they have to face these challenges, along with the areas that need to be strengthened and in which students could contribute.

Job fairs

Where it is intended to offer the University community spaces that favor access to the labor market, internships and professional practices, this as part of the effort to strengthen relations between the university and the labor sector, while allowing the business sector to know the profile and characteristics of students and graduates.

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Added to different festivals and exhibitions aimed at the general public and the productive sector.

2.2 Identified gap

However, despite everything stated above, the need to strengthen the Business-University link has been identified in the Technological University of Nayarit, it's necessary to shorten the gap, seeking to ensure that the transfer of knowledge and technology can be effectively inject the necessary inputs so that the region sees improvement in the economy.

As Lázara Ramos Calzadilla mentions, "The University-Society link has become a necessity and a challenge for Higher Education Institutions (HEIs), called upon to achieve greater relevance to their environment, and in this way, generate transformative and driving impacts. of changes in all social areas. The relevance of knowledge for development processes constitutes the main driving force for relations between universities and society."
Committing to this, this pilot seeks to offer an alternative through the design and implementation of pedagogical and didactic strategies that allow learning to be situated in the needs of the reality that occurs in the Nayarit society and economy.

2.3 Supporting theories

This project is based on the position that views the academy-business relationship as a high-impact factor in the social, technological and economic development of a region, allowing knowledge and technology to be translated into a source of innovation for companies. Likewise, it is intended that the University Community can be strengthened in the development of new skills, facing the future.

The implementation of this pilot seeks to strengthen an alliance that means successful development for those who participate through interaction with leading companies through different means that form shared value strategies.

3. Methodology

3.1 Pilot design

The pilot design by the UTN is based on the premise that the school community participates in all the activities, with the objective of developing the phases of the methodology in an integral form; with this, the goals of the Ibero4jobs project can be achieved and transcend beyond the established schedule, ensuring that the activities with students, teachers and the business sector permanently strengthen the employability, entrepreneurship, articulation with the business sector, training, among others.

Different aspects were taken into account for the design of the pilot program, such as the characteristics of the Educational Programs involved (Gastronomy and Business Management), the active methodologies seen in the training cycle, the bases of the competences model and the nature of the institution.

The pilot proposal of the UT of Nayarit is based on the principles of active learning methodologies, which aims to provoke a change in the classrooms and allows interactive learning, permanent

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communication from teacher to students, students to business sector actors, from business sector to universities. Furthermore, the pilot has considered the technological changes and tools of this times to make practices more effectively in order to help students interact with the productive sector.

It is important to point out that the pilot program contains elements of educational innovation since it pretends to include new approaches, methods, strategies, technologies and ideas that allow the development and strengthening of ties with the business sector through activities for the acquisition of entrepreneurship skills, business incubation, soft skills development and location of strategic allies within the university and the environment that permit the region development.

Challenge-based learning methodology is part of the pilot, in this sense the proposal aims for students to promote learning by themselves, through the analysis of real situations that the business sector faces and to be able to offer viable and concise solutions to the productive sector problems and needs, in a creative and innovative way and that allows the students to live a workplace experiences, besides promoting soft skills such as collaborative, multidisciplinary work, decision making, advanced communication, ethics and the leadership. (University of León, 2019).

3.2 Participants

The pilot proposal has the following actors as main participants:

- Educational authorities. They are the project management actors who will authorize and promote the activities to be carried out, the financial budget management, university community awareness and promotion issues.
- Teaching staff: the teaching staff will carry out the activities planned in the schedule. They will execute each goal with the students. The pilot raise awareness the teachers to help them feel like a core part of the pilot.
- Students: the students will get involved by carrying out each activity creatively, in order to develop skills in the areas of entrepreneurship, soft and hard skills, creativity, socialization of ideas, etc. Along the project, students will be supported by their teachers.
- Chambers of commerce: through established agreements or new agreements, these entities will help review the internal capacity of the University with the aim of providing support to the pilot activities through their programs. It is worth to mention that awareness will be the key to succeed in this relationship.

Each of the actors who will participate in the pilot will be guided by the Ibero4jobs Project institutional team, who will provide the necessary help to realize the programmed activities.

3.3 Planned interventions

The Pilot proposal for the institution will be named: *UTJOBS*

It consists of an institutional project that relates active methodologies, development of soft skills, training of digital skills for work, all of the above relating practices in the university and towards the business sector that take into account business challenges, consolidate the university-business relationship, not forgetting the importance of knowledge transfer.

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It will be developed in stages, which will be defined within the period from month 19 to 22 corresponding to the official schedule of the Ibero4jobs project. These stages are described in general terms below:

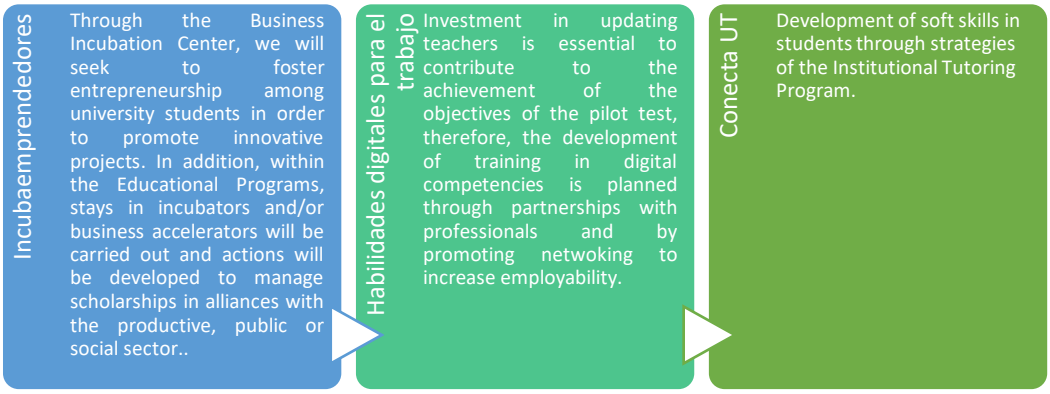

Figure 2 Stages of the "Preocupate" project

3.4. Timeline

Phase	***Deadline***
Enlistment	*May 30, 2024*
Contextualization	*June 15, 2024*
Awareness and dissemination of the methodology	*July 30 to August 15, 2024*
Training	*July 3 to August 15*
Implementation	*July 15 to November 30, 2024*
Experiences learned	*November 30, 2024*
Final Report	*November 30, 2024*

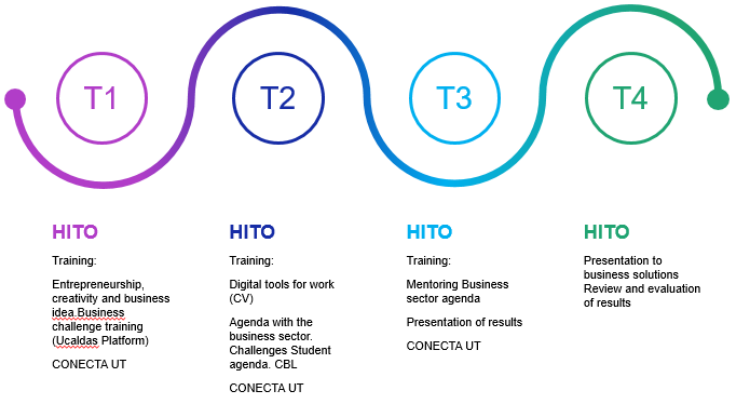

Figure 3 – Project plan

4. Implementation

4.1 Pilot development

With the suggested methodology, and the pilot proposal presented during the immersion week by the Technological University of Nayarit, UT4JOBS, 3 programs will be developed:

- **CONECTA UT** It is directed towards the development of soft skills through strategies

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integrated into the Institutional Mentoring Program.

- **The INCUBAEMPRENDORES** program focuses on fostering entrepreneurship among university students to promote innovative projects.
- **The DIGITAL SKILLS TRAINING** program aims to develop digital abilities in teachers and students through collaboration with professionals and promoting networking to increase employability.

For the implementation and achievement of the Pilot's objectives, each program will be performed in 5 phases outlined by the methodology:

I. Planning

Working groups will be formed, they will include Higher Education Institutions, business sector, public administrations and business chambers with the aim of creating spaces to collaborate, promote reflection, analysis and exchange of ideas and experiences, identifying needs, trends and problems of the environment, as well as creating networks that strengthen the connection.

During this phase, strategies will be designed to communicate, raise awareness, train and evaluate the methodology, based on an action plan.

II. Contextualization

In this stage, business mapping will be done, identifying those companies and industries that are relevant to the Educational Programs, as well as the design of business challenges that will be set out to students.

III. Awareness and dissemination of the methodology

Awareness-raising and socialization are necessary actions to inform, turn to positive actions and increase the commitment of participants in this project. The pilot methodology will be socialized through different social media tools, meetings and workshops will be addressed to Directors, teachers, families, students and business owners.

IV. Training

Training is essential to improve skills, acquire knowledge and develop capacities in working fields. Therefore, conferences and workshops will be incorporated with theoretical-practical training and multiple activities, soft and hard skills and key competences will be developed in students, necessaries for personal fulfilment, social inclusion, and employment. Simulators and boot camps will be used to create real environments and to approach students to real work situations.

The training cycle also includes activities in articulation with the business sector and public organizations focused on the development of students' skills.

V. Learned experiences

Focus groups will help obtain information for the evaluation and adjustment of the methodology that positively impacts scaling.

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4.2 Required Resources

Figure 4 - Resources

4.3 Risks and mitigation:

Figure 5 – Risk mitigation

5. Evaluation and Impact Measurement

5.1 Success criteria

- Number of participants (students, professors, partners, business people).
- Number of professors trained in the methodology.
- Number of Entrepreneurship projects.
- Number of students qualified in digital tools for workplace.
- Number of qualified students in soft skills.
- Number of students who attend the bootcamps

5.2 Evaluation methods

The Pilot Methodology will be evaluated in two levels

- Knowledge, acquired competences.
    - Soft Skills Test
    - Certificate to assess digital competences
    - Business idea Survey.
    - Rubric to assess Entrepreneurship project.
- Satisfaction level
    - Survey to measure the satisfaction level towards Methodology.

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- Focus group with partners.

These tools will measure the implementations of the methodology, highlighting the strengthening of entrepreneurship, employability, soft skills and digital competences in students.

5.3 Data collection and analysis

The data collection method used in the first phase will be through the application of surveys, questionnaires and rubrics applied to Gastronomy and Business Management careers students in 4th quarter.

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Annex V

Work Methodology for the Pilot Program

AUTONOMOUS UNIVERSITY OF MANIZALES

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1. Introduction y Justification

1.1 – 1.2 Context and institutional linkage

In the context of the Colombian Higher Education, the mission of the Autonomous University of Manizales (UAM) states that: "We are an educational community, inclusive, dynamic knowledge, committed to peaceful coexistence and sustainable development, which contributes to the formation of ethical and enterprising citizens with critical and innovative thinking within a framework of social responsibility" (UAM, strategic direction 2024-2030). This mission implies a permanent commitment to the integral formation of people throughout their lives, suitable professionals who become enterprising citizens to contribute to the solution of problems. Likewise, the institutional vision implies that "based on our commitment to innovation and sustainability, we will be the strategic ally of companies, civil society and the State" (UAM, strategic direction 2024-2030).

However, promoting sustained, inclusive and sustainable economic growth and full employment is a commitment to achieving the Sustainable Development Goals (SDGs). According to the Sustainable Development Goals Report (2022), progress must be made in promoting decent work for all. Facing this challenge means committing to building resilient infrastructures and promoting inclusive and sustainable industrialization through the promotion of innovation. In this regard, the Ibero4jobs diagnosis (WP4) highlights the economic dependence of the Coffee-Growing Region is associated with the coffee and manufacturing sectors. Likewise, it is a challenge for the city of Manizales to generate strategies to attract and retain talents that contribute to the solution of problems from different perspectives. These two lines of action can contribute alternatives to the necessary economic diversification and the strengthening of the industrial base of the city, which would have a positive impact on employment.

UAM-Dual-Skills is a program that seeks to generate shared value between the business sector and the university through challenges co- constructed with companies, which constitutes a route that can contribute to the consolidation of the professional profiles of graduates of the Industrial Engineering, Fashion Design and Industrial Design programs.

1.3 Problem to be solved

The development of the training offer at UAM is based on the demands of the productive sector in which the graduates of the academic program will work. Hence, the relevance of the different modes of relationship with business sector partners to identify the challenges to which the training of professionals must respond. However, it is still necessary to strengthen the strategies of linkage with the business sector in terms of the training of professionals.

It should be noted that the employability rate of graduates of the Industrial Engineering, Fashion Design and Industrial Design programs has been below the national average for the last 5 years. Therefore, it is necessary to strengthen the good practices recognized in the Ibero4jobs diagnosis. In the first place, to advance in dual relationship modes, that is, to generate training processes in the field of formal education and continuing education that favor the development and updating of the skills of human talent. Secondly, to strengthen UAM's internship agreement in association with the different actors at the local, national and international levels to enhance relations with civil

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society actors, companies, the State and graduates, favoring participation in national and international networks and alliances that contribute to the sustainable development of the regions. In that order of ideas, at UAM business internships are an invaluable opportunity for undergraduate students as they complement their academic training with real experiences in organizational environments, they also seek to strengthen and deepen the knowledge of students, as well as provide solutions to business challenges through development projects, research and entrepreneurship.

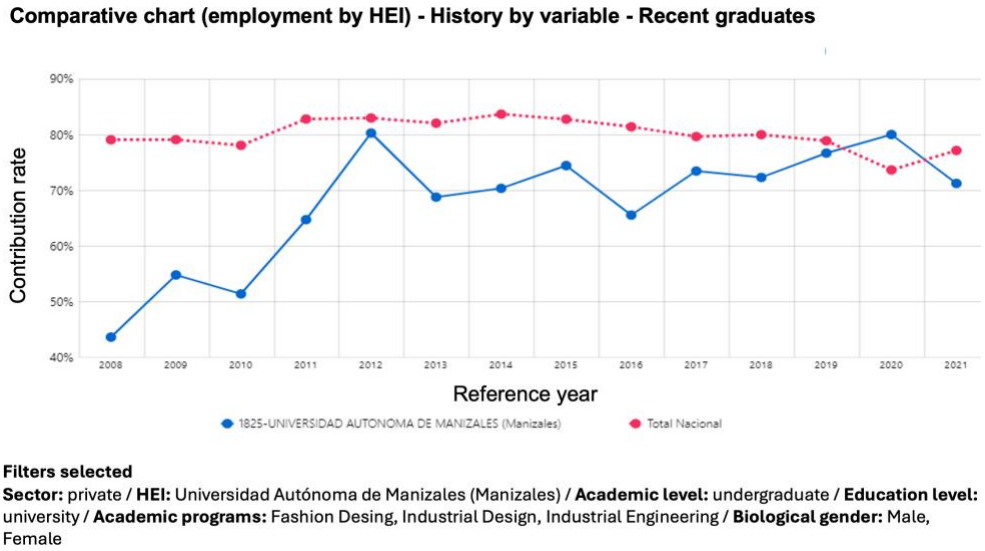

Figure 6 - Traceability of employment linkage of recent graduates (source: OLE education labor observatory)

The UAM-Dual Skills program is incorporated into the context of business practices to enhance the experience of students through a model that allows in a systematic way, guide the relationship with the productive sector and higher education institutions, improving student performance, promoting critical thinking, entrepreneurship, sustainable development and decision making in compliance with what is enacted in the institutional mission and vision.

1.4 Objectives

1.4.1 General objective

To contribute to the development of professional competencies through the training of soft skills oriented to favor employability through the solution of business challenges.

1.4.2 Specific objectives.

- Consolidate ethical competencies through critical and self-critical analysis and an attitude consistent with the dynamics of their profession based on the recognition of diversity.
- Promote learning and responsibility in knowledge transfer scenarios through the mobilization of cognitive, emotional, communicative and social skills necessary for adapting to change and decision making in socio-professional contexts.
- Facilitate the development of competencies for collaborative work and leadership of teams oriented to achievement and innovation.
- To enhance the creative and innovative capacity mediated by technology for the generation of solutions to business challenges under sustainability criteria.

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1.5 Justification

The World Economic Forum (2023) prepares a report on the future of work and its associated challenges, highlighting the role of artificial intelligence, the new logics of human talent management and generational changes in the transformations of labor markets. Specifically, it draws attention to the fact that although good technical performance is achieved, it is necessary to strengthen soft skills to enhance the accumulation of capabilities and inclusion, considering those related to resilience, problem solving, teamwork, among others.

Alper Utku Alper Utku, founder of European Leadership University suggests that the challenge for educational institutions of the future focuses on how to teach skills that are not yet known for jobs that do not yet exist. This paradigm shift was the theme highlighted at Megatrends in 2022 and sets out the innovation trends with the greatest potential to define the near future. The goal is to develop educational models that consider the present and the future, despite little certainty about what that future requires. To identify the profiles of the collaborators of the future, it is necessary to consider the needs recognized today; the Manpower Group's Global Talent Mismatch Study 2022, indicates that there is a lack of skills and competencies in the labor market, which hinders the attainment of talent (Manpowergroup, 2022).

In this sense, the UAM-Dual-Skills program is not only committed to the development of soft skills for graduates to enter the labor market, but also to contribute to the formation of citizens capable of acting in the community and solving challenges in terms of planetary sustainability.

2. Theoretical Framework

2.1 Background

In the background review, an exploration of the predominant perspectives in Latin America was carried out by selecting 47 experiences referenced in databases such as Dialnet, Redalyc and ProQuest. The key words used were employability, soft skills, training programs and entrepreneurship. The search was conducted in the period 2018-2024. Likewise, references such as the Megatrends report of 2023 regarding the gap between business requirements and the profile of new graduates (Fundación Innovación Bankinter, 2023) were also considered.

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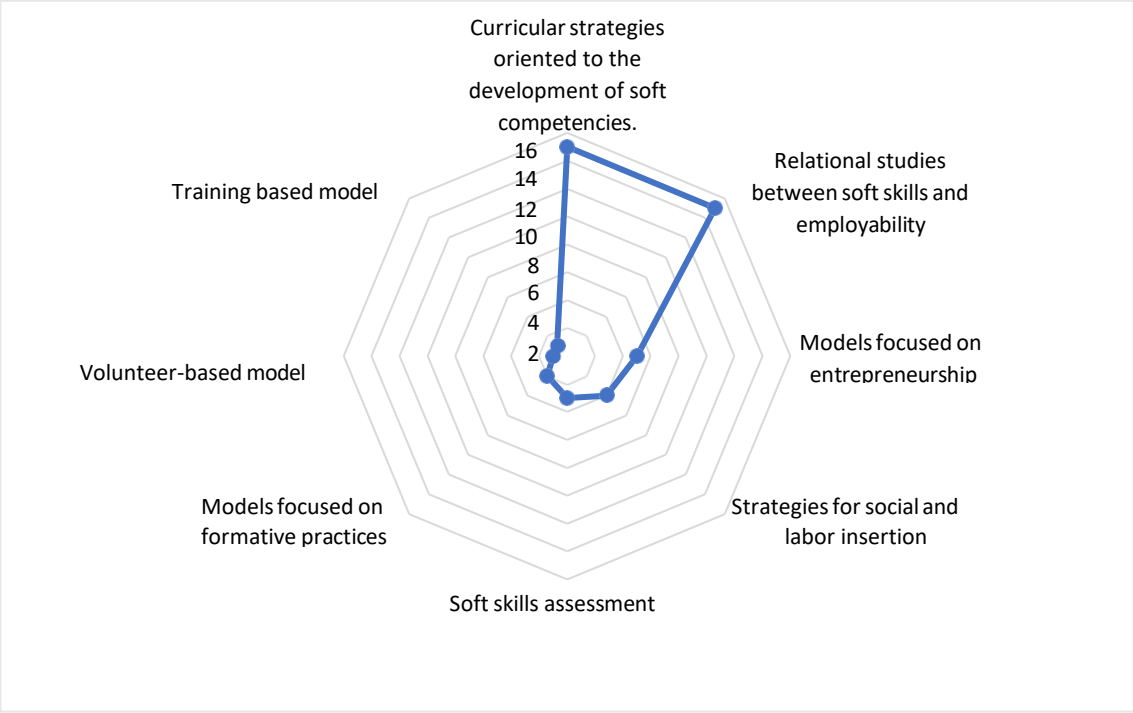

Figure 7 - Models and strategies for the development of soft skills.

In the bibliographic exploration carried out, as shown in figure two, there is a predominance of experiences focused on the implementation of curricular strategies oriented to the development of soft competencies. Likewise, there is evidence of a dynamic of systematization of experiences with the objective of establishing the relationship between soft competencies and employability. Also, experiences were identified that have the purpose of developing soft competencies oriented to entrepreneurship. Other strategies identified were those focused on the labor market insertion process; and those that show progress in the construction of procedures and instruments for the evaluation of soft competencies and two that refer to models centered on practice. It should be noted that only one strategy focused on volunteering and one on task training were identified.

In terms of Romero et al., (2018), Cejas et al., (2018) the impact of soft skills on the professional success of college graduates is undeniable. Employers increasingly value these skills, as they are indicative of an individual's ability to adapt to changing work environments; to achieve cognitive competence in creative and critical thinking, key skills, attitudes and knowledge are needed, which are developed with strategies that combine professional skills, assessments and self-efficiency, all integrated in a learning management system Garza Puente (2018).

2.2 Supporting theories

Soft skills are associated with employability competencies, generic skills, socioemotional skills, core competencies, work skills, relational skills, transversal skills or non-cognitive skills. They are understood according to Guerra-Báez (2019) as the set of capabilities of the person to interact with others by facing different situations through assertive decision making to which Lozano et al. (2022) adds that these skills are necessary to perform with leadership.

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Consequently, for the design of learning environments, it is assumed at UAM according to Agamez et al. (2021) based on the learning cycle that is operationalized in situated learning activities: inquiry, problematization, application, completion and thematization. The Challenge-Based Learning (ABR) strategy, which "actively involves the student in a real, relevant and environment-linked problematic situation, which implies the definition of a challenge and the construction of solution alternatives" (ITM, 2015, p.4) being this strategy in line with the sociocontructivist and problematic character approach of the UAM. This pedagogical and didactic dynamic is operationalized through the bootcamp strategy, which stands as a specific, intensive and short-term training alternative that allows the training of students in a practical and accelerated manner (Zahedi, Leblanc, Lamirande, 2019).

2.3 Identified Gap

The common element in the experiences identified in the background is the recognition of the critical importance of soft skills in the contemporary educational and work context. Likewise, the authors highlight the importance of developing comprehensive strategies for the development of key skills, knowledge and attitudes in students in order to adequately prepare them to face the dynamic challenges of the world of work. In the Colombian context, an objective indicator that not only quantifies, but also describes the level of student performance in general competencies (transversal) based on a national standard test, is provided by the ICFES through the Saber PRO tests. In this test, the general competencies evaluated for any type of professional training in Colombia are: quantitative reasoning, critical reading, citizenship, written communication and English.

The results have shown a decrease in the overall average in the three pilot programs, which have been analyzed, encouraging reflection on the process of continuous improvement, where decisions have been made for the development of different actions to overcome difficulties and consolidate or maintain the strengths in performance. In this context, the UAM-Dual-Skills program seeks to contribute to the strategies of accompaniment and consolidation of competencies that the university is developing.

3. Methodology

3.1 Pilot design

Educational innovation is a participatory, itinerant and systematic process whose purpose is to contribute to the solution of problems in the pedagogical, didactic, evaluative and academic management areas. According to Palacios, et al. (2021) in terms of Mykhailyshyn, et al. (2018) educational innovations can be of five types: curricular, pedagogical, methodological, technological and administrative. UAM-Dual-Skills is a pedagogical innovation because it seeks to promote comprehensive training by introducing the dynamics of challenge-based learning with the participation of students, teachers and entrepreneurs. Likewise, UAM-Dual-Skills implies a process of methodological innovation because it is based on business challenges according to the soft skills that will be worked on in each Bootcamp, which in turn, integrate activities mediated by simulation, virtual learning environments, mentoring, among others.

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The pilot experience of the UAM-Dual-Skills program has been structured through the phases of enlistment; contextualization; awareness and dissemination of the methodology; training of mentors; implementation; and finally, the systematization of learned experiences. It is described as follows:

- **The readiness phase** corresponds to the period during which the team carries out the ideation of the following activities: formulation of the pilot in the Ibero4jobs template; design of the awareness and communication strategy; design of the mentor training strategy; design of the Bootcamp and design of the lessons learned strategy.

- **In the contextualization phase,** the mapping of the companies that are relevant for the development of the project will be carried out. The specific activities of this phase are the identification of companies by sector in coherence with the academic program, the construction of the agenda for the socialization of the methodology with the companies and the construction of business challenges.

- **the awareness and dissemination phase** which purpose is to promote the involvement of the actors that are part of the university community, entrepreneurs and graduates. The activities to be carried out are awareness and dissemination days with professors, managers, businessmen and students; digital communication strategy and workshops with the actors of the academic program by curricular component. All these activities will involve the participation of at least 200 people.

- **The training of the professors** that will guide the Bootcamp will take place through three learning circles as a peer learning strategy. This model promotes the participation of professors, UAM graduates and entrepreneurs who, based on shared experiences, co-create mentoring strategies focused on the development of soft skills oriented by UAM values: autonomy, honesty, respect, solidarity, criticality and excellence. The activities to be developed in this phase are the call for professors, graduates and entrepreneurs to participate in the Bootcamp according to their expertise; learning circle 1. ¿What is mentoring? And ¿what is a Bootcamp? Learning circle 2. Mentoring skills and finally, learning circle 3. Process and key strategies to develop mentoring**.**

- **The implementation phase** will be carried out based on the challenges identified by the companies. In UAM-Dual-Skills the challenges have been characterized based on the development of soft skills such as those related to induction and self-recognition; collaboration, teamwork and effective communication; adaptability and emotional intelligence; creativity, innovation and continuous learning; leadership and team management and STEAM. The Bootcamps of the pilot program have been named Self-e; Team-Building; Catharsis; CreInTic; Lets go and Empowerment, which although each one focuses on one of the skills, they also integrate each of them to different degrees. UAM-Dual-Skills is developed through Bootcamp as an immersive and binding strategy to address the challenges proposed by companies in terms of soft skills. Bootcamps are designed through activities of inquiry, problematization, application, finalization and thematization. The activities are developed by articulating different methods and techniques focused on challenge-based learning. Firstly, through mediations such as simulation through interactive worksheets, role-playing, software, among others. Secondly, with the participation of business experts through forums, panel discussions and demonstrative practice. Thirdly, task training sessions are developed based on peer learning and independent practice. Finally, activities may include business visits as exploration, training or socialization exercises.

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- **The last phase corresponds to the systematization of learned experiences,** understood as a process that documents, categorizes and evaluates the different experiences from the perspective of the actors according to the process and scope of the UAM-Dual-Skills program.

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3.2 Planned interventions for the implementation phase

Table 1. Description of interventions for the implementation phase

Research activities	***Main line of action A. Induction and self-recognition***					
	Business challenge	*Personal branding*				
	BootCamp	***Self-e***				
	Activities	*Activity 1: UAM-Dual-Skills presentation*	*Activity 2: initial rubric application*	*Activity 3: Expert Panel Discussion: Current Trends in the Job Market*	*Activity 4: Personal Branding Workshop and Crafting Your Resume (Spanish and English)*	*Activity 5: Role-playing Game (Personal Interview Training)*
	Resources	*Digital tool, simulation scenario, wardrobe room, digital platform*				
	Main line of action B. Collaboration and teamwork; effective communication					
	Business challenge	*Formation of interdisciplinary teams*				
	Boot Camp	***Team Building***				
	Activities	*Activity 1: confidence*	*Activity 2: complementarity*	*Activity 3: coordination*	*Activity 4: commitment*	*Activity 5: Communication*
	Resources	*Route of activities based on games, student playground, legos, hoops, balls, ropes, among others.*				
	Main line of action C. Adaptability, Emotional Intelligence					
	Business challenge	*Organizational Transformation*				
	BootCamp	***Catarsis***				
	Activities	*Activity 1: sensitization, perception (identification of perception distortion)*	*Activity 2: observation and attribution*	*Activity 3: interaction, attitude and decision making*	*Activity 4: Reflection and closure*	
	Resources	*Collaborative work room, digital platform, role-playing scenarios*				

Problematization and application activities	***Main line of action D. Creativity and innovation and continuous learning.***					
	Business challenge	*STEAM*				
	BootCamp	***CreInTIC***				
	Activities	*Activity 1: exploration*	*Activity 2: conceptualization*	*Activity 3: creation*	*Activity 4: testing*	*Activity 5: communication*
	Resources	*Collaborative work room (Heuristics), laboratories, virtual platform (blogs, videos)*				
	Main line of action E. Leadership and team management.					
	Business challenge	*Everest*				
	BootCamp	***Let's go***				
	Activities	*Activity 1: preparation and planning*	*Activity 2: strategy development*	*Activity 3: implementation*	*Activity 4: evaluation and adjustments*	*Activity 5: Closure*
	Resources	*Collaborative work room, plataforma digital, software de simulación*				

Completion activities	***Main line of action F. Evaluation and closure***				
	Business challenge	*Socialization and Closing Event*			
	BootCamp	***Empowerment***			
	Activities	*Activity 1: final application of rubrics*	*Activity 2: Panel of experts, preferably graduates to identify job opportunities and trends.*	*Activity 3: Socialization of experiences*	*Activity 4: Stakeholder certification*
	Resources	*Questionnaires, auditorium, digital platform.*			

3.3 Participants

The students of the Autonomous University of Manizales that will participate in the Ibero4jobs pilot, in the second semester of the year 2024, are formed by the Industrial Engineering, Industrial Design and Fashion Design programs, most of them are in their last semester and there are 17 women and 3 men, they have a basic level of English, they handle some office tools and simulators. As for the mentors, professors from the various academic departments of the UAM will be called.

In the same way, business experts from the different companies identified in the business mapping will be called upon. Also, graduates convened by the Graduate Unit will participate. The participating companies will be defined through the business mapping and the fulfillment of the agenda for the socialization of the methodology will be concretized with the respective participation.

4. Implementation

4.1 Timeline

The project will be implemented according to the timeline presented in the next table.

Table 2. Pilot implementation timeline.

Phase	***Completion date***
Enlistment	*May 30, 2024*
Contextualization	*June 15, 2024*
Awareness and dissemination of the methodology	*July 30 to August 15, 2024*
Training	*July 3 to August 15*
Implementation	*July 15 to November 30, 2024*
Experiences learned	*November 30, 2024*
Final Report	*November 30, 2024*

4.2 Resources for implementation

For the development or implementation of the pilot, the necessary resources are: simulation scenarios for role-playing, costume room, digital platform, collaborative work room, legos, outdoor scenarios, computer lab, simulation software, among others.

4.3 Description of risks and mitigation strategies.

Table 3. Risk analysis.

Type of risk	*Description of risk*	*Severity*	*Degree of probability*	*Impact of risk*	*Actions*
Strategic	*Not very effective communication*	*Moderate*	*Very likely*	*Medium*	*Maintain permanent communication with participants and participating companies by different means- Follow- up of the communication sent.*
Logistics	*Non-availability of required materials or equipment*	*Moderate*	*Likely*	*High*	*Plan and make available in sufficient time the required resources*
Strategic	*Limited time availability of the students participating in the pilot program.*	*Very important*	*Likely*	*High*	*Agree on times and schedules with students, internship coordinator and program coordinator.*
Performance	*Lack of interest of the students participating in the pilot*	*Important*	*Likely*	*High*	*Generate incentives for the successful completion of the pilot.*
Performance	*Attrition of participants in the pilot*	*Very important*	*Likely*	*High*	*Follow-up and permanent accompaniment of students through mentors.*
Performance	*Non-attendance at scheduled sessions*	*Important*	*Likely*	*Medium*	*Record each session for asynchronous viewing*
External-Strategic	*Changes in the business environment or practice sites*	*Important*	*Probable*	*High*	• *foresee the participation of several companies - To involve entrepreneurs in the definition of challenges and accompaniment.* • *Formalize agreements through conventions or agreements of wills.*

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5. Evaluation and measurement of impact

5.1 Success Criteria

In terms of success criteria, the following have been identified:

a) level of progression of competencies in participating students according to the rubric applied,
b) linkage of companies in terms of identifying business challenges,
c) linkage of subject matter experts in the pilot,
d) training of mentoring-oriented teachers,
e) percentage of students who start and finish the pilot,
f) percentage of students who start and finish the pilot.

5.2 Evaluation methods

Table 4. Evaluation method, criteria, moments and products.

Method	***Instrument***	***Time of data collection***	***Product***
Pretest	Evaluation rubric	Application of rubric to students at the beginning of the pilot.	Test results for each participant.
Post test	Evaluation rubric	Application of rubric to students at the end of the pilot.	Test results for each participant
Likert Scale	Attitude questionnaire applied to entrepreneurs, experts and mentors participating in the pilot.	At the beginning and end of the program	Test results for each participant
Evaluation of the components and development of the UAM-Dual-Skills Pilot Program.	Lessons learned	At the end of the pilot implementation.	Document that collects the trends, methodologies implemented, aspects of improvement and recommendations during the implementation of the UAM-Dual-Skills pilot program

5.3 Collection and analysis of data

Data will be collected through the application of pre- and post-pilot experience rubrics; attendance lists; workshop reports; Likert scale and focus group minutes. As for data processing, statistical software will be used for quantitative descriptors; qualitative information will be analyzed with the relevant software.

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