Empowering Future Entrepreneurs: Developing an Online Entrepreneurial Mentoring Program Across Diverse EU Regions

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Abstract: The 2023 European Innovation Scoreboard reveals that there is an innovation asymmetry between different EU regions which is leading to an innovation gap. In particular southern and eastern EU countries showcase a lower level of innovation compared to their northern and western counterparts. Addressing this disparity, the ENTRPRENEDU project, funded by the European Union, pioneers a unique approach tailored for emerging and moderate innovation regions. This paper presents the development process of the curriculum for the ENTRPRENEDU online mentoring program, detailing the demand analysis, curriculum development, and implementation phases. This paper contributes to the discourse on entrepreneurial online education and mentoring program development by showcasing a tailored approach to curriculum design. The findings offer practical insights for educators, policymakers, and practitioners seeking to nurture entrepreneurship and innovation in diverse regional contexts.

Keywords: Innovation, Entrepreneurship, Hackathon, Mentoring, Curriculum, Demand analysis

1. Introduction

The European innovation landscape is currently at a critical juncture, marked by increasing global competition (Abels and Bieling, 2023). The European Union (2023) states in the European Innovation Scoreboard (EIS) that despite notable progress, there remains a pressing need to bridge the innovation gap between European countries and regions. In particular southern and eastern European countries perform lower innovation activities compared to their western and northern counterparts. The EIS offers a comparative evaluation of the research and innovation performance among EU member states, as well as other European countries and regional neighbours. It clusters countries based on their innovation activities into four performance groups which are namely: Innovation Leaders, Strong Innovators, Moderate Innovators and Emerging Innovators. Countries that fall into the last two categories have an innovation score that is lower than the European Union average score. Hereby, Croatia, Slovakia, Poland, Latvia, Bulgaria and Romania are Emerging Innovators while Estonia, Slovenia, Czechia, Italy, Spain, Malta, Portugal, Lithuania, Greece and Hungary are Moderate Innovators.

The urgency to close the innovation gap extends to the development of educational programs and support mechanisms aimed at fostering the ambitions of young individuals and bolstering start-up growth. However, challenges such as knowledge disparities, available human resources, financial constraints, and the accurate use of information technologies are present in this dynamic environment (European Union, 2023). In this context, innovators, educational institutions, and entrepreneurs emerge as pivotal drivers of technological progress, economic prosperity and job creation (Blackwell, Cobb and Weinberg, 2002; Fritsch and Wyrwich, 2017). To fully leverage this potential, educational institutions should forge close partnerships with the industry, equipping students with the entrepreneurial skills necessary to navigate the rapidly evolving innovation landscape.

The ENTREPRENEDU project (Enhancing Entrepreneurial Ecosystems for Education), involving a consortium of eight European partners including Fondazione E. Amaldi, Fraunhofer IPK, EBAN, Corallia, Cleantech Bulgaria, F6S Network Limited, Luiss University, and the University of Thessaly, aims to enhance entrepreneurial ecosystems in education. This initiative focuses on reducing the innovation and educational gaps across Europe. It features hackathons in Italy, Greece, and Bulgaria, where individuals aged 18 to 40 and new start-ups generate about 90 business ideas related to deep tech and sustainability. The top four teams from each hackathon join the ENTREPRENEDU online mentoring program.

2. Development of Online Mentoring Programs for Early-Stage Entrepreneurs

Mentoring programs for entrepreneurs provide a structured framework in which novice entrepreneurs, or mentees, receive guidance from seasoned business practitioners, known as mentors. These programs are pivotal in developing vital entrepreneurial skills and advancing business growth. Assenova (2020) showed that mentoring for early-stage entrepreneurs lead to an increase in revenue, profit and employment growth for underprivileged entrepreneurs. Further, research by Cope and Watts (2000) underscores the significance of

these programs in offering personalized support that is critically aligned with the mentees' specific business development stages. Such individualized support not only addresses the immediate needs of the entrepreneurs but also profoundly impacts their self-efficacy, enhancing their belief in their capabilities to succeed (St-Jean et al., 2018). Furthermore, mentoring influences the culture within start-ups, promoting adherence to foundational principles and cultivating an environment conducive to constructive problem-solving (Brodie et al., 2017).

Despite the benefits, the shift towards online mentoring programs introduces new challenges, particularly in establishing the depth of connection that face-to-face interactions facilitate. Online platforms, while providing wide-reaching access, lack the non-verbal communication cues such as body language and eye contact, which are essential in building trust and rapport between mentors and mentees (Lall et al., 2022). The asynchronous nature of many online interactions also impedes the flow of real-time feedback, which is important for the timely guidance and adjustment in the learning process (Hooley et al., 2016; Walsh, 2016).

In contrast, Kakouris (2017) introduces a transformative pedagogical approach in Greek entrepreneurship education through the TeleCC online platform. This constructivist model emphasizes cognitive development through interactive and reflective learning experiences. By fostering critical thinking and meta-learning, it represents a substantial shift from traditional mentoring to a dynamic, participant-driven educational practice, potentially enriching lifelong and inclusive learning in entrepreneurship. Kakouris (2009) further emphasizes the importance of specialized online platforms to support experiential entrepreneurial learning effectively in European higher education. These platforms are crucial for facilitating action learning and supporting working groups beyond traditional classroom settings.

The global spread of COVID-19 has further accelerated the transition to online education, as highlighted by Liguori and Winkler (2020). The pandemic has forced a swift and substantial shift to online delivery across educational institutions worldwide, necessitating a rethink of how entrepreneurship is taught. This situation underscores the urgency to enhance online learning capacities and develop more effective methods for imparting entrepreneurial competencies and mindsets online, adapting to new realities and market conditions as they evolve.

Addressing these challenges necessitates a hybrid approach that combines the strengths of both asynchronous and synchronous learning methods. Asynchronous learning allows participants the flexibility to engage with the material at their own pace, which can make the mentoring more accessible and inclusive, accommodating various learning styles and personal schedules (Chang et al., 2014). On the contrary, synchronous learning, through real-time interactions such as video conferences, mimics the immediacy and engagement of traditional classroom settings. This method enhances the engagement and allows for dynamic discussions and immediate feedback, which are vital for an effective learning experience (Mullen, 2021). By incorporating both asynchronous and synchronous learning formats into the curriculum, participants can benefit from a blended approach that combines the advantages of self-paced learning with real-time engagement. This hybrid model can offer a comprehensive learning experience, cater to different learning preferences, and maximize the effectiveness of the mentoring program (Dada et al., 2019).

Moreover, the structure of mentoring programs should embrace progressive learning, which involves designing a curriculum that gradually transitions from basic to more complex entrepreneurial concepts and practices. This approach allows participants to build on their knowledge base and skills systematically, ensuring a solid foundation of understanding before advancing to more challenging topics (DuBois et al., 2011).

To effectively support mentees through these progressive stages of learning, mentoring support should be adaptable and responsive to the changing needs of the participants as they advance through the program. This support includes tailored guidance and feedback that align with the mentees' evolving levels of expertise and challenges (Rigg and O'Dwyer, 2012; Russell, 2007). Additionally, fostering autonomy and self-efficacy is crucial in these programs. As mentees progress, they should be encouraged to gradually take on more responsibility in decision-making and problem-solving, thus empowering them to take ownership of their learning journey and business development (Sarri, 2011; Seet et al., 2018). Incorporating opportunities for reflection and self-assessment at each stage of the program can further aid mentees in consolidating their learning, identifying areas for improvement, and setting realistic goals for future development (Garcia-Molsosa et al., 2021).

Finally, conducting a demand analysis for entrepreneurial mentoring is critical in understanding the specific needs and psychological resources of entrepreneurs, such as self-efficacy and optimism. Such an analysis can guide the development of mentoring programs that effectively address these needs, enhancing entrepreneurial intentions and outcomes (Ayodele et al., 2022; Baluku et al., 2020; Nabi et al., 2021).

3. Development of an Online Mentoring Program in the ENTREPRENEDU Project

In the following, the methodology for developing the ENTREPRENEDU online mentoring program is presented.

3.1 Methodology for Demand Analysis

The first step to develop the curriculum for the ENTREPRENEDU online mentoring program was the execution of a demand analysis. Employing a qualitative research design for the demand analysis, semi-structured interviews were conducted to delve into the nuanced needs and experiences of the participating teams. These hour-long sessions followed a pre-defined guideline and aimed to determine the specific entrepreneurial needs of the participating teams. For the analysis of interview data, a thematic approach was utilized revealing clusters of predominant needs among the teams, serving as the cornerstone for deriving six overarching mentoring topics.

The data collection took place on 30th June 2023. The process comprised online interviews with representatives from each of the four selected teams that constitute the first cohort of the program. Each interview session lasted one hour, aiming to capture an understanding of the participant's experiences and needs. The interviews were conducted and protocolled by two Fraunhofer researchers and one research assistant to ensure consistency in data collection and interpretation. Prior to data collection, an interview guide was prepared to establish a clear direction and framework for the interview. The guideline was structured around eight key dimensions, namely: (1) Business Objectives and Goals, (2) Resources and Support, (3) Product or Service Evaluation, (4) Target Group, (5) Challenges and Problems, (6) Trends and Innovation relevant for business idea, (7), Knowledge, Know-How and Attitude, (8) Learning Objectives.

All interviews were conducted with respect to ethical considerations, including voluntary participation, confidentiality, and privacy of the participants. The data gathered from the interviews were analysed using thematic analysis. This method was employed as it provides a flexible and useful research tool for identifying, analysing, and interpreting patterns of meaning ('themes') within qualitative data. Based on the protocols of the interviews, we carried out a process known as 'open coding'. This is the first step in qualitative data analysis, and it involves identifying and defining themes that emerged from the interviews. In this process, we read through the protocols and labelled segments of the text that encapsulated key thoughts or concepts. After coding the protocols, the codes were examined for patterns and sorted into broader categories. This stage of 'axial coding' involved the clustering of related codes to identify the main themes. These themes were then compared across all teams to identify shared or unique demands. The themes derived from this analysis process served as a basis for the derivation of the mentoring topics, thereby ensuring that the curriculum is tailored to meet the specific needs and learning objectives of the teams.

Based on the results from the demand analysis presented above, the modules described in Table 1 have been derived. The mentoring partners were responsible for the creation and execution of one of the six mentoring modules. Fraunhofer IPK was responsible for coordination of the creation and execution of the mentoring program.

Table 1: Mentoring Modules

Module	Description	Mentoring Partner
Business Model Development	Enables participants to understand the importance of a well-defined business model, equipping them with necessary tools and knowledge for its development.	Fraunhofer IPK
Crafting a Unique and Competitive Value Proposition	Teaches participants how to define, develop, and communicate compelling value propositions for market differentiation and competitive advantage.	Luiss University
Idea Pitch: from Tech Feasibility to Product Development	Guides participants in connecting technological feasibility with product development and creating persuasive technology pitches.	Fondazione. E. Amaldi
Investment Pitch and Quantifying Funding Needs	Equips participants with skills to create effective investment pitches and accurately determine financial needs.	EBAN

Module	Description	Mentoring Partner
Entrepreneurial Business Planning	Provides participants with a comprehensive understanding of business planning, including market analysis, operational planning, and financial forecasting.	Corallia
Access to Finance and Related Funding	Offers knowledge on navigating the financial landscape and developing skills to present compelling business cases to participants.	Cleantech Bulgaria

3.2 The Mentoring Program Development

The results derived from the demand analysis were tailored to address the identified needs and laid the foundation for the program's curriculum development. The results indicated that the teams and start-ups possess varying skill levels and experiences. Hence, a blended learning approach entailing asynchronous and synchronous elements that increase in their complexity was chosen for the curriculum development. This allows the participants to benefit from both approaches and focus on the content of their respective skill levels. Further, the online setting enables participants to join the program from their respective geographical regions. Figure 1 provides a comprehensive overview of the mentoring program's three distinctive phases, detailing their respective mentoring units, content structure and learning depth.

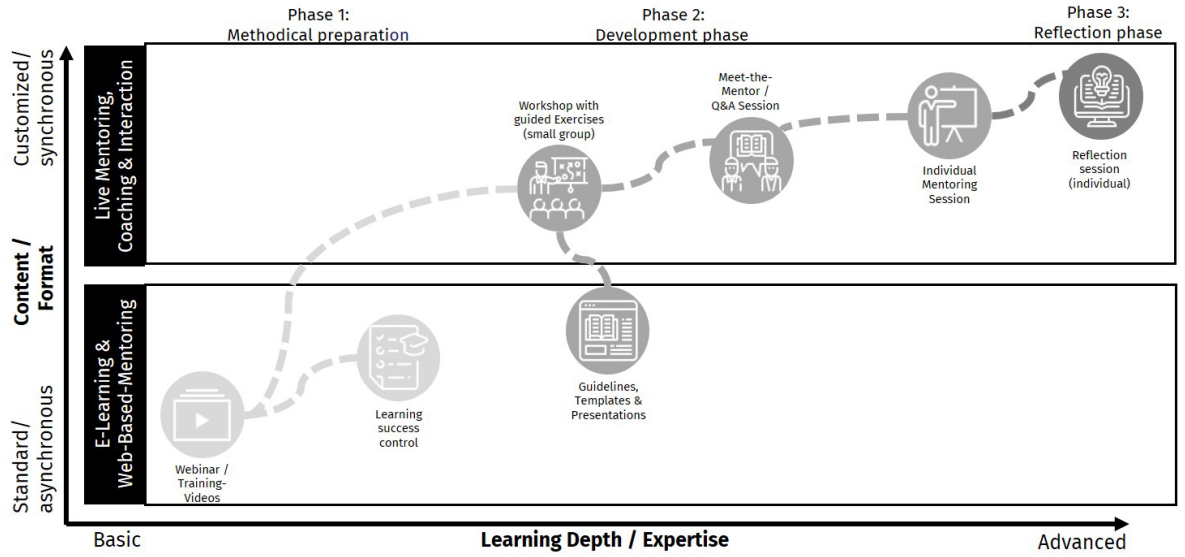

Figure 1: Mentoring program structure

The methodical preparation constitutes phase one where the content is standardized, aiming to transfer basic knowledge via online-based formats such as webinars and training videos. This content is identical for all participants of the first cohort and includes a one-hour learning success control which can be conducted using a quiz format. Here for each mentoring module three training videos have been facilitated by the mentoring partners. Each video has a length of approximately one hour and the complexity of the video content increases in unison with their numeration.

The second phase is focused on development and entails more advanced learning experiences that are customized to the participants' needs. This phase takes place in a live mentoring setting that entails interaction between the mentor and the participants. Therefore, workshops, Question & Answer (Q&A) sessions and individual mentoring are all viable formats for this phase. Each mentoring partner offers a two-hour workshop for all participants of a cohort. Thereby templates and tools such as Concept and Miro boards are utilized, and the participants have the opportunity to exchange feedback with their peers. Following the workshop, a 1-hour Question & Answer session is provided by each mentoring partner, in which participants can discuss the previously learned content. Further, each mentoring partner offers 2 hours of individual mentoring to each participant in which their needs and specific circumstance are prioritized.

Lastly, the reflection phase focuses on introspection and feedback. Each mentoring partner offers a one-hour reflection session. Here the participants come together with the mentor for one last time to evaluate their

progress, development and achievements of their goals. Further, future actions and goals that the participants should aim for are discussed.

Combining the durations of all three phases, the mentoring program will provide a total of ten hours of valuable mentorship to each participant. This extended support seeks to maximize the potential of the participating teams and contribute to their long-term success. Considering the participation of six mentoring organizations, each start-up within the first cohort is set to benefit from a total of 60 hours of mentoring.

4. Results: Application of the Mentoring Program

A comprehensive curriculum has been developed for all six mentoring modules. It begins with a clear outline of the goals and objectives for each module of the mentoring program. Moreover, based on the need's analysis and the expertise of each mentoring partner, the core subjects that the program aims to impart to the mentees have been defined. Each module has been designed to directly support the achievement of the program's objectives. For each module, the curriculum specifies the expected learning outcomes, which helps to clarify the contents of each mentoring module. Moreover, the content & resources, which include the materials, resources, and activities that will be used to deliver each module, as well as the different applied mentoring methods, were outlined in the curriculum. Additionally, the curriculum detailed the sequence in which the topics would be covered and the timeline for the entire mentoring program. It also defined how progress would be assessed and how feedback would be provided. In the following chapter, the curriculum is exemplified through Module 1: Business Model Development.

4.1 Exemplary Mentoring Module for Business Model Development

The module was strategically designed to equip participants with a comprehensive understanding of the elements of a robust business model. The module, facilitated by experts from Fraunhofer IPK, aims to provide the foundational tools and strategic insights necessary for the effective development and implementation of business models that are congruent with the entrepreneurial versions and market requirements of start-up teams.

The module commenced with the methodical preparation phase which comprised three learning videos aiming to establish a strong knowledge base for the participants, equipping them with the necessary theoretical concepts and tools needed to develop a robust business model.

The initial video serves as an introduction to the fundamental understanding of business model development. It is explained that it is not just about understanding one's product or service, but also about understanding the ecosystem in which the future business operates. The challenges faced by budding entrepreneurs and the importance of feedback and mentorship in defining a robust business model are highlighted. By the end of the video, viewers are said to be equipped with the knowledge to start, redefine, or pivot their current or future business model to better align with their business goals.

Progressing to a more advanced stage, the second video introduced participants to the business model canvas (BMC), aiming to offer an advanced understanding of its elements and application as a tool. It covers the definition and history of the BMC, introduces various adaptations, discusses its elements in detail, and provides examples of BMC applications.

In the third video, an overview is given of an approach to continuously adapt, develop, and change a business model according to external and internal drivers. For this purpose, a framework for strategic business development is introduced and filled with practical tools and techniques to analyse internal and external factors affecting the business model, as well as to derive relevant actions to systematically develop the business model in order to grow and survive as a successful company on the market.

Following the videos, a multiple-choice quiz was implemented to test the mentees understanding of mentoring videos to then focus in the following mentoring process on areas where the performance in the quiz was lacking. The quiz includes both theoretical and practical questions related to the content presented in the 3 videos of the module.

In the development phase participants actively refined and enhanced their business model under mentor guidance. A pivotal component of this phase is an interactive workshop designed to facilitate the application of learned concepts through the use of the business model canvas. During this workshop, participants are guided through a series of structured exercises that aid in the visualization and refinement of their business models. In this session, a whiteboard tool was used to let the mentees fill out their own business model canvas. Each team

had their individual virtual room in which the mentors provided support. Later on, the teams presented their status of the BMC and received feedback from the mentors and their peers.

Additionally, a meet-the-mentor Q&A session provided the teams with an opportunity to clarify questions and receive direct feedback on their business model development. This session offered strategic insights and practical advice, helping teams improve and tailor their business models to market demands.

Furthermore, individual mentoring sessions were conducted to provide bespoke guidance tailored to the unique needs of each team. These sessions focus on strategic aspects of business model refinement such as resource allocation, partnership development, and customer engagement. Mentors work closely with the teams to fine-tune each element of the business model, ensuring its alignment with strategic business objectives and market opportunities. In the individual session the business model canvas of the start-ups was reviewed and completed. The sessions began with a thorough review of the start-up's current BMC. Mentors and mentees collaboratively examined each component of the canvas, from the value proposition to customer segments, channels, revenue streams, and key activities. Further, the focus was placed on providing and discussing fitting business model partners that the start-up can apply to their BMC. Where gaps were identified, mentors provided targeted advice on how to address them, ensuring that by the end of the session, each start-up had a completed BMC that was both realistic and ambitious. A significant portion of these sessions was dedicated to exploring and selecting fitting business model patterns that start-ups could integrate into their BMC. This exploration was guided by the mentor's expertise in identifying patterns that have proven successful across various industries and how they could be tailored to the teams' specific context. Discussions revolved around a range of innovative business model patterns.

The module culminates in the reflection phase, which centres on reflection and strategic forward planning. A structured reflection session allowed the participants to assess their progress, recognize achievements and identify areas for future development.

4.2 Implementation and Validation of the Online Mentoring Program

To facilitate the mentoring program the online platform of the consortium partner F6S Network Limited was utilized. Here participants registered their teams on the platform to access the dedicated mentoring pages for each module. Each page featured private groups for sharing training videos, quizzes, and materials, and allowed mentors to post announcements and communicate with mentees. Further, the module descriptions and quizzes, to assess the mentees understanding of the mentoring modules, were also hosted on the F6S platform. The first four teams registered during the Italian hackathon formed cohort one. The mentors conducted workshops, Q&A sessions, individual mentoring and reflection sessions using their preferred online meeting tools.

The first initiation of the mentoring program took place from the middle of November 2023 to the beginning of March 2024. After the completion of the mentoring program the participants provided the consortium with feedback during a qualitative interview. The interview took place in guided online video calls and was facilitated by two researchers from Fraunhofer IPK. The methodology was structured around a semi-structured feedback guideline, exploring seven sections which are namely: (1) Reflection on the Mentoring Journey, (2) Overcoming Obstacles and Developing Skills, (3) Progress and Future Goals, (4) Learning from the Community, (5) Overall Satisfaction with the Mentoring Program and Modules, (6) Technical and Organisational Feedback and (7) Closing thoughts

The respondents reported significant development in their business ideas and models, attributing the program's effectiveness to steering their concepts towards feasibility and concrete planning. Mentors played a crucial role in this transformation, challenging assumptions and refining visions. Challenges faced by teams included scalability concerns and integrating learned modules effectively, but the program provided focused support to overcome these hurdles and cultivate essential skills. Through mentoring, teams clarified and strengthened value propositions and identified areas for business model improvement. Participants expressed appreciation for the program's assistance in establishing actionable goals and metrics for success, although an even stronger linkage between the different mentoring modules was desired. The overall, satisfaction with the program and modules was high, with constructive feedback provided for improvement in integration and scheduling. Derived from the feedback various enhancement actions were determined to improve the quality of the mentoring program for the second cohort. These include for example increasing the time between sessions without extending the program's duration to facilitate better absorption and reflection of the content. This approach would allow participants to apply their learnings more effectively during the intervals. Furthermore, it was

decided to facilitate the live mentoring session on one specific web application to streamline the process of scheduling and executing these sessions.

5. Conclusion

In conclusion, the ENTREPRENEDU project has demonstrated a proactive approach in addressing the innovation and educational gaps prevalent in the European Union, with a specific focus on emerging and moderate innovation regions. This initiative has successfully implemented a blended learning curriculum that combines traditional methods with asynchronous materials, enhancing its attractiveness and accessibility for diverse teams. This approach not only supports the scalability of the program across different regional contexts but also ensures it is replicable, allowing for broad adoption in various educational settings. These elements together make the ENTRPRENEDU mentoring program a valuable model for both academic research and practical application.

This research enhances the literature on online education and entrepreneurial training by demonstrating the effective use of blended learning strategies in emerging and moderate innovation regions. It highlights the effectiveness of asynchronous learning tools and structured mentoring on entrepreneurial skill development. For practitioners, the project offers a tested framework to foster innovation and skill growth. The participant feedback emphasizes the program's positive effects on business development and skill enhancement, while also suggesting areas for refinement such as better integration and scheduling. Overall, the ENTREPRENEDU online mentoring program exemplifies a concerted effort to foster entrepreneurial ecosystems, cultivate innovation, and bridge educational disparities, thus contributing to the long-term prosperity of the European Union.

Disclaimer

The ENTREPRENEDU project is funded by the European Union under the Grant Agreement 101100507. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Innovation Council and SMEs Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

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