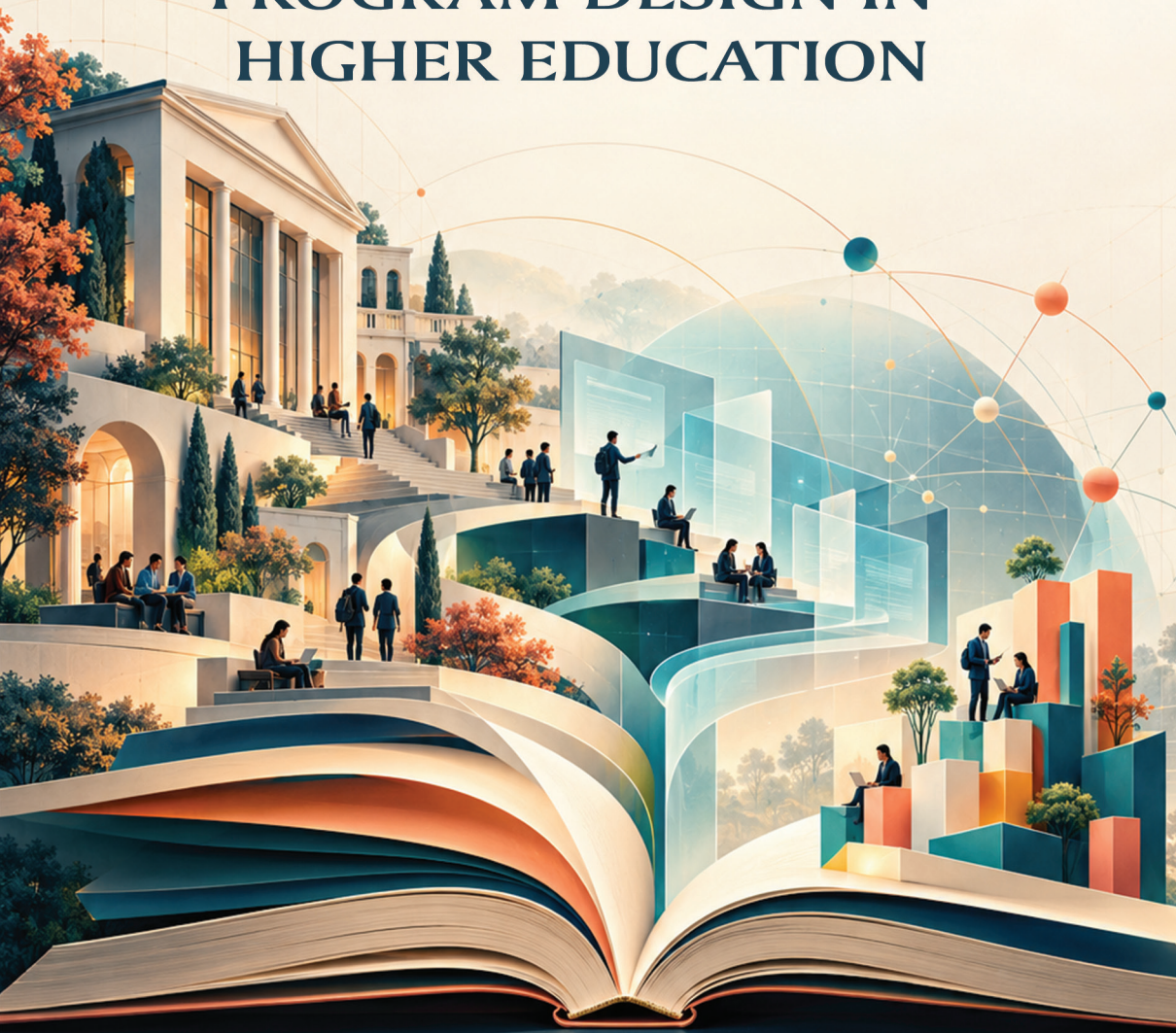


A BLENDED LEARNING-BASED ENTREPRENEURSHIP AND INNOVATION PROGRAM DESIGN IN HIGHER EDUCATION



Authors

Prof. Dr. Özge ALTUN
Assoc. Prof. Dr. Alev ATEŞ ÇOBANOĞLU
Prof. Dr. Fırat SARSAR
Lect. Abdullah KALAY

PhDc Sercan ERTAŞ KALAY
Prof. Dr. Özge ANDİÇ ÇAKIR
Prof. Dr. Şenay ŞANLIER



Genel Yayın Yönetmeni / Editor in Chief • C. Cansın Selin Temana

Kapak & İç Tasarım / Cover & Interior Design • Serüven Yayınevi

Birinci Basım / First Edition • © Ekim 2026

ISBN • 978-625-8911-80-0

© copyright

Bu kitabın yayın hakkı Serüven Yayınevi'ne aittir.

Kaynak gösterilmeden alıntı yapılamaz, izin almadan hiçbir yolla çoğaltılamaz.

The right to publish this book belongs to Serüven Publishing. Citation can not be shown without the source, reproduced in any way without permission.

Serüven Yayınevi / Serüven Publishing

Türkiye Adres / Turkey Address: Kızılay Mah. Fevzi Çakmak 1. Sokak

Ümit Apt No: 22/A Çankaya/ANKARA

Telefon / Phone: 05437675765

web: www.seruvenyayinevi.com

e-mail: seruvenyayinevi@gmail.com

Baskı & Cilt / Printing & Volume

Sertifika / Certificate No: 42488

A BLENDED LEARNING- BASED ENTREPRENEURSHIP AND INNOVATION PROGRAM DESIGN IN HIGHER EDUCATION

AUTHORS

Prof. Dr. Özge ALTUN

Assoc. Prof. Dr. Alev ATEŞ ÇOBANOĞLU

Prof. Dr. Fırat SARSAR

Lect. Abdullah KALAY

PhDc Sercan ERTAŞ KALAY

Prof. Dr. Özge ANDIÇ ÇAKIR

Prof. Dr. Şenay ŞANLIER

Authors

Prof. Dr. Özge ALTUN

*Faculty of Medicine/ Department of Internal Medicine Sciences,
Child Health and Diseases*

Assoc. Prof. Dr. Alev ATEŞ ÇOBANOĞLU

*Faculty of Education / Department of Computer Education and
Instructional Technology*

Prof. Dr. Fırat SARSAR

*Faculty of Education / Department of Computer Education and
Instructional Technology*

Lect. Abdullah KALAY

*Akdeniz University/ Korkuteli Vocational School of Higher
Education/ Department of Computer Technologies*

PhDc Sercan ERTAŞ KALAY

*Graduate School of Educational Sciences / Computer Education and
Instructional Technology Program*

Prof. Dr. Özge ANDİÇ ÇAKIR

Faculty of Engineering / Department of Civil Engineering

Prof. Dr. Şenay ŞANLIER

Faculty of Science / Department of Biochemistry

İÇİNDEKİLER

PREFACE.....	IX
1. INTRODUCTION	1
1.1. GENERAL INFORMATION.....	3
2. MATERIALS AND METHODS.....	11
3. FINDINGS	13
3.1. 1. WHAT ARE THE PERCEPTIONS OF EGE UNIVERSITY STUDENTS REGARDING THEIR NEEDS AND EXPECTATIONS FOR ENHANCING THEIR RESEARCH CAPACITY?	13
3.2. WHAT ARE THE PERSPECTIVES OF EGE UNIVERSITY ACADEMIC STAFF ON ENHANCING UNDERGRADUATE/ GRADUATE STUDENTS' RESEARCH CAPACITY?.....	17
3.3. WHAT ARE THE NEEDS AND EXPECTATIONS OF INDUSTRY STAKEHOLDERS REGARDING UNIVERSITY-INDUSTRY COLLABORATIVE PROJECT DEVELOPMENT?	21
3.4. TO WHAT EXTENT DO STUDENTS' PROJECT DEVELOPMENT SKILL SCORES CHANGE FOLLOWING THE COMPLETION OF THE 'ENTREPRENEURSHIP AND INNOVATION-ORIENTED RESEARCH PROCESSES' COURSE?	21
4. DISCUSSION AND CONCLUSION	23
REFERENCES.....	25
APPENDICES.....	30
APPENDIX 1 OBJECTIVE-CONTENT TABLE OF THE CURRICULUM DEVELOPED WITHIN THE SCOPE OF THE PROJECT	30
APPENDIX 2. THE BLENDED PROGRAM OF ENTREPRENEURSHIP AND INNOVATION-ORIENTED RESEARCH PROCESSES	33

VIII • A BLENDED LEARNING-BASED ENTREPRENEURSHIP AND INNOVATION
PROGRAM DESIGN IN HIGHER EDUCATION

PREFACE

This book is one of the publications of a multidisciplinary project funded by the Ege University Scientific Research Projects Coordination Unit (project ID 22770). The project first sought to investigate the research background and needs of a purposefully sampled university that is Ege University. Second, it includes design, development, and pilot implementation of a blended program for increasing the research capacity of university students. The project benefited from the collaborative efforts of experts in instructional technology, engineering, health, and science, who collectively contributed to its advancement. As a research university, Ege University leads fields of entrepreneurship, research and development (R&D), and innovation. It is considered that the AROM unit plays a critical role in the development of a research ecosystem. Therefore, it is imperative to support students in developing skills for scientific projects of R&D quality.

An analysis was conducted to ascertain the prevailing expectations and needs of the stakeholders with regard to project development. The application of the questionnaires was conducted among the volunteer participants from Ege University, including students, academic staff, and industry sector representatives. In the third phase of the project, in line with these expectations and needs, the "Entrepreneurship and Innovation Oriented Research Processes" curriculum was designed and piloted as a University Elective course based on blended learning.

The findings indicate that a significant proportion of Ege University students, faculty members, and industry representatives, including those from Technopark, exhibit a keen interest and motivation in project development, innovation, entrepreneurship, and research and development (R&D). The integration of mentors and flexible learning models, such as blended learning, is poised to facilitate the development of scientific R&D projects among Ege University students. The project is considered to be instructive for two distinct groups. First, researchers working on entrepreneurship and innovation-oriented curricula for university students may find it beneficial. Second, decision makers aiming to support project development processes may as well.

1. INTRODUCTION

As one of the publications of a multi-disciplinary research project, the current book initially presents theoretical framework as research ecosystem development and the role of universities, entrepreneurship and innovation programs and the role of technology and in particular blended learning. Second, the book presents the findings of a research project which was supported by Ege University Scientific Research Projects Coordination Unit (Project Number 22770).

Conceptually, research ecosystems are defined as complex networks of institutions, funding, and human capital that drive knowledge, societal advancement, and economic growth and require strategic management and a functional equilibrium between short-term impact and long-term vitality to sustain national innovation leadership (PwC UK et al., 2025). Universities function as the primary engines of basic and applied scientific discovery within the research ecosystem, continuously advancing the frontiers of knowledge to generate intellectual property, scholarly publications, and the foundational frameworks for knowledge-based enterprises. Moving beyond their traditional siloed research paradigms, modern higher education institutions act as dynamic co-creators of knowledge, actively bridging the gap between academia and the market by pooling resources, expertise, and technologies with industry stakeholders, government bodies, and civic organizations. Crucially, universities are the bedrock of advanced human capital development; they cultivate the next generation of researchers and a highly specialized workforce, supplying both the public and private sectors with graduates who possess not only rigorous theoretical expertise but also the entrepreneurial acumen necessary to translate academic findings into scalable solutions for pressing economic and societal challenges (Colombelli et al., 2022; Ernst & Young [EY] & FICCI, 2024). When the role of universities on research ecosystem development is considered, the European Commission (2025) noted that higher education institutions (HEIs) have evolved from traditional academic centers into "agents of change" and "catalysts for social transformation".

21st century witnesses rapid developments in technological systems, learning-teaching models, research ecosystems and entrepreneurship opportunities. In this context, the role of universities is no longer limited

to the production of research; they must foster the mindsets necessary to translate that knowledge into societal value. It is considered that a core component of this shift is the integration of *Entrepreneurial Competences* into the curriculum. Guided by the EntreComp framework by the European Commission (2025), HEIs are embedding following key components into their students experiences:

- Creativity and Opportunity Recognition: Identifying needs and devising innovative solutions.
- Resource Mobilization: Training in the acquisition and management of financial and human capital.
- Risk Management: Developing the ability to take calculated risks in uncertain environments (European Commission, 2025).

For this rationale, the needs and expectations of the undergraduate and graduate students of Ege University was investigated to understand the factors for increasing their research and entrepreneurship capacity and skills. Afterwards, the opinions of the Ege University staff on the factors affecting the research capacity of the students were collected. Moreover, as a stakeholder of industrial projects, the expectations and needs of industry sector participants were surveyed for project development in collaboration with the university and private sector. Finally, the researchers investigated the scores of the students' project development skills after the blended learning based "Entrepreneurship and Innovation Oriented Research Processes" course.

Ege University, established in 1955 as the fourth university in Türkiye, has a vision to establish a global knowledge network by engaging students in the production of qualified and quantitative knowledge. Having a strong research infrastructure, Ege University has 896 laboratories within the faculties, graduate schools, institutes, research and application centers to aid educational and research activities within, and Ege Teknopark Technology Development Zone and nùvEge Incubation Center (EU, 2025). In accordance with this vision, it is among the inaugural examples of the Fourth Generation University concept. This distinction is attributable to the institution's commitment to providing quality education and undertaking theoretical and applied research activities on an international scale. Furthermore, it has pioneered a distinctive model that seamlessly integrates the university with industry and the public sector, fostering collaboration in research and development (R&D), innovation, entrepreneurship, knowledge transfer, and

technology transfer. In accordance with the conceptual framework of a Fourth Generation University, the present project aimed to assist the improvement of research and development projects that meet the highest scientific standards. In the context of student-oriented research studies, a program entitled "Project Writing Training for Undergraduate Students" was conducted at Ege University in 2019. Since its inception in August 2020 under the auspices of EBİLTEM-TTO, AROM has been committed to elevating its achievements through a systematic and robust support program (Ege University Research-Oriented Student Center [AROM], n.d.).

1.1. GENERAL INFORMATION

In this section, theoretical description of blended learning and practices of blended and digitally enhanced entrepreneurship education literature records are presented. Blended learning can be defined as the combination of traditional face-to-face teaching processes with current computer or internet-supported teaching processes (Graham, 2006). Another definition posits that the blended learning process is the result of the blending of face-to-face and online learning environments (Allen & Seaman, 2010). It is known that blended learning strategically integrates face-to-face instruction with online educational components, granting students a degree of control over the time, place, and pace of their learning (Turyamureeba, 2024). The flexibility and access to learning materials increase students satisfaction for blended programs. In blended learning literature, several core models are widely utilized in higher education (Cao, 2023):

- **Flipped Classroom Model:** The most popular model among other blended learning models and widely studied around the world. In this model, theoretical and instructional content is delivered online before class (e.g., via videos or readings), reserving physical classroom time for active, collaborative learning and problem-solving. This project facilitated flipped classroom model including asynchronous (video-based) education and regular face-to-face sessions with their instructors of the elective course. The course plan and the brochure for the course can be seen in the Appendix section.

- **Enriched Virtual Model:** In this model, students complete the majority of their coursework online and only attend intermittent face-to-

face sessions for activities that heavily benefit from physical interaction, such as practical labs.

- **Rotation Model (including Station and Lab Rotation):** In rotation models, students rotate on a fixed schedule between different learning modalities, including at least one online learning station and traditional face-to-face collaborative stations. In teacher education, there are examples of lab rotation model practices (Ermis & Ates Cobanoglu, 2025) which has positive outcomes for student teachers.

- **Flex and A La Carte Models:** In the Flex model, online learning forms the foundation of the course, allowing students to progress at their own pace while instructors provide customized mentoring. Conversely, the A La Carte model allows students to take courses entirely online alongside traditional face-to-face classes.

For effective blending learning practices, systematic planning is essential. The following factors must be considered in this process: needs analysis, writing aims and objectives of the program, content selection, design and development of blended learning materials and assesment activities of the program (Ateş-Çobanoğlu, 2013). Blended learning is a popular instructional design approach that aims to integrate digital and face-to-face learning modalities in a meaningful way. Its application in various disciplines has yielded favorable outcomes, including in the domains of teacher education (Ates Cobanoglu, 2018; Ermis & Ates Cobanoglu, 2025), engineering (Singh et al., 2019; Zampiroli et al., 2018), and medical sciences (Luo et al., 2017).

In terms of the effects of blended learning on several variables, previous studies indicate that this pedagogical approach can result in increased student satisfaction, participation rates, and digital literacy. Consequently, it can engender a learning environment that is more conducive to the diverse, technology-rich realities of modern higher education (Namysova et al., 2019). Consequently, these benefits position blended learning as a transformative pedagogical approach that both elevates educational outcomes and addresses the evolving needs of students and institutions.

As it is the theme of the project, the authors also would like to mention practises of blended learning in entrepreneurship education. When applied specifically to entrepreneurship education, blended learning transcends logistical arrangements to become a strategic design aimed at cultivating an entrepreneurial mindset and following four

distinct archetypes of the "entrepreneurial blend" are introduced (Viebig, 2022):

1. Traditional Blend: This model focuses on foundational business and economic theory by supplementing core face-to-face lectures with digital accessibility, such as learning management systems (LMS) and digital textbooks.

2. For-Action Blend: This model aims to build capabilities for specific venturing tasks by utilizing online business planning tools, financial templates, and market-sizing simulators to enhance practical business-planning skills.

3. In-Action Blend: This model provides process-oriented support while students are actively engaged in projects, facilitated through real-time digital feedback, collaborative boards, and reflection logs to encourage adaptation and self-regulation. The current project is inspired by the third model by teaching students collaborative project development and entrepreneurship skills and implement these skills in research project development tasks.

4. Experiential Blend: This model focuses on mindset development and complex decision-making through full immersion in simulated entrepreneurial environments, utilizing high-fidelity simulations, virtual incubators, and serious games.

On the other hand, implementing blended learning models in entrepreneurship programs requires pedagogical frameworks that support learning by doing. Following are those models suggested by Chen, Ifenthaler and Yau (2021) and Colombelli et al. (2022):

- *The Etappe Method:* Designed particularly for technology-savvy "Generation Y" students, this method posits that theoretical instruction is best delivered online, whereas learning is best internalized in the classroom. Online platforms deliver asynchronous tasks and theory, reserving classroom time for high-intensity, active interventions such as live case studies, term sheet negotiations, and interactions with real-world entrepreneurs (Chen et al, 2021).

- *Challenge-Based Learning (CBL):* An experiential framework wherein students tackle real-world problems, such as founding a startup or addressing strategic issues for existing firms. Students use digital tools to structure their investigation and implementation phases while

receiving hybrid mentoring from faculty and industry stakeholders (Colombelli et al., 2022).

Moreover, to operationalize these pedagogical strategies, entrepreneurship educators predominantly rely on three categories of educational technologies (Chen, Ifenthaler, & Yau, 2021):

- **Serious Games (SGs) and Simulations:** They offer gamified environments which are risk-free platforms for students to experience the complexities of venture creation. These tools enhance student engagement and motivation, and facilitate the multi-level assessment of business decisions.

- **Social Media and Collaboration Tools:** Platforms such as collaborative wikis and social networks are leveraged to build communities, foster peer-to-peer cooperation, and promote rapid feedback. These tools assist students in cultivating the professional networks and social capital essential for future entrepreneurial endeavors.

- **Massive Open Online Courses (MOOCs) and Digital Platforms:** MOOCs provide scalable access to high-quality, self-paced learning resources. While they excel at delivering foundational knowledge, they are frequently paired with local face-to-face mentoring or social networking features to mitigate high dropout rates and ensure practical application.

Inline with the below theoretical underpinnings of blended learning and entrepreneurship education, a blended learning-based program was developed and piloted, with the objective of engaging students in entrepreneurship, research and development processes. In this context, the literature summary encompasses effects of blended learning in higher education, curriculum development processes, the design of the learning environment, and universal design principles. In terms of educational philosophies and instructional design, the blended program was developed inline with the progressivism (Glatthorn et al., 2019) and the ADDIE Model. The ADDIE model is comprised of five distinct stages: Analysis, Design, Development, Implementation, and Evaluation and these steps were applied during instructional design process (Peterson, 2003; Seels & Glasgow, 1998).

Analysis: At this stage, the primary consideration is the target audience. A needs analysis study is conducted on the students' existing knowledge and the knowledge they require to complete the process. In instances where the course has already been delivered, it is possible to draw from previous course evaluations. A task analysis process can then

be carried out to identify content-related skills. *Design*: At this stage, the instructional designer carries out research and planning activities through the data collected in the analysis phase. In this context, the process of determining the objectives, how the objectives will be achieved, the strategies, environments, and methods to be used to achieve the objectives are carried out within the scope of this step. Furthermore, the evaluation method to be employed should be determined in accordance with the objectives established at this stage. *Development*: At this stage, the process of creating a product begins in light of the data provided by the previous two stages. The designer then transitions to production mode. At this stage, designers employ a three-step approach of drafting, production, and evaluation to develop materials and course materials. Designers must consider whether students can learn from the material and identify how it can be improved before implementation. *Implementation*: In this step, the learning-teaching process is realized by leveraging the information examined in the analysis, design, and development steps, as well as the materials created using predetermined teaching principles and methods. During the implementation phase, it will be essential to ensure an equitable distribution of the weekly workload in alignment with the course curriculum. During the application process, meticulous attention is paid to ensuring that individuals remain engaged at every stage by utilizing suitable materials that facilitate interaction. Concurrently, it is imperative to enhance individuals' motivation levels by captivating their attention and engaging them in interactive activities. This is a fundamental component of distance education, alongside the provision of motivation. *Evaluation*: In this step, the final phase of the ADDIE model is implemented. The evaluation stage is executed in accordance with the predetermined evaluation criteria, and the resultant evaluation will furnish information regarding the efficacy of the process, in addition to feedback and corrections for subsequent implementations. The results of the assessment are documented in either an online format or in person, contingent upon the type of assessment instrument employed. These results are subsequently disseminated to the course instructor. In subsequent implementations, this assessment data is taken into consideration, and the instruction is reviewed.

The project took place in the AROM Unit of Ege University which is a local example of student innovation center. Student innovation centers (SCs) aim to provide a rich field of activity for students in the

classroom or in everyday life, to prepare students academically and professionally for the future, to create an interdisciplinary ecosystem by bringing together students from different fields of study, to be supportive of research and scholarships, and to offer current learning opportunities and study programs (Gustafson, 2008). Student innovation centers are actively involved in the transition of ideas into practice (Student Innovation Center About, no date). According to Gustafson (2008), expectations in student innovation centers can be grouped under the following main headings

- Research strategies and scientific research methods
- Writing techniques and communication skills
- Work environment and mentor support
- Providing program referrals and learning opportunities

SCs have the potential to contribute to increasing the qualified labor force and employment rate for the future by offering students different project design channels (Ah Kim, Yun Ryoo, & Joo Ahn, 2017). Interdisciplinary working strategies and collaborations developed in this context play an important role for a sustainable future in the projects aimed to be developed by students. In the light of this information, students who are effective in an interdisciplinary working environment can reflect different perspectives in projects. Different perspectives contribute to the developmental process of students in terms of productivity (Bacon et al., 2011). In terms of productivity, SCMs assume the role of conducting extracurricular scientific and technological activities within the university campus. Through this role, organizing and participating in innovative competitions, organizing scientific exhibitions and creating scientific communities are the responsibilities of SCs to strengthen the researcher aspect of universities (Student Innovation Center About, nd). In the context of innovation and sustainability, student innovation centers that serve global goals should adopt "Universal Design Principles" in their development and training programs in order to provide equal opportunities for all (Campbell & Henn, 2020; Scott, McGuire, & Shaw, 2003).

In the 21st century, effective technology integration in education requires teachers to be aware of the readiness levels and educational needs of students. In addition, learning-teaching activities should be carried out to recognize students' abilities, interests and individual characteristics and

proper media and methods should be designed accordingly (Anderson & Kurt, 2017; Tekedere & Göker, 2016). In order to achieve that, universal design principles need to be considered during technology integration. Universal design is the design of the environment and the spaces and products within the environment that can be used by everyone without allowing any discrimination and classification, and that will reduce the problems and difficulties that all individuals may encounter in daily life (Sloan & Horton, 2019). Anderson and Kurt (2017) explained the principles of universal design as follows.

- Equal Use: The possibilities of use should be equal for everyone.
- Flexibility in Use: The design process should be adaptable to individual characteristics and choices of individuals.
- Simple and Intuitive Use: The design should be plain, simple and straightforward.
- Perceptible Information: The information to be conveyed should be conveyed in such a way that it is not affected by external factors.
- Fault Tolerance: The design should be developed in a structure that can eliminate negative situations.
- Minimum Physical Effort: The products and spaces that will emerge as a result of the design should be used in a structure that can give a lot of efficiency with little power.
- Size and Space for Approach and Use: In the design of access, space and size, a design should be made taking into account the differences of all individuals.

While universal design was used effectively in architectural areas in the early days, it has taken on an active role in education and training over time. Inclusively, all students including with special needs are provided different technologies according to their needs (Telli & Ünlüer, 2018). In the literature, it is reported that there are various innovation centers designed in accordance with universal design principles, and it is important to design them in accordance with universal design principles (Evans & Schares, 2017; Lukens, 2009; University of Toronto, 2020). In this context, it is important to design innovation centers in accordance with universal design principles.

For higher education students, student research programs are carried out in several faculties of Ege University to support students. It has

been reported that the "Research Training Program" carried out at Ege University Faculty of Medicine, which can be shown as a good practice example among these programs, has a positive effect on students' motivation, inquisitive thinking and research studies (Öcek et al., 2020). In order to disseminate those practices and improve research capacity of Ege University, the present study initially aimed at revealing the number of the Ege University originated research projects within the time interval of the project (2015-2021). Secondly, the needs and expectations of the undergraduate and graduate students of Ege University was investigated to understand the factors for increasing their research capacity. Thirdly, the opinions of the Ege University staff on the factors affecting the research capacity of the students were collected. Fourthly, as a stakeholder of industrial projects, the expectations and needs of industry sector participants were surveyed for project development in collaboration with the university and private sector. Finally, the researchers investigated the scores of the students' project development skills after the blended learning based "Entrepreneurship and Innovation Oriented Research Processes" course.

In this context, the research questions of the current project are as follows:

1. What are the perceptions of Ege University students regarding their needs and expectations for enhancing their research capacity?
2. What are the perspectives of Ege University academic staff on enhancing undergraduate/graduate students' research capacity?
3. What are the needs and expectations of industry stakeholders regarding university-industry collaborative project development?
4. To what extent do students' project development skill scores change following the completion of the 'Entrepreneurship and Innovation-Oriented Research Processes' course?

2. MATERIALS AND METHODS

The present research is two folded. The first phase includes investigation of the numbers of the research projects at Ege University within 2015-2021 years and needs analysis of the project development stakeholders such as university students, staff and industry sector participants on increasing research capacity. In the first descriptive study phase (Fraenkel, Wallen & Hyun, 2023), document analysis and cross-sectional survey method was conducted. Whilst, the second phase includes intervention (Fraenkel et al., 2023) of the program which was developed within the project and measuring the scores of the students afterwards. The second phase of the project included designing and piloting a blended curriculum for developing innovative scientific projects and increasing awareness for entrepreneurship. In line with the objectives of the "Entrepreneurship and Innovation-Oriented Research Processes" (EIORP) program, multi-disciplinary academic mentors and experts collaboratively conducted the course for a semester.

Within the scope of the project, firstly, the determination of the current situation and needs analysis; the creation of mentor, sector and student pools, the development of the curriculum, the pilot implementation of the developed program and the evaluation steps are included. Curriculum development processes in line with progressivism (Demirel, 2008; Glatthorn et al., 2019) were followed in the project. First of all, the program design was guided by the information obtained from the needs analysis. As Saylan (1995) states, curriculum design provides the structure, framework or model for determining, selecting and organizing objectives. The philosophical basis of this design is based on pragmatism, a contemporary philosophical understanding that emphasizes the present and the future.

The objective-content matrix of the EIORP course, which is the interventional material of the project, is shown in Appendix-1. Whilst, Appendix-2 contains the orientation program of the EIORP. In addition, the syllabus of the EIORP course, incompatible with the Bologna process, is presented in both Turkish and English in Appendix-3.

The quantitative data of the project were analyzed using the descriptive statistics as frequency and percentage. Besides, the qualitative

data which were collected by the The first study group consisted of 288 students studying at Ege University; the second group consisted of 77 academic staff of Ege University; the third group consisted of 14 representatives from the industrial sector; and the last study group consisted of 20 students who participated in the blended learning-based university elective course titled "Entrepreneurship and Innovation Oriented Research Processes" developed during the project.

In the data collection process, questionnaires including demographics forms were used to reveal the needs and expectations of students, faculty members and industry sector representatives on R&D-oriented scientific project development. The three questionnaires developed by the project team were validated by three experts who hold PhD in the field of educational sciences. The findings of the initial phase guided designing the objectives, content, learning-teaching process and assesment of the blended EIORP program.

During intervention of the blended EIORP program, the students who enrolled voluntarily to the elective EIORP course were asked to do project development work twice a semester. Afterwards, their project proposals were subjected to expert evaluation from project team members.

3. FINDINGS

3.1.1. WHAT ARE THE PERCEPTIONS OF EGE UNIVERSITY STUDENTS REGARDING THEIR NEEDS AND EXPECTATIONS FOR ENHANCING THEIR RESEARCH CAPACITY?

The descriptive findings of the questionnaire aimed at revealing the expectations and the needs of Ege University students within the scope of developing R&D skills. The findings of the survey are presented below.

SQ1: I have previously taken part in a R&D scientific project.	n	%
Yes	47	16,32
No	241	83,68
Total	288	100,00

Table 1 . The students' answers to SQ1

Table 1 presents the distribution of students' responses to SQ1 ("I have previously taken part in an R&D scientific research project"). The majority of the participants reported that they had not taken part in such a project (n = 241, 83.68%). In contrast, a smaller proportion of students (n = 47, 16.32%) indicated prior involvement in an R&D research project. These results suggest that only a limited number of students have gained direct experience in research and development activities. Therefore, the need for student involvement in R&D scientific projects is apparent and needs to be studied.

SQ2: I previously participated in a study at the Research-Oriented Student Center.	n	%
Yes	42	14,58
No	246	85,42
Total	288	100,00

Table 2. The students' answers to SQ2

Table 2 displays the distribution of students' responses to SQ2 ("I previously participated in a study at the Research-Oriented Student Center"). A large majority of students (n = 246, 85.42%) reported that they had not participated in any activities conducted by the Research-Oriented Student Center. Only 42 students (14.58%) indicated prior participation. This finding highlights the relatively limited engagement of students with the institutional opportunities available for research-oriented learning.

SQ3: An ecosystem that supports interdisciplinary projects that bring students and academics together should be created.	n	%
Yes	279	96,88
No	9	3,12
Total	288	100,00

Table 3. The students' answers to SQ3

Table 3 presents the distribution of responses to SQ3 ("An ecosystem that supports interdisciplinary projects that bring students and academics together should be created"). An overwhelming majority of students (n = 279, 96.88%) agreed with this statement, while only a small minority (n = 9, 3.12%) disagreed. These results indicate a strong consensus among students on the importance of establishing an interdisciplinary ecosystem that fosters collaboration between students and academics.

SQ4: I would like to benefit from project development training.	n	%
Yes	272	94,44
No	16	5,56
Total	288	100,00

Table 4. The students' answers to SQ4

Table 4 illustrates the distribution of responses to SQ4 ("I would like to benefit from project development training"). A very high

proportion of students ($n = 272$, 94.44%) expressed interest in receiving project development training, whereas only a small fraction ($n = 16$, 5.56%) indicated no such interest. These findings demonstrate that students are highly motivated to enhance their skills in project development and show a clear demand for structured training opportunities in this area.

SQ5: I would like to have a mentor who is an expert in the subject area during the project development process.	n	%
Yes	268	93,06
No	20	6,94
Total	288	100,00

Table 5. The students' answers to SQ5

Table 5 presents the distribution of students' responses to SQ5 ("I would like to have a mentor who is an expert in the subject area during the project development process"). The vast majority of students ($n = 268$, 93.06%) expressed a desire to work with a subject-matter expert as a mentor, while only 20 students (6.94%) reported no such preference. This finding underscores the strong demand among students for expert guidance and mentorship during project development, highlighting the perceived importance of professional support in facilitating successful learning and research outcomes.

SQ6: I think I need a physical environment where I can develop my project.	n	%
Yes	221	76,74
No	67	23,26
Total	288	100,00

Table 6. The students' answers to SQ6

Table 6 shows the distribution of responses to SQ6 ("I think I need a physical environment where I can develop my project"). A considerable

majority of students (n = 221, 76.74%) indicated the need for a physical space dedicated to project development, whereas 67 students (23.26%) did not perceive such a need. These results suggest that while most students value access to a tangible working environment to support their projects, a noteworthy minority may consider alternative or non-physical means sufficient for their development processes. According to the findings, it was found out that a significant portion of the students who participated in the project had not participated in any R&D scientific projects and AROM activities before, but they wanted to carry out interdisciplinary projects with academicians, to receive project development training, and to be supported by an expert mentor and environment in this process. In addition, a significant portion of the participants (91%) responded positively to being informed about announcements for project development.

The students' expectations from AROM	n
Trainer/Mentor	38
R&D trainings (Online+Face-to-face+Practical)	33
Participating in Projects/Projects	30
Getting informed	26
Environment	20
Developing Research Skills	19
Help/Support	19
Personal Development	18
Financial Support	13
Contact	10
Experience/Experience	9
Event	8

Table 7. The students' expectations from AROM (n=288)

Table 7 presents that the most common expectation of the students (n=38; 13.2%) is to have instructors/mentors; secondly (n=33; 11.46%) is to have online, face-to-face and applied R&D trainings; and thirdly (n=30; 10.42%) is to be involved in projects/to do projects. Accordingly,

developing a blended learning-based curriculum on R&D and entrepreneurship, which is the subject of the project, in a way that students also prefer, meets the expectations of the students.

3.2. WHAT ARE THE PERSPECTIVES OF EGE UNIVERSITY ACADEMIC STAFF ON ENHANCING UNDERGRADUATE/GRADUATE STUDENTS' RESEARCH CAPACITY?

It is indicated that most of the participants of Ege University instructors ($n=77$; 88.3%) expressed that they would like to mentor students who want to develop projects, and all of them stated that students should be provided with project development training and their development processes should be monitored. In addition, almost all of the lecturers (97.4%) stated that an ecosystem that supports interdisciplinary projects that bring students and academics together is needed; a significant portion of them (63.6%) are willing to mentor students in industry-partnered student projects, and the majority (80.5%) stated that a physical environment is needed for this purpose and that they would like to take part in the mentoring pool (81.8%).

IQ1: I would like to work with and mentor students who are enthusiastic about developing projects.	n	%
Yes	68	88,31
No	9	11,69
Total	77	100,00

Table 8 . The participant instructors' answers to IQ1

Table 8 presents the distribution of instructors' responses to IQ1 ("I would like to work with and mentor students who are enthusiastic about developing projects"). A strong majority of instructors ($n = 68$, 88.31%) expressed willingness to mentor motivated students in project development, while only 9 instructors (11.69%) reported no such interest. This result demonstrates that instructors are largely open to taking an

active role in guiding students, which aligns with students’ strong demand for mentorship opportunities.

IQ2: I think that students should be given project development training at our university.	n	%
Yes	77	100,00
No	0	0,00
Total	77	100,00

Table 9. The participant instructors' answers to IQ2

Table 9 displays the distribution of instructors’ responses to IQ2 (“I think that students should be given project development training at our university”). All participating instructors (n= 77, 100%) unanimously agreed that students should receive project development training, with no respondents expressing disagreement. This consensus underscores the perceived importance of integrating structured project development training into the university curriculum and reflects a shared recognition among instructors of its value for students’ academic and professional growth.

IQ3: I think students' project development processes should be monitored.	n	%
Yes	77	100,00
No	0	0,00
Total	77	100,00

Table 10. The participant instructors' answers to IQ3

Table 10 presents the distribution of instructors’ responses to IQ3 (“I think students’ project development processes should be monitored”). All instructors (n = 77, 100%) agreed with this statement, indicating that students’ project development activities should be systematically monitored. This finding highlights a shared recognition among

instructors of the importance of providing continuous oversight and support throughout the project development process.

IQ4: An ecosystem that brings students and academics together and supports interdisciplinary projects is necessary at our university.	n	%
Yes	75	97,40
No	2	2,60
Total	77	100,00

Table 11. The participant instructors' answers to IQ4

Table 11 shows the distribution of instructors' responses to IQ4 ("An ecosystem that brings students and academics together and supports interdisciplinary projects is necessary at our university"). The vast majority of instructors (n = 75, 97.40%) agreed with this statement, while only a small minority (n = 2, 2.60%) disagreed.

IQ5: I would like to mentor student projects with industry partnerships.	n	%
Yes	49	63,64
No	28	36,36
Total	77	100,00

Table 12. The participant instructors' answers to IQ5

Table 12 presents the distribution of instructors' responses to IQ5 ("I would like to mentor student projects with industry partnerships"). A majority of instructors (n = 49, 63.64%) expressed interest in mentoring projects that involve collaboration with industry partners, whereas 28 instructors (36.36%) indicated no such interest. This finding suggests that while many instructors are willing to engage in industry-linked mentorship, a notable proportion may prefer to focus on academic-centered projects, highlighting a potential area for strategic alignment in university-industry collaboration initiatives.

IQ6: I think there is a need for a physical environment where students at our university can develop their projects.	n	%
Yes	62	80,52
No	15	19,48
Total	77	100,00

Table 13. The participant instructors' answers to IQ6

Table 13 presents the distribution of instructors' responses to IQ6 ("I think there is a need for a physical environment where students at our university can develop their projects"). A majority of instructors (n = 62, 80.52%) agreed that a dedicated physical space is necessary for students' project development, while 15 instructors (19.48%) disagreed. These findings align with students' perspectives in SQ6 and suggest a shared recognition of the importance of providing an appropriate physical environment to support effective project development activities.

The categories of responses	n
Project Development Support	16
Education	13
Working Environment	11
Promotion and Awareness	11
Mentoring	10
Financial Support	6
Student Tracking	5
Multidisciplinary Work	5

Table 14. The lecturers' expectations from the AROM Unit (n=77)

Table 14 shows that the greatest expectations of academic staff from AROM are project development support (n=16), training (n=13), working environment and promotion and awareness (n=11), mentoring (n=10), respectively.

3.3. WHAT ARE THE NEEDS AND EXPECTATIONS OF INDUSTRY STAKEHOLDERS REGARDING UNIVERSITY-INDUSTRY COLLABORATIVE PROJECT DEVELOPMENT?

The demographic data of the industry stakeholders revealed that most of them (35.7%) were working in Ege Technopark companies and R&D centers. In terms of their needs and expectations, all respondents reported their motivation for collaborative project development. They mentioned that they would like to develop projects with students who are eager to take part in projects and also they would like to provide internship support to those students.

Most of the participants stated that they would like to provide employment to projects that will contribute to the sector (94.1%); to provide financial support and equipment to these projects (76.5%); to receive training on entrepreneurship, intellectual property and patents (76.5%); and to join the mentoring pool (82.4%). In addition, it was also determined that the expectations of industry sector representatives from AROM were primarily in the areas of university-industry cooperation, project development support and communication.

3.4. TO WHAT EXTENT DO STUDENTS' PROJECT DEVELOPMENT SKILL SCORES CHANGE FOLLOWING THE COMPLETION OF THE 'ENTREPRENEURSHIP AND INNOVATION-ORIENTED RESEARCH PROCESSES' COURSE?

The blended learning based "Entrepreneurship and Innovation Oriented Research Processes" program is the experimental material of the project (Please see *Appendix*). The program is aimed to develop collaborative working skills with the basic concepts of project development, mentor-mentee relationship and effective communication skills, innovative business idea development skills and skills to produce scientific projects in an interdisciplinary environment. The weekly content of the program is as follows:

1. Ege University R&D and innovation ecosystem and the role of EBILTEM-TTO
2. Scientific Ethics and Ethics Committee Approvals
3. Research Techniques in Science-Engineering, Health Sciences and Social Sciences

4. Applied Literature Review
5. Use of Electronic Bibliography
6. Academic Presentation Techniques
7. Information on Ege University Intellectual Rights
Procedures and Principles
8. Patent Information, Processes, Research in Patent
Databases
9. Interdisciplinary collaborative work
10. Innovation, Technology and Entrepreneurship
11. Preparing an innovative business plan
12. Project preparation
13. Mentoring and effective communication
14. The art of creative thinking

The pilot study of the program was conducted with 30 students as a University Elective Course in 2022. 10 students did not attend the course and did not submit their project development assignments. For 20 undergraduate students who regularly attended the course, the experts evaluated their project proposal forms as course assignments twice during the semester.

Accordingly, it was revealed that the 20 students received an average of 70.25 / 100 points on their first project development work prepared within the term. Henceforth, it was calculated that they received an average of 80 / 100 points in their second project development studies they prepared at the end of the semester within the scope of the final assessment.

4. DISCUSSION AND CONCLUSION

Driven by rapid advancements in emerging technologies, novel instructional models and evolving research ecosystems, the twenty-first century has reshaped the foundational mission of global higher education. Rather than confining their scope strictly to knowledge production and scholarly publication, universities are confronted with the imperative to bridge the gap between academic theory and real-world application. Consequently, fostering an entrepreneurial mindset that empowers learners to convert research discoveries into sustainable societal benefits has emerged as a strategic priority. Critical to achieving this mission is the systematic integration of core entrepreneurial skills and mindsets into undergraduate and graduate curricula. Drawing extensively on the European Commission's updated EntreComp framework (2025), modern pedagogical designs operationalize entrepreneurship as a broad transversal competence. This framework provides an actionable blueprint for embedding essential attributes—including critical thinking, self-efficacy, risk management, and value creation—into university-wide learning environments, thereby reinforcing institutional research and innovation ecosystems.

This study explores the role of blended learning in higher education entrepreneurship programs from both theoretical and practical perspectives. In the practical phase, a blended entrepreneurship curriculum was designed and implemented at Ege University to cultivate students' competencies in developing entrepreneurship- and innovation-driven R&D projects. To establish the curriculum objectives, a descriptive survey was conducted to evaluate the needs and expectations of key stakeholders, including students, faculty members, and industry representatives. Furthermore, a needs analysis assessing institutional metrics between 2015 and 2021—specifically the volume of university-funded Scientific Research Projects (BAP), TÜBİTAK-BİDEB applications, entrepreneurial initiatives, and intellectual property/invention disclosures—indicated substantial room for institutional improvement.

Furthermore, findings indicate that Ege University students, faculty members, and industry representatives demonstrate a strong interest in project development and a willingness to generate high-caliber R&D

projects through student–mentor collaboration within AROM. Specifically, participating students expressed the highest demand for blended R&D training programs that combine online instruction with hands-on, face-to-face sessions supported by mentors. This aligns with existing literature; for instance, a meta-analysis by Vo, Zhu, and Diep (2017) demonstrated that blended learning yields significantly higher student performance than traditional classroom instruction, particularly across STEM disciplines. Another salient outcome of the project is the willingness of industry stakeholders to provide tangible support—such as internships, machinery, and equipment—thereby fostering students' project development capabilities.

The 'Entrepreneurship and Innovation-Oriented Research Processes' course was delivered via a blended learning model, combining online and face-to-face instruction to cultivate students' competencies in R&D, entrepreneurship, and innovation. Grounded in stakeholder needs and expectations, the design and implementation of this blended curriculum are expected to offer valuable contributions to the future development of higher education research ecosystems. The quantitative outcomes revealed a significant increase in the midterm and final project scores of students who regularly attended the pilot course. These findings suggest that the blended curriculum effectively enhanced students' project development capabilities. However, this study has certain limitations. Notably, irregular student attendance during the course's rollout as a university elective resulted in incomplete datasets across some planned quantitative metrics, constraining the overall scope of data collection.

Consequently, institutionalizing and scaling this program across the university is strongly recommended, paired with the adoption of multifaceted assessment instruments to capture student learning outcomes more comprehensively. Given its status as a designated research university with a prominent standing in R&D, innovation, and entrepreneurship, Ege University's initiative offers valuable empirical benchmarks and actionable insights for peer institutions seeking to implement similar curricular models in the age of artificial intelligence and modern learning technologies.

AI Usage Disclosure: This document was translated with assistance of DeepL Translate on-line tool. The content has been reviewed and edited by the researchers.

REFERENCES

- Ah Kim, S., yun Ryoo, H., & joo Ahn, H. (2017). Student customized creative education model based on open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 3(1), 6.
- Allen, I. E., & Seaman, J. (2010). Class Differences: Online Education in the United States. *Sloan Consortium*. <https://files.eric.ed.gov/fulltext/ED529952.pdf>. Accessed 25 Oct 2018.
- Anderson, C., & Kurt, A. A. (2017). Universal design for learning and technology integration for learners with disabilities. in *The Child in Digital Life*. Pegem Akademi, 117-144.
- Ateş Çobanoğlu, A. (2018). Student teachers' satisfaction for blended learning via Edmodo learning management system. *Behaviour & Information Technology*, 37(2), 133-144. <https://doi.org/10.1080/0144929X.2017.1417481>
- Ateş-Çobanoğlu, A. (2013). The effect of blended learning on students' achievement, perceived cognitive flexibility levels and self-regulatory learning skills. *Unpublished doctoral dissertation*, Ege University, Institute of Social Sciences.
- Bacon, C. M., Mulvaney, D., Ball, T. B., DuPuis, E. M., Gliessman, S. R., Lipschutz, R. D., & Shakouri, A. (2011). The creation of an integrated sustainability curriculum and student praxis projects. *International Journal of Sustainability in Higher Education*.
- Campbell, C. M., & Henn, S. C. (2020). *The Innovation Center of St. Vrain Valley Schools: An Investigation of Essential Skills and Diverse Student Enrollment* (Doctoral dissertation, Vanderbilt University. Peabody College).
- Cao, W. (2023). A meta-analysis of effects of blended learning on performance, attitude, achievement, and engagement across different countries. *Frontiers in Psychology*, 14, 1212056. <https://doi.org/10.3389/fpsyg.2023.1212056>
- Chen, L., Ifenthaler, D. & Yau, J. Y.-K. (2021). Online and blended entrepreneurship education: A systematic review of applied educational technologies. *Entrepreneurship Education*, 4(2), 191–232. <https://doi.org/10.1007/s41959-021-00047-7>

- Colombelli, A., Loccisano, S., Panelli, A., Pennisi, O. A. M., & Serraino, F. (2022). Entrepreneurship Education: The Effects of Challenge-Based Learning on the Entrepreneurial Mindset of University Students. *Administrative Sciences*, 12(1), 10. <https://doi.org/10.3390/admsci12010010>
- Demirel, Ö. (2008). *Program development in education from theory to practice*. (11th edition). Ankara: Pegem Akademi.
- Ege University Research-Oriented Student Center. (n.d.). *Research-Oriented Student Center (AROM)*. Retrieved May 22, 2026, from <https://arom.ege.edu.tr/index.php>
- EU (Ege University), (2025). About Ege. [https://ege.edu.tr/eng-1/Ege University from past to today.html](https://ege.edu.tr/eng-1/Ege%20University%20from%20past%20to%20today.html)
- Ernst & Young LLP, & Federation of Indian Chambers of Commerce & Industry. (2024). *Research ecosystem within Indian higher education sector: Strategic pillars of reform across academic and industry research*. EY. https://www.russellgroup.ac.uk/sites/default/files/2025-04/International%20Research%20Funding%20Systems_A%20Comparative%20Analysis_PwC_Wellcome_Russell%20Group.pdf
- Ermis, K., & Ateş-Çobanoğlu, A. (2025). Motivational effect of shifting educational video in a blended instructional design. *Educational Technology & Society*, 28(4), 78-97. [https://doi.org/10.30191/ETS.202510_28\(4\).RP05](https://doi.org/10.30191/ETS.202510_28(4).RP05)
- European Commission. (2025). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Strategic priorities for research and innovation* [COM(2025) 90 final]. EUR-Lex. <https://eur-lex.europa.eu/legal-content/en/TXT/PDF/?uri=CELEX%3A52025DC0090>
- Evans, P. M., & Schares, E. J. (2017, June). Board# 31: Work in Progress: FLEx-University X's Mobile Technology Classroom. In *2017 ASEE Annual Conference & Exposition*.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2023). *How to design and evaluate research in education* (11th ed.). New York: Mc Graw Hill.

- Glatthorn, A. A., Boschee, F. A., Whitehead, B. M., & Boschee, B. F. (2019). *Curriculum leadership: Strategies for development and implementation* (5. baskı). SAGE Publications.
- Graham, C. R. (2006). Blended learning systems: Definition, current trends and future directions. In C. J. Bonk & C. R. Graham (Eds.), *The handbook of blended learning: Global perspectives, local designs* (pp. 3-21). San Francisco: Pfeiffer.
- Gustafson, R. J. (2008, October). Work in progress-Engineering Education Innovation Center. In *2008 38th Annual Frontiers in Education Conference* (pp. T2D-12). IEEE.
<https://doi.org/10.1186/s12909-017-1009-x>
- Lukens, M. (2009). Innovation Engineering®: An interdisciplinary program for students in every field. In VentureWell. *Proceedings of Open, the Annual Conference* (p. 1). National Collegiate Inventors & Innovators Alliance.
- Luo, L., Cheng, X., Wang, S., Zhang, J., Zhu, W., Yang, J., & Liu, P. (2017). Blended learning with Moodle in medical statistics: An assessment of knowledge, attitudes and practices relating to e-learning. *BMC Medical Education*, 17(1), 170.
- Maguirre, M. V., Ruelas, G. C., & Torre, C. G. D. L. (2016). Women empowerment through social innovation in indigenous social enterprises. *RAM. Revista de Administração Mackenzie*, 17(6), 164-190.
- Namyssova, G., Tussupbekova, G., Helmer, J., Malone, K., Afzal, M., & Jonbekova, D. (2019). Challenges and benefits of blended learning in higher education. *International Journal of Technology in Education (IJTE)*, 2(1), 22-31.
- Öcek, Z., Batı, H., Sezer, E.D., Köroğlu Ö.A., Yılmaz, Ö., Yılmaz, N.D., Mandiracıoğlu, A. (2021). Research training program in a Turkish medical school: challenges, barriers and opportunities from the perspectives of the students and faculty members. *BMC Med Educ.*, 21(1):2.
- Peterson, C. (2003). Bringing ADDIE to life: Instructional design at its best. *Journal of Educational Multimedia and Hypermedia*, 12(3), 227-241.
- PwC UK, Wellcome, & Russell Group. (2025). *International research funding systems: A comparative analysis*. Russell Group.

https://www.russellgroup.ac.uk/sites/default/files/2025-04/International%20Research%20Funding%20Systems_A%20Comparative%20Analysis_PwC_Wellcome_Russell%20Group.pdf

- Saylan, N. (1995). *Program design in education basics - principles - criteria*. Balıkesir: Ince Ofset.
- Scott, S. S., Mcguire, J. M., & Shaw, S. F. (2003). Universal design for instruction: A new paradigm for adult instruction in postsecondary education. *Remedial and Special Education*, 24(6), 369-379.
- Seels, B., & Glasgow, Z. (1998). *Making instructional design decisions (2nd ed.)*. Upper Saddle River, NJ: Merrill/Prentice Hall.
- Singh, A., Rocke, S., Pooransingh, A., & Ramlal, C. J. (2019). Improving student engagement in teaching electric machines through blended learning. *IEEE Transactions on Education*, 62(4), 297–304. <https://doi.org/10.1109/TE.2019.2918097>
- Sloan, D., & Horton, S. (2019). Usability, Universal Usability, and Design Patterns. In *Web Accessibility* (pp. 445-460). Springer, London.
- Student Innovation Center About. (n.d.). Retrieved from <https://www.ualberta.ca/student-innovation-centre/about.html>
- Tekedere, H & Göker, H. (2016). Content analysis of graduate thesis studies on e-learning environments for disabled people. *Journal of Adıyaman University Institute of Social Sciences*,(24), 945-970. Retrieved from <https://dergipark.org.tr/tr/pub/adyusbdi/issue/37218/429584>
- Telli E. & Ünlüer S. (2018) Feedback in Online Learning Applications. Akkoyunlu, B., İşman,A. and Odabaşı, H. F. (Eds), in *Technology in Education Readings 2018*, 439-458
- Turyamureeba, S. (2024). Blended learning in higher education: Models and effectiveness. *Eurasian Experiment Journal of Arts and Management*, 5(3), 5-10.
- University of Toronto. (2020). *Center for Teaching Support & Innovation*. Retrieved December 20, 2020, from <https://teaching.utoronto.ca/>
- Viebig, C. (2022). Blended learning in entrepreneurship education: A systematic literature review. *Education + Training*, 64(4), 533–558. <https://doi.org/10.1108/ET-05-2021-0164>

- Vo, H.M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, 53(2017), 17-28, doi: 10.1016/j.stueduc.2017.01.002.
- Yerlikaya, Y. G. and Doğruyol, B. (2020). Collaboration Scale: Cultural Adaptation. *IBAD Journal of Social Sciences*, (8), 350-363.
- Yilmaz, E. and Sünbül, A. M. (2009). Development of entrepreneurship scale for university students. *Selcuk University Journal of Institute of Social Sciences*, (21), 195-203.
- Zampirolli, F. A., Goya, D., Pimentel, E. P., & Kobayashi, G. (2018). Evaluation process for an introductory programming course using blended learning in engineering education. *Computer Applications in Engineering Education*, 26(6), 2210–2222. <https://doi.org/10.1002/cae.22029>

APPENDICES

APPENDIX 1 OBJECTIVE-CONTENT TABLE OF THE CURRICULUM DEVELOPED WITHIN THE SCOPE OF THE PROJECT

Program Objectives and Content	COGNITIVE DOMAIN						AFFECTIVE DOMAIN				SUMM				
	Recall - Knowledge						Application	Awareness				Reacting - Willingness to React			
	Knowledge of interdisciplinary collaborative work	Knowledge of innovative business ideas	Knowledge of scientific work with R&D qualifications	Knowledge of information ethic concepts	Knowledge of the concept of creativity	Explain the difference between the concepts of mentor and mentee		To be able to give examples of R&D qualified projects	To be able to give examples about the concept of entrepreneurship						
Topics															
Interdisciplinary collaborative work	x		X		X	X	X				X			X	6
Innovation, Technology and Entrepreneurship	X	X		X	X			X	X				X		7
Preparing an innovative business plan		X											X		3
Project preparation				X	X									X	4

APPENDIX 2. THE BLENDED PROGRAM OF ENTREPRENEURSHIP AND INNOVATION-ORIENTED RESEARCH PROCESSES

EÜ EBILTEM-TTO, AROM, EGESEM and Ege-UZEM
"AROM Research Student Orientation Program" hold in
cooperation with AROM.

All training recordings, were presented asynchronously via
<https://akademi.ege.edu.tr/> on May 16-June 16, 2022. Participants
entered certificate exam at the end of the program
and received certificates.

AROM RESEARCH STUDENT ORIENTATION PROGRAM_ASYNCHRONOUS

1. Ege University R&D and innovation ecosystem and the role of EBİLTEM-TTO Prof. Dr. Şenay ŞANLIER, Director of EBİLTEM-TTO

Participants will be informed about the research infrastructure and organization within our university and the functions of EBİLTEM-TTO within this organizational structure.

2. Knowledge and Innovation

Betül SEZGİN, IZIKAD Chairman of the Board

Participants will be informed about the philosophy of innovation and the importance of knowledge.

3. Foundations of Scientific Thought

Prof. Dr. Hasan YILDIZ, Dean of the Faculty of Engineering

Within the scope of the foundations of scientific thought, participants will be informed about what scientific thought is, what are the characteristics of scientific thought, etc.

4. History and Philosophy of Science

Prof. Dr. Beno KURYEL, Guest Lecturer

Participants will be informed about the philosophy of science, history, etc.

5. Scientific Ethics and Ethics Committee Approvals

Assoc. Prof. Dr. Özge ALTUN KÖROĞLU, Faculty of Medicine

Participants will be informed about the ethics of science, the ethical values that scientists should have, and the situations that require ethics committee approval.

6. Research Techniques

Assoc. Prof. Dr. Aylin ŞENDEMİR, Faculty of Engineering

Assoc. Prof. Dr. Fatma ORGUN, Faculty of Nursing, Institute of Health Sciences

The stages of scientific research in the fields of Science-Engineering, Health and Social Sciences, defining the problem, writing the hypothesis, determining the research method, collecting and writing the data and writing the final report.

7. Use of the EU Library Web Page

Leman KOZAKÇI BAKAR, EÜ Rectorate Library and Documentation Department

Participants will be informed about the use of the library web page, databases, e-journals, e-books, e-resources, library services, EÜ publications.

8. Scientific Output Statistics and Internationalization Databases at Ege University: InCites - SciVal

Prof. Dr. Mehmet Reşat ATILGAN, EBİLTEM-TTO

Scientific Output Statistics and Internationalization Databases of Ege University: Participants will be informed about InCites - SciVal issues.

9. Applied Literature Review

Assoc. Prof. Dr. Özlem TUNCAY, EÜ Faculty of Agriculture, Department of Horticulture

How to conduct a literature review will be explained to the participants practically.

10. Article Writing Technique

Lecturer Gör. Dr. Ozan KARACA, Institute of Health Sciences

General information about article preparation technique will be given. In particular, the issues to be considered when making citations and how to make citations will be explained.

11. Using Electronic Bibliography

Lecturer Gör. Dr. Yusuf YILMAZ, Faculty of Medicine

Participants will be informed about electronic bibliography preparation environments and the issues to be considered when preparing bibliographies.

12. Academic Presentation Techniques

Assoc. Prof. Dr. Ayşe Hilal BATI, Faculty of Medicine

How an academic study should be presented, which information should be given in which parts of the presentation and which steps these presentations consist of will be explained and information will be given about the steps to be followed during the presentation.

13. Hazardous Waste Management

Res. Assist. Dr. Tuğçe KALKAN DAĞLIOĞLU, ÇEVMER

Participants will be informed about the identification, collection, transportation, storage and storage of hazardous wastes and the issues to be considered.

14. Laboratory Safety Rules

Assoc. Prof. Dr. Burcu OKUTUCU, Faculty of Science

Participants will be informed about basic laboratory safety and the rules applied in different laboratories, who to contact in case of problems and related procedures.

15. Technology Development Zone and Applications Anıl BAYBURA, EGE TEKNOPARK

Detailed information about the Technology Development Zone will be given.

16. Entrepreneurship and Company Building

Aysun DEMİRDÖĞEN, EBİLTEM-TTO

Participants will be provided with a new perspective and will be provided with information about the strategies necessary to turn new ideas into business.

17. Information on Ege University Intellectual Rights Procedures and Principles Özgür GÜVENERLER, EBİLTEM-TTO

Information about the functioning of Ege University's intellectual rights procedures and principles will be given.

18. Patent Information, Processes, Research in Patent Databases Özgür GÜVENERLER, EBİLTEM-TTO

The role and importance of patents in the research process, how to do patent search and how to use patents in creating project ideas will be given.

19. Project Preparation Method, Institutions and Organizations Providing Project Support Prof. Dr. Özge ANDIÇ ÇAKIR, Faculty of

Engineering

It will be explained how to identify the research idea and which basic criteria (originality, prevalence, applicability, etc.) the project should have. In addition, information about the institutions that provide financial support to projects and their programs will be given.

NOTE: This training content is presented asynchronously. Since the information in the source will be current and valid, it is appropriate to check the information from the relevant places.

20. National Project and Scientist Support Programs Sercan ERTAŞ, EBİLTEM-TTO

Participants will be informed about the application conditions, functioning, budget items, etc. of national project and scientist support programs.

NOTE: This training content is presented asynchronously. Since the information in the source will be current and valid, it is appropriate to check the information from the relevant places.

21. CV and Cover Page Preparation

Prof. Dr. Ferhan GİRGİN SAĞIN, *Faculty of Medicine*

Participants will be informed about what a resume and cover page are and how to prepare them.

22. Overseas Scholarship Opportunities and Student Exchange Programs

Assoc. Prof. Dr. Fırat SARSAR, *Director of Faculty of Education Distance Education Application and Research Center*

Scholarships and programs provided for students to study abroad for graduate studies will be introduced.

NOTE: This training is asynchronous.

APPENDIX 3.
ENTREPRENEURSHIP AND INNOVATION-ORIENTED RESEARCH PROCESSES COURSE PLAN

Course Name / Course Name	ENTREPRENEURSHIP AND INNOVATION BASED RESEARCH PROCESSES	
Course Acts Credit / ECTS	3.00	
Course Hours For Week (Theoretical) / Course Hours For Week (Theoretical)	2.00	
Weekly Practice Hours / Course Hours For Week (Objected)	0.00	
Weekly Laboratory Hours / Course Hours For Week (Laboratory)	0.00	
Course Year / Year	2	
Teaching System / Teaching System	Face-to -face and online (blended)	
Education Language	Turkish	
Prerequisite/ Prerequisite	No	
Purpose / Purpose	In this course, it is aimed to develop collaborative working skills, by learning the basic concepts of project development,mentor mentee relationship and effective communication skills, innovative business idea development skills and skills to produce scientific projects in an interdisciplinary environment.	

Book / Material / Recommended Reading / Books / Materials / Recommended Reading	Bock, A. J., & George, G. (2017). <i>The Business Model Book: Design, build and adapt business ideas that drive business growth</i>. Pearson UK. Cross, N., Naughton, J., & Walker, D. (1981). Design method and scientific method. <i>Design studies</i>, 2(4), 195-201. Andersen, H., & Hepburn, B. (2015). Scientific method. Bonhoeffer, D. (2012). <i>Ethics</i>. Simon and Schuster. Shrader-Frechette, K. S. (1994). <i>Ethics of scientific research</i>. Rowman & Littlefield. Benos, D. J., Fabres, J., Farmer, J., Gutierrez, J. P., Hennessy, K., Kosek, D., & Wang, K. (2005). <i>Ethics and scientific publication</i>. Advances in physiology education, 29(2), 59-74. Rother, E. T. (2007). Systematic literature review X narrative review. <i>Acta Paulista de Enfermagem</i>, 20, v-vi. Van Lange Paul, A. M., Liebrand, W. B., & AM, W. H. (2015). Introduction and literature review. <i>Social dilemmas</i>, 3-28. Knopf, J. W. (2006). Doing a literature review. <i>PS: Political Science & Politics</i>, 39(1), 127- 132. Barbara, S., & Celebrate, M. C. D. P. (1989). Collaboration. Lai, E. R. (2011). Collaboration: A literature review. Pearson Publisher. Retrieved November, 11, 2016. Walsh, L., & Kahn, P. (2009). Collaborative working in higher education: The social academy. Routledge. Braun-Thürmann, H. (2005). <i>Innovation</i> (p. 118). transcript Verlag. Kline, S. J., & Rosenberg, N. (2010). An overview of innovation. <i>Studies on science and the innovation process: Selected works of Nathan Rosenberg</i>, 173-203. Webster, P. R. (1990). Creativity as creative thinking. <i>Music Educators Journal</i>, 76(9), 22-28. Newell, A., Shaw, J. C., & Simon, H. A. (1962). The processes of creative thinking. In <i>Contemporary Approaches to Creative Thinking</i>, 1958, University of Colorado, CO, US; This paper was presented at the aforementioned symposium. Atherton Press. Paul, R., & Elder, L. (2004). <i>Critical and creative thinking</i>. Dillon Beach, CA: The Foundation for Critical Thinking. Kamien, M. I. (1992). Patent licensing. <i>Handbook of game theory with economic applications</i>, 1, 331-354. Gupta, H., Kumar, S., Roy, S. K., & Gaud, R. S. (2010). Patent protection strategies. <i>Journal of Pharmacy and Bioallied Sciences</i>, 2(1), 2. Strauss, A., & Corbin, J. (1998). Basics of qualitative research techniques. Piore, M. J. (1979). Qualitative research techniques in economics. <i>Administrative Science Quarterly</i>, 24(4), 560-569. E.Ü. Science Technology Application and Research Center. E.Ü. Science Technology Application and Research Center. (n.d.). Retrieved July 1, 2022, from https://ebiltem.ege.edu.tr/
Faculty Member (Members) / Faculty Member (Members)	Prof. Dr. Özge Altun Koroğlu

LEARNING OUTCOMES / LEARNING OUTCOMES

1	To be able to define the concepts of interdisciplinary environment and collaborative work
2	Define the concept of innovative business idea
3	To be able to define R&D qualified scientific work
4	Define the concepts of mentor and mentee
5	To be able to define the concept of creativity
6	Explain the difference between the concepts of mentor and mentee
7	To be able to give examples of R&D qualified projects
8	To be able to give examples about the concept of entrepreneurship
9	Develop an interdisciplinary project draft by working collaboratively
10	Volunteering to do R&D qualified scientific work.

WEEKLY COURSE CONTENT / DETAILED COURSE OUTLINE

	Theoretical Courses / Theoretical	Application	Lab	Teaching Methods and Techniques
1	Ege University R&D and innovation ecosystem and the role of EBILTEM-TTO	Face to Face		Lecture, Q&A, Discussion, Online Assessment
2	Scientific Ethics and Ethics Committee Approvals	Online		Lecture, Q&A, Discussion, Online Assessment
3	Science-Engineering, Health Sciences and Social Sciences Research Techniques in the Fields	Face to Face		Lecture, Q&A, Discussion, Online Assessment
4	Applied Literature Review	Face to Face		Lecture, Q&A, Discussion, Online Assessment
5	Use of Electronic Bibliography	Face to Face		Lecture, Q&A, Discussion, , Online Assessment
6	Academic Presentation Techniques	Face to Face		Lecture, Q&A, Discussion, Online Assessment
7	Information on Ege University Intellectual Rights and Property Procedures and Principles	Online		Lecture, Q&A, Discussion, Online Assessment
8	Midterm Examination			
9	Patent Information, Processes, Searching in Patent Databases	Online		Instruction, Q&A, Discussion, Online Evaluation
10	Interdisciplinary collaborative work	Face to face		Instruction, Q&A, Discussion, Online Evaluation
11	Innovation, Technology and Entrepreneurship	Online		Lecture, Q&A, Discussion, , Online Assessment

12	Preparing an innovative business plan	Face to Face		Lecture, Q&A, Discussion, Online Assessment
13	Project preparation	Online		Lecture, Q&A, Discussion, Online Assessment
14	Mentoring and effective communication	Face to Face		Lecture, Q&A, Discussion, Online Assessment
15	The art of creative thinking	Online		Lecture, Q&A, Discussion, Online Assessment
16	Final Exam			

EVALUATION/ EVALUATION

Semester (Year) Learning Activities / Term (or Year) Learning Activities	Number / Number	Percentage of Contribution (%)
Midterm Examination	1	100
Total	1	100
Contribution to Success Grade(%):		40

End Of Term (or Year) Learning Activities	Number / Number	Percentage of Contribution (%)
Final Examination	1	100
Total	1	100
Contribution to Success Grade(%):		60

Total Percentage of Contribution (%) to Success Grade / Total Percentage of Contribution (%) to Success Grade:	100
Evaluation Type / Evaluation Type:	

WORKLOAD / WORKLOADS

Activities / Workloads	Number / Number	Duration (Hours) / Duration (Hours)	Total Workload (Hours) / Total Work Load (Hour)
Midterm Examination / Midterm Examination	1	10.00	10.00
Final Examination / Final Examination	1	20.00	20.00
Discussion / Discussion	1	5.00	5.00
Business plan preparation / Business Plan Preparation	1	5.00	5.00
Project Preparation / Project Preparation	1	5.00	5.00
Report Preparation / Report Preparation	1	10.00	10.00
Report Presentation / Report Presentation	1	5.00	5.00
Individual Study for Mid term Examination / Individual Study for Mid term Examination	1	10.00	10.00
Individual Study for Final Examination / Individual Study for Final Examination	1	10.00	10.00
Reading / Reading	1	10.00	10.00
Total / Total:	10	90.00	90.00
Course ECTS Credit= Total Workload (Hour) / 30.00 (Hour / ECTS)= 90.00/30.00= 3.00~ 3.00 / Course ECTS Credit= Total Workload (Hour) / 30.00 (Hour / ECTS)= 90.00 / 30.00= 3.00~ 3.00			



www.seruvenyayinevi.com



/seruvenyayinevi



/seruvenyayinevi



/seruvenyayinevi



9 786258 911800