

Electronic, didactic and innovative platform for learning based on multimedia assets



e-DIPLOMA



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D8.5 Exploitation and after project communication plan (M30) V3.2

31 October 2025

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0. Executive Summary

This deliverable (D8.5) presents the Final Exploitation and After-Project Communication Plan developed within WP8 of the e-DIPLOMA project. It outlines how the project’s Key Exploitable Results (KERs) will be sustained, commercialised, and communicated beyond the project duration. The document builds on D8.4 (Business Strategy Baseline) and integrates the recommendations of the Horizon Results Booster (HRB) service. It aims to ensure the long-term visibility, uptake, and impact of e-DIPLOMA results.

A **first version of the KERs and their exploitation strategies** was reviewed by the **Horizon Results Booster (HRB) service**, which provided a set of recommendations to strengthen their market relevance, sustainability, and validation. These recommendations have been carefully analysed and **implemented in the present final version**, which incorporates all agreed improvements related to KER characterization, financial structure, exploitation roadmap, and risk assessment. The consolidated version attached here reflects these refinements, ensuring a coherent and evidence-based exploitation framework for the three KERs.

Summary of Key Exploitable Results

KER	Leading Partner	Description	Target Market	Expected Impact (3 years)
KER1	BRA	Repository of educational 3D assets	Education & EdTech	Increased use of EVS, growth of 3D learning assets
KER2	UJI	Block Programming course through VR/AR	Higher Education	Improved engagement and retention in programming education
KER3	BME/ARIS	Social Entrepreneurship Course	VET & NGOs	Enhanced training capacity for social businesses

1. Introduction

The **D8.5 – Final Exploitation and After-Project Communication Plan** is a key deliverable of **Work Package 8 (Dissemination, Communication and Exploitation)** within the *e-DIPLOMA* project. Its purpose is to ensure that the project’s innovations –educational methods, digital tools, and immersive learning technologies– continue to generate value and impact beyond the project’s lifetime.

1.1 Context

Dissemination and exploitation of research results are central pillars of **Horizon Europe**. These activities are not only essential for the success of individual projects but also for strengthening Europe’s innovation ecosystem and its capacity to transfer research into tangible benefits for society.

In this context, *e-DIPLOMA* integrates dissemination, exploitation and after-project communication strategies to maximise visibility, usability, and sustainability of its results.

1.2 Link with Previous Work

This deliverable builds on the foundations established in **D8.4 – Business Strategy Baseline**, which identified potential Key Exploitable Results (KERs) and defined their preliminary business models.

In D8.5, these results are refined into concrete exploitation roadmaps, with defined market targets, roles, responsibilities, financial planning, and risk assessments. The document also includes an **After-Project Communication Plan** to maintain engagement with stakeholders once the project concludes.

1.3 Objectives

The main objectives of this deliverable are to:

1. **Define the exploitation strategy** for the three Key Exploitable Results (KERs) identified during the project.
2. **Ensure the sustainability and market readiness** of these KERs through clear business and operational roadmaps.
3. **Address intellectual property and ownership aspects** to guarantee appropriate protection and use of project outcomes.
4. **Plan after-project communication activities** to ensure long-term visibility and uptake of results by external stakeholders.
5. **Identify risks and mitigation measures** to secure continuity of exploitation after project completion.

1.4 Scope and Structure of the Document

This deliverable provides a comprehensive overview of the **final exploitation and after-project communication strategy for the e-DIPLOMA** project. It builds upon Deliverable D8.4 (Business Strategy Baseline) and integrates the feedback received from the Horizon Results Booster (HRB) service to strengthen the market readiness and long-term sustainability of the project's Key Exploitable Results (KERs).

The structure of the document is as follows:

- **Section 1 – Introduction and Context**
Introduces the objectives, scope, and relevance of Deliverable D8.5 within the overall framework of Work Package 8 (*Exploitation and Communication*). It explains how this document complements earlier work and serves as the final consolidated version of the exploitation plan.
- **Section 2 – Overall Exploitation Strategy**
Describes the consortium's strategic approach to exploitation, differentiating between collective and individual exploitation routes. It outlines partner responsibilities, coordination mechanisms, and the sustainability vision for maintaining project results after its completion.
- **Section 3 – Methodology and HRB Support**
Presents the methodological approach followed to refine and validate the exploitation strategy. This section details how the Horizon Results Booster (HRB) service supported the consortium through expert guidance on defining the KERs, assessing their innovation potential, and improving their market positioning and financial viability.
- **Section 4 – Recommendations for the Exploitation of the KERs**
Summarises the main recommendations received from the HRB service and the subsequent actions undertaken by the consortium. These include refining KER descriptions, integrating validation results, specifying market launch milestones, and completing the financial and risk assessment frameworks.
- **Section 5 – Summary of Actions for the Final Version**
Provides a synthesis of the key actions implemented following the HRB recommendations. Each

action is described in detail, covering improvements to the Unique Value Proposition, refinement of KER definitions, the establishment of exploitation milestones, financial detailing, and the inclusion of the after-project communication plan. This section demonstrates how all recommendations have been addressed and incorporated into the final version.

- **Section 6 – Key Exploitable Results (KERs)**

Presents the final version of the three validated KERs, structured consistently under the following framework:

- Problem Statement
- Alternative Solutions
- Unique Value Proposition
- Description and Functional Design
- Target Market and Early Adopters
- Competitors and Market Position
- Go-to-Market and Use Model
- IPR Background and Foreground
- Exploitation Roadmap (Milestones and KPIs)
- Financial Outlook
- Risk Assessment
- Expected Impact in 3 Years
- Summary of Actions for the Final Version

- **Section 7 – After-Project Communication Plan**

Defines the long-term communication strategy to ensure visibility and impact of e-DIPLOMA outcomes beyond the project's duration. It specifies objectives, target audiences, key messages, and dissemination channels to maintain engagement and foster uptake.

- **Section 8 – Conclusions**

Summarises the key outcomes of the exploitation process, confirming the implementation of HRB recommendations and the consortium's readiness to sustain, scale, and commercialise the e-DIPLOMA results after project completion.

2. Overall Exploitation Strategy

The exploitation strategy of *e-DIPLOMA* defines the pathway by which the project's technological, pedagogical, and methodological outputs will be transferred into sustainable value for partners, educators, and the broader European education ecosystem.

It builds upon the foundations established in D8.4 *Business Strategy Baseline* and focuses on ensuring that the project results achieve tangible and long-term impact.

2.1 Strategic Vision

The overall vision of the exploitation plan is to **elevate e-learning to a new standard of quality and interactivity**, by **integrating advanced technologies** such as Virtual and Augmented Reality (VR/AR), Artificial Intelligence (AI), Machine Learning (ML), Interactive Tools, and Gamification **into an innovative digital learning platform**.

Originally developed and validated in professional industries such as broadcasting, gaming, and e-sports, these technologies are being **adapted to the educational domain** to enrich learning experiences, improve engagement, and support more inclusive and accessible education.

While the **adoption of these technologies in education will not be immediate**, it is expected to **progress gradually** as new generations of digitally native students enter the system and as current educators enhance their digital literacy.

The consortium's strategy, therefore, is to **anticipate this progressive adoption** by ensuring that all exploitable results are **technically mature, pedagogically validated, and ready for deployment** once the demand for immersive and AI-assisted learning solutions expands.

This foresight positions *e-DIPLOMA* to deliver market-ready outcomes precisely when institutions and educators are prepared to adopt them, ensuring long-term sustainability and strategic alignment with Europe's digital education transition.

This approach positions *e-DIPLOMA* not merely as a research initiative, but as a **bridge between high-end creative technologies and educational transformation**, contributing to Europe's digital sovereignty and the development of next-generation learning environments.

2.2 Co-Creation and Stakeholder Engagement

A central pillar of the *e-DIPLOMA* exploitation strategy is **co-creation**. The project actively engages teachers, students, educational institutions, policymakers, and private sector representatives in the development, testing, and validation of its tools and methodologies.

This participatory approach ensures that the project results respond to real needs and can be easily adopted by the education sector.

Through **continuous feedback loops** and pilot activities, *e-DIPLOMA* has built a strong network of early adopters across Europe. These stakeholders will remain key actors in the post-project phase, supporting the validation, dissemination, and commercialisation of the Key Exploitable Results (KERs).

2.3 Strategic Objectives

Building on this collaborative foundation, the exploitation strategy translates the project’s long-term vision into a set of concrete and measurable objectives. These **strategic objectives** provide a roadmap for ensuring that the results of *e-DIPLOMA* evolve from research prototypes into sustainable, high-impact solutions. They focus on maintaining technological and pedagogical relevance, reinforcing market orientation, and guaranteeing that all partners are equipped to exploit and sustain the project’s innovations beyond its formal duration.

- 1 **Sustainability of Results:** Ensure that the three Key Exploitable Results (KERs) remain functional, accessible, and updated beyond the project’s end.
- 2 **Market Orientation:** Identify clear business opportunities and early adopters to facilitate market entry of the developed solutions.
- 3 **IPR and Ownership Management:** Establish transparent mechanisms for ownership, access rights, and licensing among consortium partners.
- 4 **Capacity Building:** Strengthen partners’ capabilities in commercialisation, partnership development, and exploitation of research results.
- 5 **Societal Impact:** Promote the adoption of immersive and inclusive digital learning methodologies, contributing to a more resilient and future-ready education system in Europe.

2.4 Exploitation Framework

To translate these strategic objectives into actionable results, *e-DIPLOMA* adopts a **multi-layered exploitation framework** that reflects the different nature and maturity of the project outcomes.

This framework ensures that each Key Exploitable Result (KER) can generate value through complementary pathways – from direct commercialisation to knowledge transfer and collaborative initiatives.

By combining **direct, joint, and knowledge-based exploitation**, the consortium maximises both the economic potential and the societal impact of the project’s results, ensuring that innovation continues to grow beyond the project’s lifetime.

The framework for exploitation is based on three complementary levels:

Level	Focus	Expected Impact
Direct Exploitation by Partners	Integration of KERs into partners’ own products, platforms, and services.	Commercial revenue generation and product differentiation.
Collaborative Exploitation	Joint actions among partners to offer combined services or solutions to external users.	Cross-sectoral cooperation and broader market reach.
Knowledge Exploitation	Use of project outcomes for education, training, and research purposes.	Capacity building and dissemination of innovative practices.

2.5 Expected Impact

The implementation of the e-DIPLOMA exploitation strategy is expected to deliver measurable and lasting impact across educational, technological, and economic dimensions.

By ensuring that each Key Exploitable Result (KER) reaches operational maturity and finds its place within the evolving digital education market, the project will extend its influence far beyond its formal duration.

This section outlines the main areas of impact – from sustainability and market uptake to institutional innovation and European digital leadership – demonstrating how the project’s results will contribute to shaping the next generation of immersive, inclusive, and intelligent learning solutions.

The successful implementation of this exploitation strategy will:

- Extend the lifetime and usability of e-DIPLOMA results.
- Foster new collaborations between academia and industry in the field of immersive education.
- Contribute to the digital transformation of teaching and learning across Europe.
- Strengthen the visibility and reputation of the consortium members as pioneers in XR-driven education.

e-DIPLOMA’s exploitation strategy ensures that the project outcomes evolve from research prototypes into **market-ready, scalable, and impactful solutions** that reinforce Europe’s leadership in digital education and creative technologies.

3. Methodology and HRB Support

The methodology applied in this deliverable follows a structured and evidence-based approach, combining internal consortium work with external support from the **Horizon Results Booster (HRB)** service. The process aimed to transform project outcomes into exploitable assets with clear commercial and societal potential.

3.1 Methodological Approach

The methodology builds on the Business Model Canvas framework defined in D8.4 Business Strategy Baseline, and it has been refined to address the final exploitation phase.

The following steps guided the elaboration of the plan:

1. Identification of Key Exploitable Results (KERs):

Partners reviewed all project outcomes to select those with potential for commercialisation or continued use after the project. Three KERs were prioritised based on technological readiness, market interest, and relevance to the educational innovation ecosystem.

2. Characterisation of Each KER:

Each result was analysed in terms of:

- o Problem addressed and target user needs
- o Alternative solutions and competitive landscape
- o Unique Value Proposition (UVP)
- o Business and use models (including pricing and IPR background/foreground)

3. Exploitation Roadmap Development:

For each KER, partners defined short- and mid-term actions to ensure continuity after project completion, including resource allocation, financial projections, and TRL evolution.

4. Risk Assessment and Mitigation:

Each KER includes a structured risk table assessing potential technological, market, legal, and partnership risks. Mitigation measures and responsible partners were identified to ensure robust exploitation paths.

5. After-Project Communication Planning:

Finally, the consortium designed a dedicated communication plan to sustain visibility and stakeholder engagement for at least 12 months beyond the project's lifetime.

This step-wise process ensures that exploitation and communication activities are evidence-driven, realistic, and aligned with the overall objectives of WP8.

3.2 HRB Support and Added Value

The **Horizon Results Booster (HRB)** provided specialised consultancy to strengthen the e-DIPLOMA exploitation strategy and align it with market expectations and EU best practices. HRB experts supported the consortium through workshops and one-to-one coaching sessions, focusing on:

- Refinement of each **Key Exploitable Result (KER)** to ensure clear market orientation and sustainability.
- Development of detailed **market and competitor analyses**, mapping adopters, enablers, and potential investors.
- Integration of **Intellectual Property Rights (IPR)** strategies, clarifying ownership, licensing options, and open-access policies.
- Definition of **after-project exploitation scenarios**, including direct exploitation by partners and potential collaborations with external stakeholders.

This process enhanced the consortium's capacity to convert research outcomes into market-ready assets and to position the project within the broader EU innovation landscape. The HRB support also ensured consistency between technical deliverables and the exploitation plan, strengthening the overall credibility and impact potential of e-DIPLOMA.

3.3 Expected Outcomes of the Methodology

The implementation of this combined methodology—internal analysis complemented by HRB guidance—resulted in:

- A **consolidated exploitation framework** applicable across all KERs.
- **Three validated exploitation roadmaps** including measurable KPIs.
- A **clear IP and ownership strategy** to safeguard and valorise project innovations.
- A **communication framework** for the post-project phase, ensuring long-term visibility of the results.

Together, these outcomes provide the foundation for the sustainability and market impact of e-DIPLOMA beyond the project's duration.

4. HRB support and recommendations for the Exploitation of the KERs

From the HRB support and collaboration, several considerations emerged that were addressed to be implemented in the final version of this document in M30. A summary of said considerations are outlined in the table below, including those considerations that were finally not implemented after thoughtful analysis by the partners.

4.1. Regarding Characterisation of KERs

- Provide a more refined description of the use model of the analyzed KERs, i.e., the services to be provided in KER2 (mainly for problems, early adopters, alternative solutions) and KER3 (mainly for Problems, target market, early adopters).
- Clearly define the ownership, the final legal set up of each KER, and specify how they will be sustainable after the e-DIPLOMA ends. Furthermore, please integrate the exploitation roadmaps (mainly for KER2 and KER3), align the actions with the use models of the three KERs and improve the financial details.
- It is advisable to further discuss in the next Consortium Meetings the action to be undertaken after the project ends in order to ensure the sustainability of the use of the three results.
- HRB proposes to apply the exploitation methodology to the e-DIPLOMA platform, as a standalone KER, and define the management and ownership for using the platform. However, after discussion among partners, it was decided not to define a market strategy for the e-DIPLOMA platform itself.

4.2. Implementing Exploitation Actions

Preparing exploitation is a continuous process. It is recommended to discuss with the Consortium the outcomes of this service. Reserve time to update partners on exploitation next steps and related risks to address together potential challenges and opportunities.

Fine-tune the financial part of the KERs, to have a clearer view when delivering the final version of the Exploitation plan. The costs, timing and revenues should be reviewed until the end of the project, also to face the first months after the end of the project.

For the next version, define a clear timeline for each action and connect these actions with sound financials.

4.3. Discussing Exploitation

For the final version of the Plan, Exploitation intentions, characterization tables and exploitation roadmaps need to be updated.

It is recommended to involve colleagues from marketing and business development departments in the finalization of the plan, and the improvement of market analysis.

Involve legal departments for the definition of ownership and make agreements to ensure the exploitation of the KERs.

4.4. Monitoring Risk Analysis

It is recommended to improve the risk analysis to evaluate/monitor it (especially for KER 1 and KER 3).

4.5. IP ownership and partnerships for exploitation

If a KER will be jointly exploited by two or more partners (i.e., KER3), joint owners of KERs should agree amongst themselves as soon as possible upon the detailed terms of exercising ownership and protection of such results in accordance with and in proportion to the agreed intellectual contribution to its development. If relevant, bilateral/multilateral Memorandum of Understanding agreements should be signed among relevant partners.

4.6. Horizon Results Platform

After finishing the final version of D8.5, and to maximize impact of e-DIPLOMA, it is suggested to upload each Key Exploitable Result on the [EC Horizon Results Platform](#).

5. Summary of actions for the final version

To ensure that the final version of the Exploitation Plan effectively supports the long-term sustainability and market deployment of the e-DIPLOMA results, a coordinated set of actions has been defined. These actions aim to refine the clarity, completeness, and strategic coherence of the three Key Exploitation Results (KERs), strengthening their validation, market positioning, and financial robustness.

5.1. Integration of Validation Conclusions

The validation findings from the three main KERs will be incorporated into the exploitation plan, particularly within the *Unique Value Proposition* sections. These conclusions demonstrate the tested relevance, usability, and impact of each KER, reinforcing their credibility for target audiences such as educational institutions, technology partners, and end users.

Beyond the Unique Value Proposition, validation outcomes will also be referenced throughout the plan—especially in the sections addressing market potential, user benefits, and expected impacts—to ensure that evidence-based results underpin every aspect of the exploitation narrative.

5.2. Refinement of KER Descriptions

Each KER description will be revisited and refined to enhance clarity, focus, and strategic alignment. The revisions will ensure that all KERs are described with sufficient technical precision and commercial depth, highlighting their innovation, practicality, and readiness for exploitation.

This process will also align the descriptions with the broader exploitation strategy, ensuring consistent framing and clear differentiation in terms of value proposition, market segment, and scalability.

5.3. Definition of the Market Launch Timeline and Final Milestones

A detailed timeline outlining the sequence of actions leading to market launch will be included. This roadmap will identify the final milestones for each KER, from technical finalisation and certification to marketing, partnerships, and dissemination activities. The inclusion of precise temporal markers and measurable goals will help all partners monitor progress and coordinate efforts, ensuring a structured and efficient transition from project completion to market entry.

5.4. Completion of the Financial Section

The financial outlook will be expanded and finalised with detailed estimations of costs, revenues, and projected profits for each KER. This will include production and maintenance costs, expected income from licensing and institutional access, and forecasts of medium-term profitability. The objective is to provide a realistic yet attractive financial model that can guide exploitation decisions and support potential investment or follow-up funding opportunities.

5.5. After-Project Communication Plan

The communication strategy for the post-project phase has been finalised. It defines how results will be promoted beyond the project's lifetime, leveraging institutional networks, academic channels, and professional events to ensure visibility and continued engagement. This plan will

serve as a transversal support mechanism for the exploitation strategy, maintaining awareness and fostering long-term adoption of the e-DIPLOMA outputs.

Action	Description	Status
1. Integration of Validation Conclusions	Validation results from the three KERs incorporated into the <i>Unique Value Proposition</i> and related sections (impact, market, and sustainability).	✔ DONE
2. Refinement of KER Descriptions	All KER descriptions reviewed and refined for clarity, market alignment, and innovation focus.	✔ DONE
3. Market Launch Timeline and Final Milestones	Exploitation roadmap and milestones defined for all KERs, including timing and responsibilities.	✔ DONE
4. Financial Section Completion	Detailed financial outlook finalised, including costs, revenues, and profitability analysis.	✔ DONE
5. After-Project Communication Plan	Post-project communication and dissemination strategy completed and integrated.	✔ DONE

6. Key Exploitable Results

This section presents the final version of the three **Key Exploitable Results (KERs)** developed within the e-DIPLOMA project.

Each KER has been **structured and refined according to the recommendations of the Horizon Results Booster (HRB) service**, ensuring coherence, clarity, and consistency across all exploitation components. The adopted structure reflects HRB’s guidance on improving the articulation of each result’s **problem statement, unique value proposition, market positioning, financial outlook, and impact assessment**, thus enhancing their overall **market readiness and scalability potential**.

Building upon the overall exploitation framework presented in the previous section, this part of the deliverable details the **three core assets** that constitute the foundation of e-DIPLOMA’s exploitation strategy. Each KER represents a **distinct yet complementary innovation**, contributing to the shared goal of transforming digital education through immersive, interactive, and accessible learning technologies.

While their technological readiness and market maturity differ, all three KERs have been designed with **sustainability and long-term impact** in mind, ensuring that exploitation can continue beyond the project’s lifetime.

A first version of this plan was outlined in **D8.4 – Business Strategy Baseline**, where partners identified potential exploitable results. From this process, the **Exploitation Committee** selected three KERs based on their commercial viability and scalability potential, while others were retained as open academic assets.

The **final versions of the KERs**, presented below, are the outcome of several iterations, internal workshops, and HRB-led coaching sessions. Each KER follows a **harmonised analytical structure** to allow comparability, transparency, and a consistent evaluation approach.

The **Key Exploitable Results** selected for e-DIPLOMA are summarised below:

Partner name	Key Exploitable Result (KER)	Exploitation Intention	Contribution to the KER
BRA	Educational content repository of 3D assets and models for the virtual production set (VPS)	Adding value to BRA’s virtual production set for education	<ul style="list-style-type: none"> - Design and build the repository - Integrate it into the VPS
UJI	Block Programming course through VR and AR	Enhancing UJI’s educational portfolio by adding an innovative course	<ul style="list-style-type: none"> - Design and develop the course - Offer the course within the wider university course portfolio
BME/ARIS	Social Entrepreneurship course	Expanding ARIS’s and BME’s educational offerings to their associates and the general public	<ul style="list-style-type: none"> - Design and develop the course - Offer the course to associates, collaborators and the wider public

The in-depth analysis that follows in the next sections was drafted by the beneficiaries with feedback and recommendations from **Horizon Results Booster (HRB)** experts. The final versions of the KERs are the outcome of several **iterations, brainstorming sessions, and coaching activities**, incorporating inputs from both HRB and project partners.

Each KER is presented following a common analytical structure, allowing comparability and clarity for evaluation purposes.

A. Characterization Table

This section includes the main business, technical, and strategic components required to understand each KER's exploitation potential.

It covers:

- **Problem:** The main challenges faced by target users and institutions, validated through early adopters.
- **Alternative Solutions:** Competing or substitute solutions currently available in the market, their providers, and limitations.
- **Unique Value Proposition (UVP):** The distinctive advantages that make the KER more attractive or efficient than alternatives, validated through user feedback.
- **Description:** A clear explanation of the KER's design, features, and operational mechanisms.
- **Target Market:** Identification of customer segments and geographies where adoption is most likely.
- **Early Adopters:** Institutions and professionals actively involved in validation and testing of the KER.
- **Competitors:** Direct and indirect competitors, including universities, commercial providers, and repositories.
- **Go-to-Market / Use Model:** The validated model for market entry and post-project sustainability, detailing service provision, roles, and pricing.
- **Market Launch Timeline:** The timeframe for each KER to become fully operational after project completion.
- **IPR Background and Foreground:** Ownership, licensing, and protection measures, including pre-existing (background) and newly generated (foreground) knowledge.

This comprehensive structure supports the development of a robust Exploitation Roadmap and helps each partner identify the steps needed to reach full market readiness.

B. Exploitation Roadmap

The roadmap outlines the sequence of actions required to bring each KER to market and ensure its continuity after the project's end.

It is designed to mitigate the main risk faced by R&I projects – the lack of post-project resources to continue exploitation and increase TRL levels.

The roadmap defines:

- **Actions:** Activities planned within 3–6 months after project completion to sustain development and deployment.
- **Roles:** Specific responsibilities of each partner in executing the roadmap.
- **Milestones and KPIs:** Indicators for tracking progress, adoption, and commercial success.
- **Financial Costs:** Estimated investments for 1 and 3 years.
- **Revenues:** Expected turnover and profit within 1–3 years of implementation.
- **Additional Resources:** External funding or collaborations needed to enhance TRL or scalability.
- **Impact in 3 Years:** Expected educational, societal, and economic effects of each KER.

C. Use Option

This part identifies how each KER will be brought to use.

KERs can be exploited either **directly** by project partners or **indirectly** through third parties (via licensing or partnership). In *e-DIPLOMA*, all three KERs will follow the **direct exploitation model**, ensuring full ownership, control, and long-term commitment by the partners responsible for their development.

D. Risk Assessment

Finally, each KER includes a **Risk Assessment Table** addressing potential challenges related to market adoption, technology, partnerships, intellectual property, finance, and sustainability.

Each risk is evaluated according to its probability and potential impact, with mitigation strategies defined to neutralise or reduce their effects. This systematic approach ensures resilience and adaptability of each exploitation plan, increasing the likelihood of successful commercial and societal outcomes.

In the following sections (7-9), the document presents a detailed analysis of each KER according to the structure above.

These analyses form the foundation of the *e-DIPLOMA* exploitation strategy, providing the necessary roadmap to ensure that its innovations are **sustained, scaled, and effectively utilised** beyond the project's lifetime.

7. KER 1 – Repository of Educational 3D Assets

Leading Partner: Brainstorm Multimedia (BRA)

7.1 Overview and Rationale

The **Educational Content Repository (ECR)** is a web-based platform integrated with the **Edison Virtual Studio (EVS)**, designed to support the creation, sharing, and delivery of immersive virtual lessons. It directly addresses a key limitation in digital education: the **scarcity of accessible, thematic 3D assets** for teachers and institutions seeking to implement virtual learning environments.

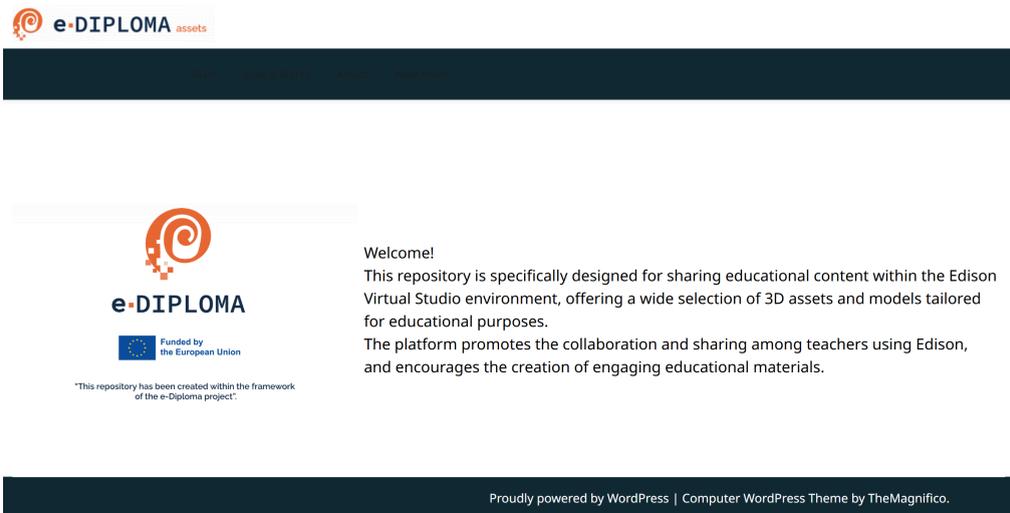


Figure 1. Educational Content Repository (ECR)

By offering an intuitive repository connected to EVS, the KER facilitates hybrid education models and lowers the technical and economic barriers for educators adopting immersive teaching.

7.2 Problem Statement

Current educational environments often lack the technical resources and content variety required to design engaging virtual lessons.

Teachers –particularly in non-technical disciplines such as Humanities or Social Sciences– face challenges in accessing suitable 3D materials and depend on costly external providers or complex workflows. Moreover, institutional bureaucracy and limited technical literacy among educators further restrict the adoption of virtual production tools.

The **ECR** directly mitigates these barriers by creating a curated repository that incentivises collaboration and supports a growing community of EVS users.

7.3 Alternative Solutions

While several technologies allow teachers to incorporate virtual classrooms and digital objects into their lessons, these solutions often present significant barriers in terms of **cost, accessibility, and usability**.

The acquisition of diverse 3D assets remains prohibitively expensive, especially for educators in non-technical disciplines such as **Social Sciences, Law, History, or Linguistics**, who are generally less familiar with searching for, downloading, and integrating digital materials into their lessons. In many cases, the difficulty of finding suitable 3D content for these subjects discourages educators from using immersive resources altogether.

Current alternatives include paid online repositories such as **Teachers Pay Teachers, TES, and Share My Lesson**, which offer lesson plans, worksheets, and general teaching materials. However, these platforms **lack a specific focus on 3D assets and immersive models**, and they are not integrated with **virtual production tools** such as Edison Virtual Studio (EVS). Some universities have internal 3D content creation services, but these are typically **time-consuming, fragmented, and costly**, limiting their scalability and responsiveness to educators’ day-to-day needs.

As a result, many teachers rely on external technical staff or abandon the use of 3D materials altogether, restricting the potential for truly **immersive, interactive, and engaging virtual classrooms**.

7.4 Unique Value Proposition

The ECR is the **first repository specifically tailored to the Edison Virtual Studio ecosystem**, offering:

- Seamless integration with EVS for direct import of assets into virtual lessons.
- A wide selection of **subject-oriented 3D models and educational content** (PowerPoints, videos, images, PDFs).
- User-friendly tools to allow teachers and students to **create and share their own 3D assets** from images or videos.
- A **community-driven model** promoting collaborative creation and reuse of educational materials.
- Optional freemium licensing to ensure scalability and long-term sustainability.

This combination transforms EVS into a complete ecosystem for **immersive, accessible, and collaborative digital education**. A detailed description of the repository can be found in Annex 1.

7.5 Description and Functional Design

The **Educational Content Repository (ECR)** is a **cloud-based platform integrated within the Edison Virtual Studio (EVS)**, designed to support the creation, sharing, and delivery of virtual classroom lessons.

Accessible directly from EVS, the repository hosts a wide range of educational resources – including **PowerPoint presentations, images, videos, PDFs**, and, most importantly, **3D models**, which are essential for immersive virtual teaching.



Figure 2. Library of 3D Assets

Users can **search and filter** content by discipline, topic, or asset type; **download** existing materials; or **upload** new ones under **Creative Commons licences**. All content is contributed by consortium members and by educational institutions using EVS, ensuring open access while maintaining proper attribution of ownership but without commercialising the materials.

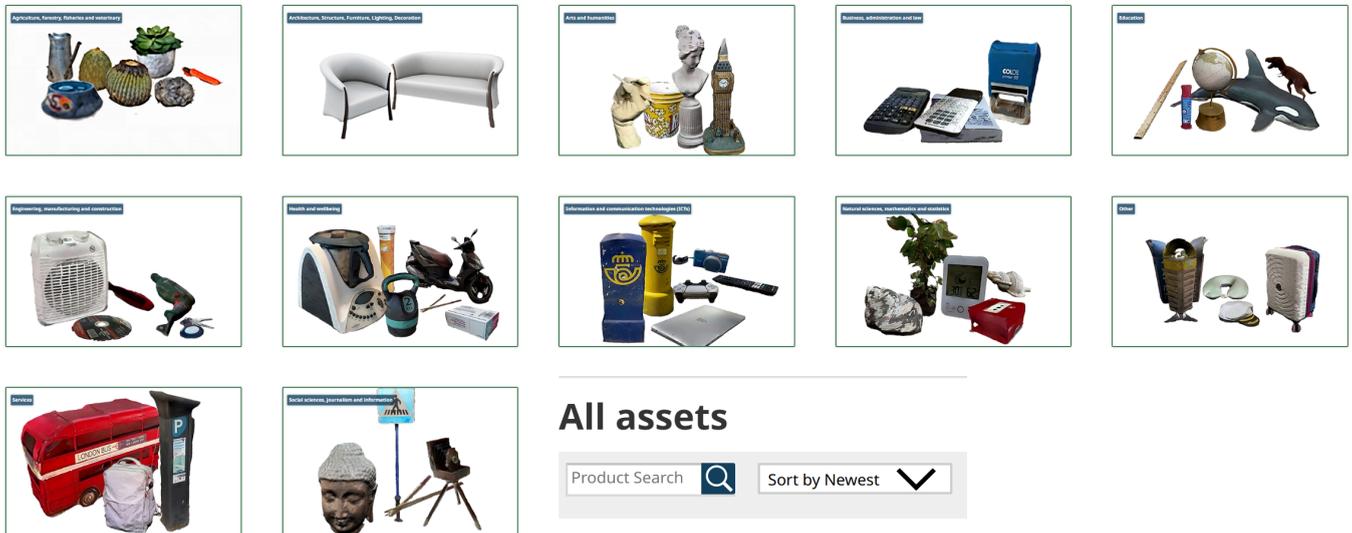


Figure 3. Search and filter content by categories

The repository represents the **first dedicated platform for educational content sharing within the EVS ecosystem**, making it significantly easier for teachers to configure, customise, and deliver interactive virtual lessons. It also includes **built-in tools for generating 3D assets from videos and photos**, empowering both teachers and students to create and contribute their own materials and thus continually enrich the repository’s content.

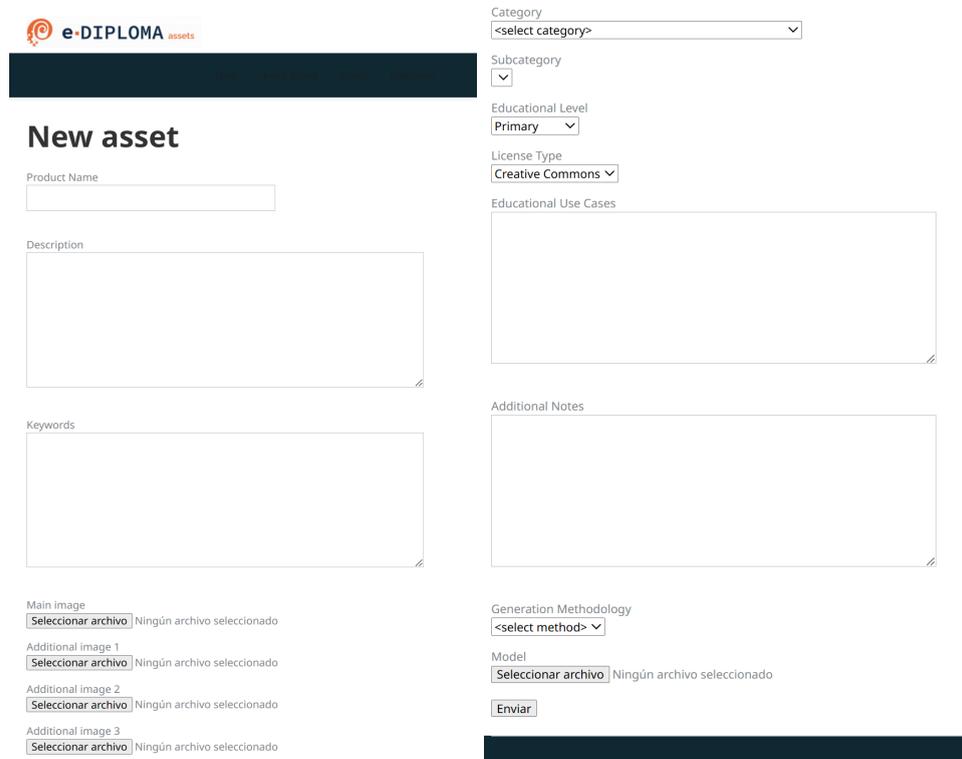


Figure 4. Built-in tool for generating 3D assets

While the repository's primary purpose is to enhance EVS's educational value and drive adoption across academic institutions, an **activation fee** will support the long-term maintenance and updates of the module. Although initially focused on education, its **modular design** allows future expansion into adjacent sectors such as **gaming, film, and advertising**, where high-quality 3D content is increasingly in demand.

The **prototype was validated by Edison users at the University of Alicante (UA)**, an external collaborator of the project. Feedback from these sessions was incorporated into the final version, improving usability and functionality. A detailed **report of the validation activity and results is included in Annex II** reflecting how user insights informed the repository's final design and performance.



Figure 5. Validation of the ECR at the UA

7.6 Target Market and Early Adopters

To ensure the sustainability and scalability of the **Educational Content Repository (ECR)**, it is essential to clearly define its **target market and early adopters**.

The repository primarily addresses the **educational sector**, serving as a key enabler for the creation and dissemination of virtual classroom content enriched with high-quality 3D assets and models.

- The **primary market** comprises **educational institutions** – including **high schools, universities, and vocational training centres** – that aim to integrate immersive teaching tools into their curricula. It also caters to **content creators and instructional designers** within the educational field who seek to develop, share, and reuse 3D educational materials efficiently.
- In a second phase of expansion, the repository will extend its reach beyond education to industries such as **gaming, film, and advertising**, where the demand for realistic, reusable 3D content is continuously increasing.

This dual-phase strategy ensures that the platform not only strengthens the digital education ecosystem but also leverages the broader **commercial potential of the 3D content market**.

The success of the ECR will depend on an **initial base of early adopters**, consisting of educators and institutions already familiar with the **Edison Virtual Studio (EVS)** platform and motivated to enhance their virtual teaching capabilities.

These early adopters include **teachers from project partner institutions** – **Universitat Jaume I (UJI), Tallinn University (TLU), Delft University of Technology (TUDelft), Universitat Politècnica de València**

(UPV), and **Budapest University of Technology and Economics (BME)** – as well as **long-standing collaborators of Brainstorm**, such as the **Open University of the Netherlands (OU)**, the **University of Santiago de Compostela (USC)**, and the **University of Alicante (UA)**.

Brainstorm will grant these institutions **early access** to the repository to validate its functionality, collect feedback, and promote community-driven adoption.

Given the existing strong partnerships and direct communication channels between Brainstorm and these universities, engagement with the repository is expected to be **highly proactive**, ensuring a solid foundation for its wider market introduction and long-term sustainability.

7.7 Competitors and Market Position

Understanding the competitive landscape is key to positioning the **Educational Content Repository (ECR)** effectively within the **EdTech and immersive education** market. This section analyses existing solutions and providers that address similar needs, highlighting their strengths and limitations in comparison to the ECR.

By mapping these competitors, the consortium can better identify differentiation factors, refine its value proposition, and ensure that the repository addresses a genuine market gap rather than duplicating existing offers.

Competitors in the educational content repository space include established online marketplaces such as **Teachers Pay Teachers**, **TES**, and **Share My Lesson**, which offer a broad range of educational materials including lesson plans, worksheets, and activities. However, these platforms lack a dedicated focus on **3D assets and models** tailored for **virtual classroom environments** like **Edison Virtual Studio (EVS)**.

Although these repositories benefit from extensive user bases and content variety, their key weaknesses lie in **limited integration with virtual production tools**, **absence of 3D immersive content**, and **higher costs for premium materials**.

Additionally, some universities and specialised providers offer **custom 3D content creation services** for educational use. Yet these solutions are often **slow, costly, and non-scalable**, requiring extensive development time and complex licensing or payment processes that function independently from EVS.

In contrast, the **ECR** distinguishes itself by offering an **integrated, specialised, and user-driven solution** within the EVS ecosystem. It provides educators with direct access to a curated collection of 3D assets designed for immersive teaching, combined with tools that enable easy creation and sharing of new content.

This focus on **accessibility, integration, and collaboration** positions ECR uniquely within the market.

Competitor	Main Features	Limitations vs. ECR
Teachers Pay Teachers / TES	Paid repositories for educational materials	No focus on 3D assets or VR/AR integration
University internal repositories	Bespoke services for 3D creation	Slow, fragmented, non-scalable
Commercial 3D marketplaces (e.g., Sketchfab, Turbosquid)	High-quality 3D models	Not tailored for education or EVS integration

Competitive advantage: The **ECR** combines **specialisation** (education and virtual teaching focus), **integration** (native EVS compatibility), and **community participation** (educator-driven content sharing).

This unique combination is **not available in any other platform**, giving the repository a strong competitive edge and a clear path to long-term sustainability and adoption.

7.8 Go-to-Market and Use Model

Once the repository's unique positioning and competitive advantage are established, the next step involves defining a **viable go-to-market and use strategy** that ensures both sustainability and scalability. The **Educational Content Repository (ECR)** operates as a **web-based platform integrated within Edison Virtual Studio (EVS)**, allowing educators to access, manage, and contribute educational materials specifically designed for virtual classrooms.

7.8.1 Use Model

The ECR follows a **freemium business model** combining open access and subscription elements.

A selection of educational resources – including PowerPoint presentations, images, videos, PDFs, and 3D models – will be freely accessible to all EVS users, while **advanced functionalities and premium content** will be available through an **annual activation fee (€1,500 per institution)**.

This model guarantees financial sustainability while maintaining inclusivity for educators and institutions with varying resource levels.

Educators and contributors can upload their own materials, enriching the repository through a **community-driven approach** that promotes sharing and collaboration across the EVS ecosystem. This participatory dynamic ensures the repository's continual growth and relevance, making it a **living platform** for innovation in virtual education.

Integration and Access

- The ECR is fully integrated as an **optional module** within EVS, accessible directly from its interface.
- Users can browse and filter content by subject, discipline, or format; download assets; or contribute new ones under **Creative Commons licences**.
- Contributors retain content ownership, with attribution ensured through metadata tagging.

Marketing and Promotion

The platform will be marketed primarily to **educational institutions, individual educators, and organisations involved in virtual and immersive education**.

Outreach activities will include:

- Demonstrations and webinars led by Brainstorm's educational partners.
- Targeted campaigns at EdTech fairs and academic conferences.
- Online tutorials, success stories, and partner showcases.

Scalability and Ecosystem Integration

New institutions can join via institutional licences or bundled EVS subscription packages, facilitating rapid adoption and expansion.

In parallel, Brainstorm will explore opportunities to extend the repository to adjacent sectors such as creative industries, gaming, and advertising, where demand for reusable 3D content continues to grow.

7.8.2 Go-to-Market – Timing

The **market launch timeline** for the ECR is directly aligned with the project's conclusion to ensure a seamless transition from prototype to commercial deployment.

A **beta version** will be released at the project's end, followed by a **six-month validation phase** involving pilot users and early adopters. During this period, the platform will accumulate a **minimum of 120 assets** across at least **six educational categories**, ensuring a rich initial offering.

Following this validation stage, the **full market launch** will open the repository to all EVS users and partner institutions.

This phased approach balances the need for an early response to the scarcity of immersive educational content with the importance of guaranteeing platform stability, content diversity, and user satisfaction.

Parallel efforts in **content curation, infrastructure optimization, and marketing activation** will support a smooth market entry and sustained post-project growth.

7.9 IPR Background and Foreground

The **Edison Virtual Studio (EVS)** solution constitutes the **IPR background** for the Educational Content Repository (ECR).

Developed by **Brainstorm Multimedia**, EVS serves as the foundational platform integrating the web-based repository for educational content, including PowerPoint presentations, photos, videos, and, most importantly, 3D models essential for immersive and interactive teaching.

While the ownership of uploaded content will be properly acknowledged, the repository itself will not be commercialised as a standalone product. Instead, it will operate as an **integrated module within the EVS framework**, enhancing its functionality and value for educational users.

Early adopters and partner institutions will be granted **complimentary access** to this module under renewable annual agreements. All assets contributed to the repository will adhere to **Creative Commons licences**, ensuring transparency, standardisation, and fair use across all users while safeguarding both individual ownership and collaborative innovation.

To ensure proper protection and long-term exploitation of the repository and its associated tools, several **intellectual property management activities** have been defined. These will be refined in line with the **marketing and exploitation analyses** presented in Deliverable D8.5. The main actions include:

- 1. Copyright Protection:**
Protect the creative elements of the solution – including software code, user interfaces, and educational resources – through copyright registration, establishing a clear record of ownership.
- 2. Confidentiality and Non-Disclosure Agreements (NDAs):**
Apply NDAs when sharing proprietary information or collaborating with third parties. All employees, contractors, and partners will be required to sign NDAs to prevent unauthorised use or disclosure of confidential material.
- 3. Clear Intellectual Property Policies:**
Define and communicate transparent internal and external IP policies outlining the rules on protection, ownership, and responsible use of the repository's intellectual assets.

This approach guarantees that the intellectual property generated within the ECR ecosystem remains protected, traceable, and exploitable, while fostering open collaboration within the educational community.

7.10 Exploitation Roadmap

The **Exploitation Roadmap** translates the strategic vision of the Educational Content Repository (ECR) into a series of **concrete post-project actions**, ensuring that the platform evolves from a validated prototype into a fully operational and commercially viable service.

This roadmap provides a timeline of activities, responsibilities, and milestones to guarantee **continuity, scalability, and market readiness** in the months following the end of the project.

7.10.1 Short-Term Actions (0–6 months after project completion)

These actions are designed to consolidate the business foundation, secure intellectual property, and prepare the repository for public release:

1. **Finalisation of the Business Plan:**
Refine the business model, update the financial plan, and validate revenue streams. Identify new potential clients and outline marketing strategies.
2. **IPR Protection:**
Complete all required intellectual property registrations, including software copyrights and licensing protocols for educational content.
3. **Validation and Beta Launch:**
Deploy the beta version with pilot universities to test usability and collect performance KPIs.
4. **Authorization and Certification:**
Secure regulatory approvals and technical certifications required for commercialization and data protection compliance (e.g., GDPR).
5. **Partnership and Collaboration Agreements:**
Formalize strategic partnerships with universities, content creators, and technology providers to expand adoption and enrich the repository’s asset base.
6. **Infrastructure Setup and Market Launch:**
Complete infrastructure deployment to ensure platform reliability and initiate the first open-access phase, providing free access to 10 % of available content.

Action	M-3	M-2	M-1	M+1	M+2	M+3	M+4	M+5	M+6	Milestone
1. Business Plan Finalisation						✓				Milestone 1
2. IPR Protection							✓			Milestone 2
3. Authorisations and Certifications								✓		Milestone 3
4. Partnership and Collaboration										
5. Infrastructure Setup & Launch									✓	Milestone 4

7.10.2 Roles

Brainstorm Multimedia will coordinate and execute most actions in this roadmap, including the finalisation of the business plan, IPR protection, infrastructure setup, and market launch.

For the establishment of partnerships and collaborations (Action 5), **external consultancy support** may be engaged to facilitate institutional agreements and outreach campaigns.

A specific budget allocation will cover these services to ensure a smooth and timely execution.

7.10.3 Milestones and KPIs

- **Milestone 1 (3 months):** Business plan finalised and at least 5 potential institutional clients identified.
KPI: Business plan completed; initial client pipeline established.

- **Milestone 2 (4 months):** Intellectual property protection completed, including copyright filings.
KPI: All necessary copyright registrations submitted.
- **Milestone 3 (5 months):** Authorisations and certifications obtained for platform release.
KPI: All compliance and security standards approved.
- **Milestone 4 (6 months):** Repository launched within EVS, providing open access to 10 % of its content and full institutional access through activation licence.
KPI: Platform live; ≥ 120 assets across 6 educational domains; first 10 registered institutions.

7.10.4 Medium-Term Actions (6–18 months)

To consolidate market presence and scale up adoption, the following medium-term goals are defined:

1. Expand repository content to **≥ 120 assets** across at least six academic areas.
2. Establish new strategic partnerships with content creators and EdTech companies.
3. Implement an international marketing campaign targeting **≥ 50 institutional clients**.

7.10.5 Key Performance Indicators (KPIs):

- Number of registered institutions.
- Number of uploaded assets and downloads.
- User engagement rate (active sessions/month).
- Revenue generated from activation fees and licensing.

7.11 Financial Outlook

A sound financial perspective is essential to ensure the **long-term sustainability** and **scalability** of the Educational Content Repository (ECR). This section presents the estimated costs, revenue projections, and additional sources of funding required to implement the exploitation roadmap effectively.

The projections cover the **first and third years after the project's completion**, reflecting the transition from early exploitation to market expansion.

- **Year 1**
 - Business plan finalisation: €10,000
 - Intellectual property protection: €15,000
 - Authorisations and certifications: €20,000
 - Total: €45,000**
- **Year 3**
 - Marketing and promotion: €30,000
 - Infrastructure scaling: €50,000
 - Total: €80,000**

These costs guarantee a smooth transition from prototype to market-ready platform, ensuring technical stability, brand positioning, and continued stakeholder engagement.

7.11.1 Revenues

The revenue model is based on the **integration of the repository as a paid module within the Edison Virtual Studio (EVS)**, following a **freemium approach**.

Approximately **10 % of the repository content** will be freely accessible to all EVS users, while full access will be offered under an **annual activation licence priced at €1,500 per institution**.

- **Year 1:**
Revenue from initial institutional subscriptions (5 clients × €1,500) → **€7,500**
- **Year 3:**
Revenue from expansion phase (50 clients × €1,500, assuming 50 % conversion rate) → **€75,000**

Projected profit:

After deducting operational costs, an estimated **€45,000 net profit** is anticipated by Year 3, supporting reinvestment in infrastructure upgrades, marketing, and content development.

7.11.2 Other Sources of Coverage

To complement revenue streams and support early-stage exploitation, the consortium anticipates a combination of **internal and external funding sources**:

- **Partners’ own investment:** €50,000 allocated for initial operational continuity.
- **Additional project grants or loans:** €10,000 secured through public innovation funding mechanisms.
- **Timing:** These resources will be mobilised during the final stages of the project to ensure a seamless transition into the commercialization phase.

Year	Activity	Estimated Cost (€)	Expected Revenue (€)
Year 1	Business plan, IPR protection, validation	45,000	7,500
Year 3	Marketing, infrastructure scaling	80,000	75,000

This diversified funding strategy mitigates early financial risks, strengthens the sustainability of the exploitation plan, and reinforces Brainstorm’s capacity to scale the ECR in the global educational technology market.

7.12 Risk Assessment and Mitigation

As with any innovative digital solution entering a competitive and fast-evolving market, the success of the **Educational Content Repository (ECR)** relies on anticipating, monitoring, and mitigating potential risks that could affect its exploitation, market uptake, or technological sustainability.

A comprehensive **Risk Assessment Map** has been developed to identify, categorise, and evaluate these risks based on their **importance (A), probability (B), combined risk grade (C), potential intervention (D), and feasibility of mitigation (E)**.

This systematic approach ensures that all foreseeable challenges—technological, market-related, legal, and financial—are properly addressed to support the long-term impact and scalability of the ECR.

Most of the identified risks present **low to medium levels of probability and impact**, as the repository builds upon **Edison Virtual Studio (EVS)**, an existing and proven platform. Only one risk—**competition from established learning platforms**—has been classified as requiring **active mitigation**, as it could affect market share and user adoption in the medium term.

Description of Risks	A	B	C	D	E	Conclusion
Partnership Risk Factors						
1. Product is to be exploited only by BRA, so no partnership risks are identified.	1	1	1	-	-	No Action
Technological Risk Factors						
2. Technological integration with Edison Virtual Studio (EVS): ensuring seamless compatibility between ECR and EVS, considering potential updates or changes in technical requirements.	10	1	10	-	-	No Action
3. Rapid technological advancements making the product obsolete.	8	1	8	-	-	No Action
4. Platform reliability: risks associated with technical glitches, server outages, or performance issues that may disrupt access or user experience.	7	2	14	-	-	No Action
Market Risk Factors						
5. Dependency on content providers: delays, quality inconsistencies, or ownership disputes due to reliance on third-party material providers.	8	5	40	-	-	No Action
6. Competition from established learning platforms: strong competitors may offer similar or more comprehensive repositories.	8	8	64	(*)	9	Action!
7. Changing educational trends requiring continuous updates to remain relevant.	-	-	-	-	-	Not Filled
8. Limited awareness of EVS in the education sector leading to slow adoption.	6	4	24	-	-	No Action
9. Economic downturn affecting educational institutions' budgets for new technology investments.	8	4	32	-	-	No Action
IPR / Legal Risk Factors						
10. Data security and privacy: ensuring GDPR compliance and safeguarding user data against unauthorised access.	8	2	16	-	-	No Action
11. Copyright infringement: preventing international IP violations or misuse of third-party/user-generated content.	6	3	18	-	-	No Action
12. Licensing agreements: ensuring clear and enforceable agreements to avoid legal conflicts over ownership or royalties.	8	1	8	-	-	No Action
Financial / Management Risk Factors						
13. Resource allocation: ensuring sufficient human, financial, and technical resources for ongoing operations, marketing, and support.	9	3	27	-	-	No Action
Environmental / Regulation / Safety Risk Factors						
14. Regulatory compliance: adhering to accessibility, moderation, and sector-specific regulations for online education content.	8	3	24	-	-	No Action
15. Ethical considerations: ensuring diversity, inclusion, and safe content curation in educational materials.	7	-	0	-	-	No Action

(*) Brainstorm will focus on dissemination and intense commercial campaigns to gain a profitable market share for Edison Virtual Studio Educational repository of materials module

The overall **risk level for KER1 is low**, with only one risk (competition from established platforms) requiring ongoing mitigation through proactive commercial and dissemination strategies.

Brainstorm will continue monitoring all identified risks, updating mitigation measures as part of the exploitation governance plan to ensure that the **Educational Content Repository** remains technologically robust, legally secure, and commercially competitive.

7.13 Expected Impact in 3 Years

The implementation of this exploitation plan is expected to generate **significant educational, economic, and societal benefits** within three years after the completion of the e-DIPLOMA project.

The integration of the **Educational Content Repository (ECR)** within **Edison Virtual Studio (EVS)** will not only enhance digital education but also contribute to the development of a sustainable European ecosystem for 3D learning and immersive content creation.

The anticipated impacts are summarised below.

7.13.1 Educational and Cultural Impact

The repository will play a central role in the **digital transformation of education**, promoting **3D literacy** and the practical use of immersive technologies across multiple academic disciplines. By empowering teachers and students to both use and create 3D content, it will establish a “**content creation culture**” within the educational community – fostering **creativity, collaboration, and critical thinking**. This hands-on, project-based approach will particularly benefit fields such as **engineering, architecture, design, and the arts**, where visualisation and spatial understanding are crucial.

The repository will also serve as a **bridge between disciplines**, encouraging cross-sector collaboration and sharing of resources among educators, institutions, and learners.

In doing so, it contributes to the **democratisation of access** to high-quality immersive materials and supports **lifelong learning** by integrating new digital competencies into educational practice.

7.13.2 Economic and Job Creation Impact

The ECR is expected to stimulate measurable economic growth and create new professional opportunities in the **educational technology and creative industries**.

Within three years, several areas of impact are foreseen:

- **Creation of new jobs** in 3D content design, educational media production, platform management, and customer support.
- **Emergence of specialised skill sets** in immersive education and virtual production, aligning with Europe’s digital and green transition priorities.
- **Revenue generation** through institutional activation licences (€1,500/year), premium services, and content licensing, enabling the repository to sustain itself economically.
- **Mobilisation of investments** from both public and private sectors, recognising the repository as a scalable and replicable solution for educational innovation.

These combined effects will contribute to the **growth of the European EdTech market**, positioning the ECR as a reference model for integrating immersive 3D content into formal and informal education.

7.13.3 Social and Strategic Impact

The repository promotes **equal access to digital resources**, enabling a wider range of institutions – including smaller or less digitally advanced ones – to benefit from immersive learning without requiring high technical expertise. By facilitating the reuse of educational content and promoting open standards through **Creative Commons licensing**, it also supports **environmental and economic sustainability**, reducing redundant content production.

Strategically, the ECR reinforces **Europe’s leadership in immersive education technologies**, strengthening its digital sovereignty and innovation capacity in the global EdTech landscape. It complements EU priorities on **digital skills, inclusion, and cultural diversity**, contributing to the **European Education Area** and **Digital Decade 2030** objectives.

Impact Dimension	Expected Outcome (by Year 3)	Indicator / KPI
Educational	Adoption of repository by universities and training centres across ≥ 6 EU countries	≥ 50 institutional users
Economic	Generation of sustainable revenues from activation licences and services	$\geq \text{€}75,000$ annual income
Employment	New job profiles in 3D design, digital content management, and EdTech support	≥ 10 new positions created
Social	Democratization of access to high-quality 3D educational content	≥ 120 assets in repository
Strategic	Recognition of ECR as a reference in immersive education in Europe	Participation in ≥ 3 EdTech networks or policy initiatives

Within three years, the Educational Content Repository will have evolved from a project deliverable into a **self-sustaining and socially relevant digital infrastructure**, driving innovation, inclusion, and competitiveness in Europe's educational landscape.

8. KER 2 – Block Programming Course through VR/AR

Leading Partner: Universitat Jaume I (UJI)

8.1 Overview and Rationale

The **Block Programming Course through Virtual and Augmented Reality (VR/AR)** developed by the **Universitat Jaume I (UJI)** introduces an innovative approach to teaching programming concepts through immersive learning experiences. This KER addresses one of the persistent challenges in computer science and digital education: the difficulty that beginners face in understanding abstract programming logic. By combining **block-based programming interfaces** with **VR/AR interactive environments**, the course enhances comprehension, engagement, and knowledge retention.

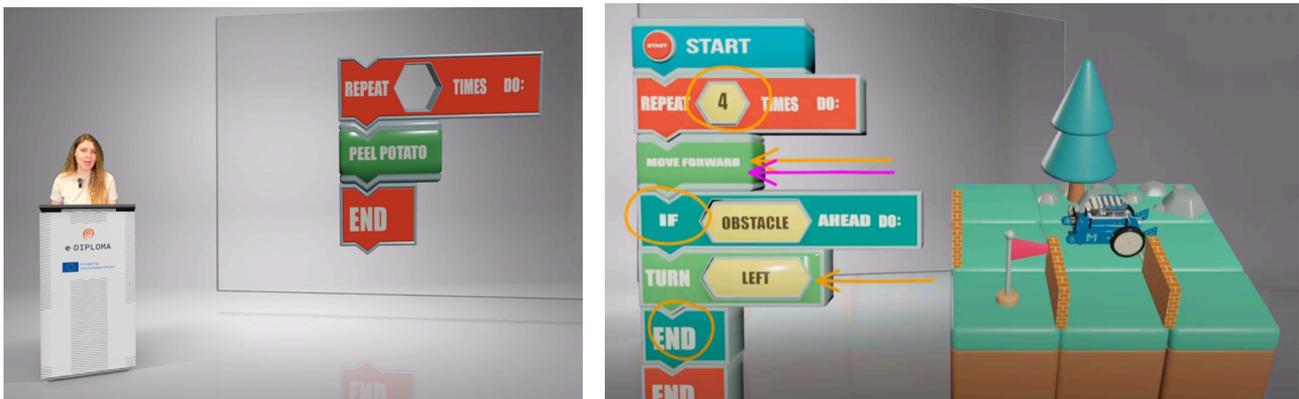


Figure 6. VR Block Programming Course

The course serves as both an **educational tool** and a **pedagogical model** that can be replicated or adapted by other universities. It leverages interactive scenarios where students can visualize programming structures and see their real-time execution in a virtual space, turning abstract logic into concrete and intuitive actions.

8.2 Problem Statement

Programming is one of the most demanded digital skills in the current labour market, underpinning the growth of emerging sectors such as artificial intelligence, data science, and automation. However, despite its relevance, **introductory programming courses continue to suffer from high dropout rates and low student engagement**. This challenge stems primarily from the **abstract nature of coding**, which often requires learners to manipulate logical structures and syntax without an intuitive understanding of how these concepts translate into real-world actions.

Traditional teaching methods typically rely on **text-based programming exercises** and **syntax memorization**, which can discourage students with limited prior exposure to computational thinking. Educators also face persistent difficulties in offering **personalized feedback** and **interactive support** in large or heterogeneous classrooms, leading to uneven learning outcomes.

As a result, many students fail to grasp fundamental programming concepts or to see their practical application, which in turn **reduces motivation and retention rates** in computer science and technology-related studies. This educational gap contributes directly to the growing **skills shortage** in Europe's digital workforce, limiting the capacity of industries to meet increasing demands for software and automation professionals.

To address these limitations, there is a pressing need for **innovative pedagogical models** that make programming **more accessible, visual, and experiential**. By integrating **Virtual Reality (VR)** and **Augmented Reality (AR)** with **block-based programming environments**, the **VR/AR Block Programming Course** developed by the Universitat Jaume I (UJI) offers a transformative approach to programming education.

This solution allows learners to **visualize algorithms and data flows** in real time, interact with virtual objects that respond to code execution, and develop programming logic through immersive experimentation rather than abstract syntax. In doing so, it bridges the gap between **conceptual understanding and practical application**, fostering deeper engagement, creativity, and problem-solving skills.

Ultimately, this KER aims to **redefine the way programming is taught**, helping educational institutions overcome traditional barriers and preparing a new generation of students with the digital competencies required for Europe’s technological future.

8.3 Alternative Solutions

A number of existing platforms offer simplified approaches to programming education through **visual and block-based interfaces**. Tools such as **Scratch**, **Blockly**, **Tynker**, and **MIT App Inventor** (<https://appinventor.mit.edu>) have made programming more accessible to beginners by eliminating syntax barriers and focusing on logical sequencing and event-driven thinking. These environments allow users—particularly children and young learners—to build simple applications by connecting visual code blocks, thus facilitating an early introduction to computational logic.

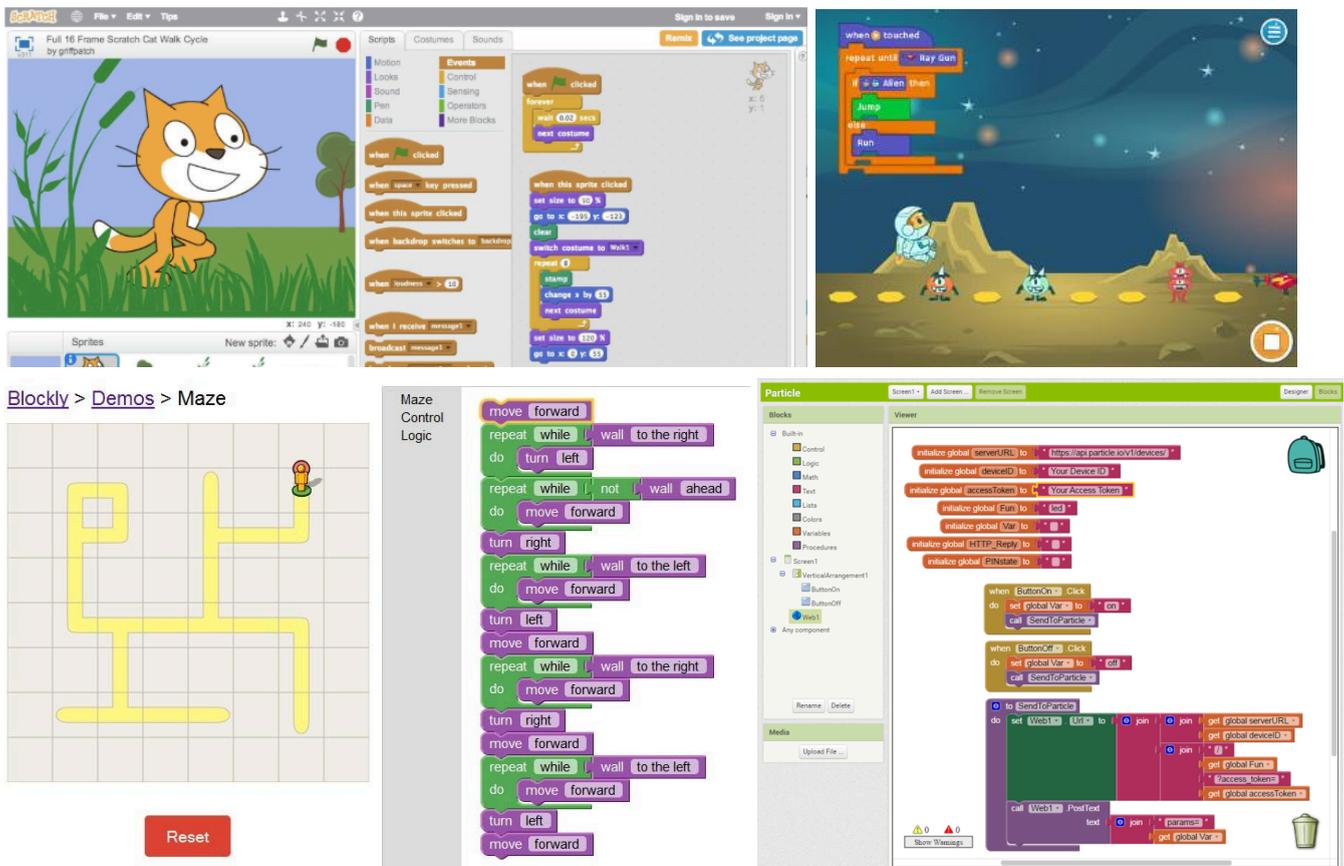


Figure 7. Alternative solutions (Scratch, Blockly, Tynker, MIT App Inventor)

In parallel, several **online 3D visualizers** and interactive design tools, such as **WithDiode** (<https://www.withdiode.com>), provide web-based environments where users can interact with virtual objects and visual assets. However, these tools remain primarily focused on **3D visualization and prototyping**, not on the conceptual or procedural understanding of programming.

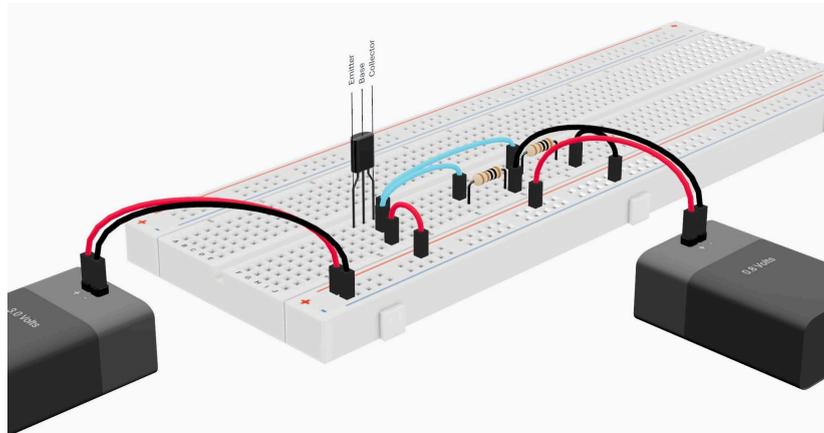


Figure 8. Alternative solutions (WithDiode)

While these existing platforms have contributed significantly to the democratization of coding education, they **lack integration with immersive technologies** such as **Virtual Reality (VR)** and **Augmented Reality (AR)**. None of them allow learners to **physically experience code execution, manipulate virtual objects through programming logic, or visualize algorithms in three-dimensional space**.

Consequently, programming continues to be taught as an abstract cognitive exercise, detached from the sensory and interactive dynamics that define contemporary learning experiences.

Some universities and research institutions have piloted **experimental VR-based programming courses**, but these initiatives are often **isolated, non-standardized, and limited in scalability**. They frequently rely on proprietary hardware or ad-hoc frameworks, making them difficult to reproduce or integrate into broader academic curricula. Moreover, they rarely incorporate a coherent pedagogical model or user-centered learning design capable of sustaining motivation over time.

The **VR/AR Block Programming Course** developed by the **Universitat Jaume I (UJI)** directly addresses these limitations. It uniquely combines:

- **Immersive interaction**, enabling students to visualize, manipulate, and test code structures within a dynamic 3D space;
- **Guided pedagogy**, providing structured exercises and feedback mechanisms designed to reinforce understanding; and
- **Cross-platform accessibility**, ensuring compatibility with both desktop and VR/AR devices for inclusive and scalable adoption.

Through this convergence of **block programming simplicity** and **immersive learning engagement**, the UJI solution redefines how programming can be taught—transforming abstract code into tangible experience, and turning passive learners into **active creators** within a virtual environment.

8.4 Unique Value Proposition

The **VR/AR Block Programming Course** introduces a **new paradigm in programming education**, merging **intuitive visual logic** with **immersive, hands-on learning experiences**. By leveraging **Virtual Reality (VR)** and **Augmented Reality (AR)**, the course transforms abstract programming concepts into **tangible**,

interactive actions, allowing students to **see, manipulate, and understand code execution** within virtual environments that mimic real-world dynamics.

Unlike traditional programming lessons—often limited to text-based exercises or 2D block platforms—this course provides a **multi-sensory, gamified, and collaborative learning environment**, increasing both **motivation and retention**.

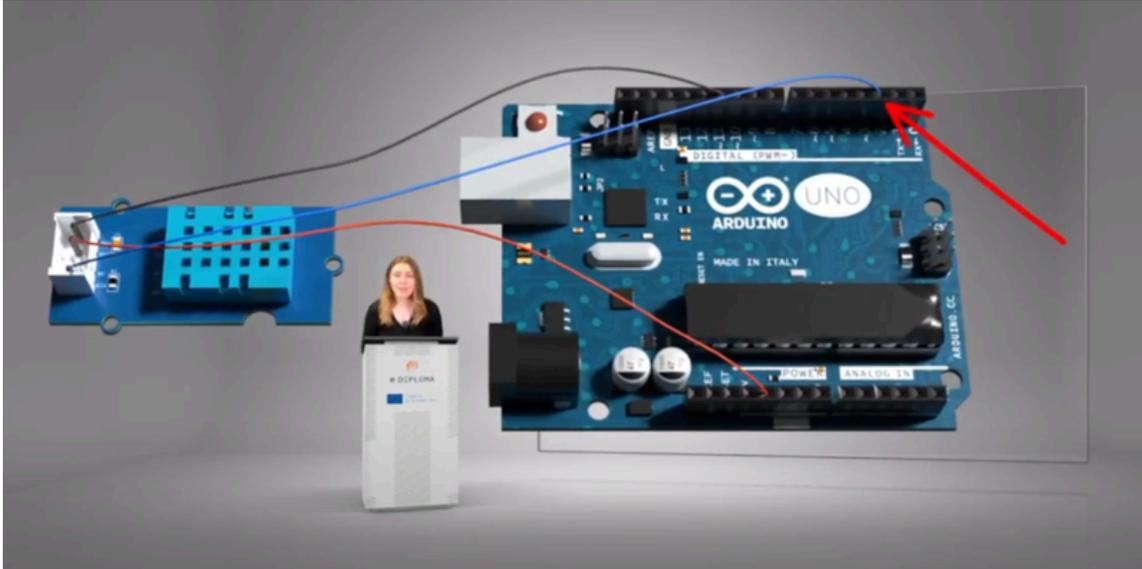


Figure 9. Collaborative learning environment

A key differentiator of this KER lies in its **co-design methodology**: the course has been **developed collaboratively with students, teachers, technicians, and education experts**, ensuring that both the content and the interactive mechanics respond directly to real classroom needs. Through this participatory approach, highly relevant features were identified to maintain **student engagement, progressive learning, and inclusive access** across educational contexts.

8.4.1 Main Differentiators:

- **Immersive Visualization:**
Students can enter a 3D environment where they manipulate programming blocks and instantly visualize the outcomes of their logic.
- **Multimodal Learning:**
The course combines visual, auditory, and kinesthetic stimuli, reinforcing comprehension through multiple cognitive channels.
- **Gamification and Motivation:**
Game mechanics and achievement systems sustain learner engagement, fostering persistence and curiosity through challenge-based progression.
- **Scalable Integration:**
Designed for straightforward incorporation into existing curricula, compatible with both desktop and standard XR devices, ensuring broad accessibility and low implementation barriers.
- **Inclusivity and Accessibility:**
Suitable for learners of different ages, backgrounds, and levels of prior experience, promoting equal opportunities in digital education and coding literacy.
- **Pedagogical Validation:**
The methodology has been tested in **real classroom environments at Universitat Jaume I (UJI)**,

with **positive feedback from both students and educators**, confirming its usability and learning impact.

The course's unique value lies in **its fusion of immersive technology, evidence-based pedagogy, and participatory design**, positioning it as a **pioneering educational asset in the field of immersive programming learning** and a scalable reference model for future digital education initiatives.

8.5 Description and Functional Design

The **VR/AR Block Programming Course** is an **interactive e-learning solution** designed to make programming learning **engaging, visual, and immersive**, addressing the persistent challenge of low student motivation in introductory programming courses.

While traditional platforms such as MIT App Inventor and WithDiode offer either visual programming tools or online 3D visualization, none provide the **immersive, game-like experience** or **pedagogical depth** required to sustain engagement and improve learning outcomes.

To overcome these limitations, the course combines **block-based programming logic** with **immersive environments** powered by **Virtual and Augmented Reality (VR/AR)** technologies. It allows students to **build and manipulate code structures in real time**, visualize their execution in three dimensions, and understand fundamental programming principles – such as loops, conditions, and event handling – through active experimentation.

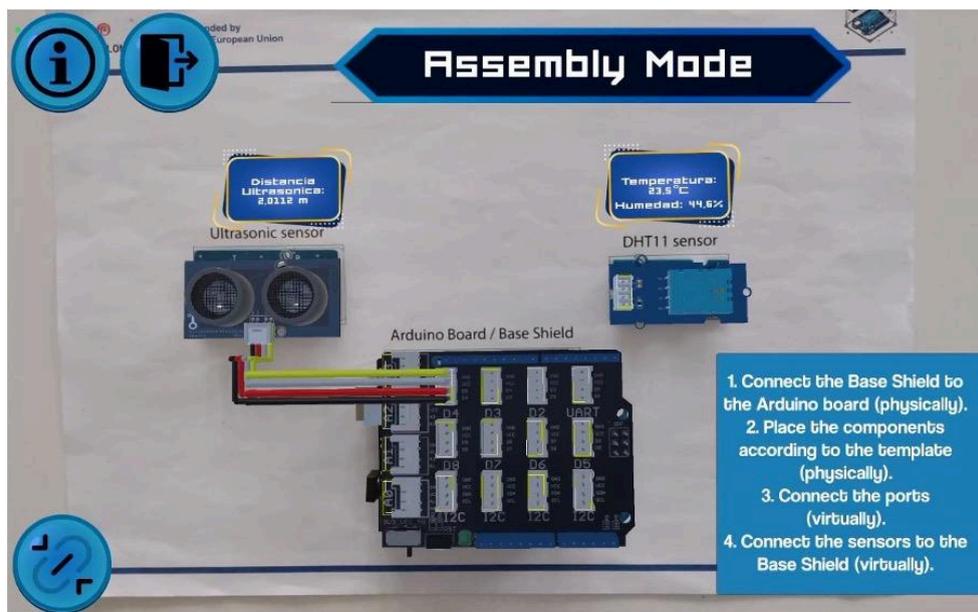


Figure 10. Example of an interactive activity in the Components Mode

The course is structured into **progressive learning modules** that follow a **step-by-step pedagogical sequence**, from basic algorithmic thinking to more advanced computational concepts. Each module includes:

- **Immersive VR/AR sessions** where learners interact directly with virtual environments to observe how their code affects digital objects and processes;
- **Guided exercises** supported by contextual hints and real-time visual feedback;
- **Automated assessments** and gamified challenges to reinforce retention and reward progress.

The platform integrates **instructor-led sessions, discussion forums, and progress tracking dashboards**, allowing teachers to monitor performance and dynamically adapt learning pathways. It is compatible

with **low-cost VR devices** and can operate both **locally and through a web-based interface**, ensuring **flexible access** and scalability across different educational settings.

In addition, the design of the course is grounded in a **co-design methodology**, involving active collaboration between students, teachers, technicians, and educational experts. This participatory approach ensures that the course's **content, mechanics, and interaction design** are aligned with learners' real needs and educational contexts, reinforcing engagement and sustained progression.

By merging **pedagogical structure, immersive interaction, and inclusive accessibility**, the course stands as a **replicable model** for modern programming education – adaptable to universities, online learning platforms, and lifelong training initiatives seeking to integrate immersive technologies into their curricula.

8.6 Target Market and Early Adopters

Understanding the target market and identifying early adopters are key to ensuring the **scalability and sustainability** of the **VR/AR Block Programming Course**.

This section outlines the primary and secondary user segments most likely to adopt the solution, as well as the initial institutions expected to validate and promote its use. The target groups reflect the growing need for **innovative, immersive methods in programming education**, and align with Europe's broader digital transformation and upskilling agenda.

8.6.1 Target Market

The **primary market** for this course consists of **higher education institutions**, including **universities, polytechnics, and colleges**, which are increasingly looking for innovative ways to teach programming and computer science. These institutions are under strong pressure to **modernize their curricula** and align them with the evolving **digital economy**, where immersive technologies and interactive pedagogy are becoming critical tools.

The VR/AR Block Programming Course can be easily integrated into undergraduate and postgraduate programs in **Computer Science, Engineering, Information Technology, and Digital Media**, providing students with **hands-on skills** directly applicable to emerging job profiles in software development, AI, and XR applications.

Vocational Education and Training (VET) centres represent another strategic target. These institutions specialize in **practical, career-oriented training**, and integrating VR/AR modules into programming courses offers students a tangible and engaging way to connect theory and practice. By using immersive environments, VET learners can develop technical skills in real-world simulations, improving employability in **technology-driven sectors** such as automation, robotics, and creative industries.

Adult education and professional training centres form a third target segment. With the fast pace of technological change, professionals from diverse fields are increasingly seeking **reskilling and upskilling opportunities**. The course's immersive format provides an intuitive, low-barrier way to learn programming, particularly for **adult learners without prior coding experience**, helping them stay competitive in evolving labour markets.

The **secondary market** includes **training centres, EdTech providers, and online learning platforms** aiming to expand their offering with innovative STEM content and interactive programming modules. This diversification will enable the course to reach broader audiences beyond formal education, including **corporate learning environments** and **digital bootcamps** focusing on digital literacy and XR-based skills development.

8.6.2 Early Adopters

The first adopters of the VR/AR Block Programming Course are expected to emerge from the **existing academic and innovation network of Universitat Jaume I (UJI)**, particularly among partners involved in the **e-DIPLOMA project**.

These include:

- **Tallinn University (TLU)** – providing pedagogical feedback and testing integration within teacher training frameworks;
- **University of Naples Federico II (UNINA)** – supporting evaluation and cross-disciplinary implementation in digital education courses;
- **Brainstorm Multimedia (BRA)** – contributing with technical feedback and integration insights from the perspective of immersive content production.

Additional early adopters are expected among **UJI's extended academic collaborators** and **partner institutions** in Spain and across Europe, which are already active in digital education experimentation. The **initial market deployment** will focus on **Spanish and European higher education**, where institutional readiness and policy frameworks (e.g., Digital Education Action Plan, Higher Education Pact) provide a fertile environment for adoption.

As **VR/AR devices become more affordable** and **digital literacy increases**, the course is expected to expand progressively to **international markets**, particularly those prioritizing **STEM education reform and immersive learning adoption**.

8.7 Competitors and Market Position

Understanding the competitive landscape is key to defining the market positioning of the **VR/AR Block Programming Course** and to highlighting its unique differentiators. Currently, a number of solutions address basic programming education, but few integrate **immersive learning methodologies** or **pedagogical validation** within **extended reality (XR) environments**.

Platforms such as **Scratch, Blockly, or Tynker** dominate the field of introductory programming education. They offer **block-based, visual learning environments**, which are highly accessible but limited to **2D interaction** and **flat, screen-based engagement**. In parallel, **commercial VR platforms** such as **EngageVR** and **ClassVR** provide virtual classroom experiences; however, they do not focus on programming education or the teaching of algorithmic thinking. Their virtual environments are designed for general educational use, lacking the structured, logic-based activities essential to programming.

Other competitors include **universities and higher education institutions** developing internal pilot courses on VR or AR for coding. While these prototypes often demonstrate strong research value, they remain **non-commercial, non-scalable, and limited in accessibility**. In this specific case, the **target market also represents a potential competitor**, since institutions capable of developing digital courses could, in theory, design their own alternatives. Nonetheless, most lack the **technical, content integration, and XR expertise** necessary to deliver a fully functional and pedagogically validated product.

The **UJI course**, by contrast, occupies a **unique niche** that combines **immersive technology, validated pedagogy, and scalable deployment**. It stands out as the **first replicable and accessible VR/AR-based programming curriculum**, designed to enhance student motivation, engagement, and learning outcomes across diverse educational contexts.

Competitor	Main Features	Limitations vs. UJI KER
Scratch / Blockly / Tynker	Block-based learning environments	Lack of immersive or 3D interactivity
EngageVR / ClassVR	General virtual education environments	No programming logic integration
Custom university pilots	Research-oriented prototypes	Non-commercial, limited scalability
VET and higher education institutions	Existing programming course	Lack of immersive XR experiences and gamified pedagogy

The **VR/AR Block Programming Course** combines **pedagogical structure, immersive engagement, and validated design**, creating a scalable and adaptable product that bridges the gap between traditional programming education and next-generation immersive learning. Its blend of **academic credibility, technological robustness, and replicability** makes it a leading innovation in the European EdTech landscape.

8.8 Go-to-Market and Use Model

The **use model** for the VR/AR Block Programming Course is centred on **institutional adoption** rather than individual subscriptions. The course is primarily aimed at **universities, vocational training centres, and educational institutions** seeking to integrate immersive programming content into their curricula. It is conceived as an **added-value component** within academic programmes, where impact will be measured through the **number of enrolled students** and the **rate of course completion**, rather than through direct sales volume.

The model focuses on providing structured access and scalability within the educational ecosystem. It includes different licensing options that balance accessibility for validation partners and long-term sustainability through institutional participation.

Access Model	Description
Academic license	Free access for validation partners and research purposes
Institutional license	Annual fee (~€2,000 per institution) for full course package
Integration model	Option for inclusion in national or regional educational portals

Once its differentiation and validation are confirmed, the go-to-market strategy will prioritise **gradual** institutional integration across higher education and vocational training networks.

During the **first year**, the course will be offered to **academic and research partners** on an open-access basis, allowing them to test and refine the learning experience.

From the **second year onwards**, the **institutional license model** will be deployed, targeting universities, training centres, and EdTech providers interested in adopting immersive STEM learning tools.

Marketing and dissemination activities will focus on:

- Presentations at **academic conferences** and **EdTech fairs**;
- Collaboration with **ministries of education, innovation agencies, and European digital skills initiatives**;
- Strategic partnerships to promote **inclusion in national or regional educational portals**;
- **Localization of content** into multiple European languages (English, Spanish, Italian, Estonian) to expand reach and facilitate adoption across Europe.

This approach ensures a **progressive and sustainable market rollout**, aligning with institutional readiness and the growing **accessibility of XR technologies** in the educational sector.

8.9 IPR Background and Foreground

The **UJI team** contributes exclusively with the **knowledge, expertise, and pedagogical methodologies** accumulated through years of **teaching and applied research** in the fields of **computer science, educational technology, and immersive learning**. This foundation is strengthened by the **experience acquired during the co-design phase** of the project, where UJI collaborated with teachers, students, and educational experts to ensure a user-centred, pedagogically coherent approach.

The background intellectual property therefore resides in:

- The **didactic models** and **teaching methodologies** previously developed by UJI in programming education;
- The **research outcomes** from national and European projects related to immersive learning and digital pedagogy;
- The **expertise of the research team**, which provides a scientifically validated basis for the structure and content of the course.

All pre-existing background information has been clearly identified in the **Consortium Agreement**, ensuring that it can be safely used within the project while maintaining UJI's ownership and rights.

The **foreground IPR** refers to the assets and results **generated during the project**, which include the **course content, immersive modules, software tools, and pedagogical materials** developed specifically for this VR/AR programming course.

The content of the prototype, created and tested within the university, will be **protected through appropriate intellectual property mechanisms**, including:

- **Copyright protection** of the original course materials, visual assets, and interactive learning modules;
- **Software registration** for the digital components of the course to ensure authorship and prevent unauthorized use;
- **Licensing provisions** that define the conditions for access, modification, and dissemination within and beyond the academic community;
- **Attribution requirements** for external use, preserving UJI's recognition as the main developer and scientific owner of the course design.

UJI retains full ownership of the intellectual property generated under this KER, while maintaining open collaboration channels with academic partners under **non-commercial educational licenses** to encourage dissemination and validation.

Any future commercialization will follow the internal **UJI Technology Transfer policies** and the **IPR framework of Horizon Europe**, ensuring both protection and responsible use of the developed assets.

8.10 Exploitation Roadmap

The **exploitation roadmap** for **KER2 – Block Programming Course through Virtual and Augmented Reality (VR/AR)** defines the key actions to ensure the **successful transition from prototype to educational deployment** after the project’s completion. This roadmap combines short-term operational steps with medium-term strategic goals, ensuring the course’s long-term sustainability and market relevance.

It encompasses four main pillars: **IP protection, academic authorization, infrastructure and content deployment, and institutional collaboration** for broader adoption. The plan is designed to maintain alignment with UJI’s educational mission while leveraging Brainstorm’s immersive technologies for enhanced student engagement.

1. Intellectual Property Protection:

Secure IPR for all course content and VR/AR software modules. This includes copyright registration and internal UJI protection procedures to prevent unauthorized use.

2. Authorization and Validation:

Obtain official university approval to integrate the course into the curriculum. Ensure compliance with academic quality standards and alignment with UJI’s pedagogical framework.

3. Promotion Strategy:

Launch a targeted communication campaign through academic networks, EdTech fairs, and digital channels. Emphasis will be placed on the innovative integration of immersive technologies in programming education.

4. Infrastructure Setup and Content Development:

Establish the required VR/AR infrastructure (hardware, software, and hosting), ensuring scalability and compatibility with UJI’s and Brainstorm’s systems. Begin structured content creation, targeting at least **25% completion** of core materials by Month 6.

5. Institutional Expansion:

Establish collaboration agreements with **early adopter universities and VET centres**, deploy the course in **at least 10 institutions across 5 EU countries**, and initiate the creation of **additional modules** (e.g., AI fundamentals, robotics).

Action	M-3	M-2	M-1	M+1	M+2	M+3	M+4	M+5	M+6	Milestone
1. Intellectual Property Protection					✓					Milestone 1
2. Course Authorization and Academic Validation					✓					Milestone 2
3. Promotion and Communication Strategy						✓				Milestone 3
4. Infrastructure Setup and Content Development								✓		Milestone 4
5. Institutional Collaboration and Expansion Planning									✓	Milestone 5

8.10.1 Roles

Universitat Jaume I (UJI) plays a central role in the exploitation of the Block Programming Course through VR/AR, acting as both the **intellectual owner and academic leader** of the initiative.

UJI is responsible for defining the pedagogical framework, developing the course content, validating the learning methodology, and ensuring compliance with academic quality standards. Beyond its academic function, UJI will also oversee the **protection of intellectual property**, the **integration of the course into**

its curriculum, and the **promotion and dissemination** of results across its educational and research networks.

Through its Department of Computer Science and the e-DIPLOMA ecosystem, UJI will lead the scaling of the course to other European universities and VET centres, reinforcing its position as a pioneer in immersive and experiential programming education.

8.10.2 Milestones and KPIs

- **Milestone 1 (2 months):** Intellectual Property protection completed for course materials and software components.
KPI: Copyright and software registrations submitted; IPR ownership documented.
- **Milestone 2 (2 months):** Academic authorization and validation granted by UJI for official course inclusion.
KPI: Course approved by UJI academic board; integrated into internal learning platforms.
- **Milestone 3 (3 months):** Promotion and communication campaign launched to attract early adopters and pilot participants.
KPI: At least 3 dissemination activities completed (academic events, EdTech fairs, webinars).
- **Milestone 4 (5 months):** Infrastructure setup completed and first 25% of VR/AR content finalized and tested.
KPI: Platform operational; 25% of modules validated by pilot students.
- **Milestone 5 (6 months):** Collaboration agreements signed with early adopter institutions and expansion strategy defined.
KPI: Minimum of 5 institutional partners confirmed; roadmap for international deployment established.

8.10.3 Medium-Term Actions (6–18 months)

To consolidate market presence and ensure long-term sustainability, the following medium-term goals are defined:

1. Deploy the VR/AR Block Programming Course in **≥10 institutions** across at least five EU countries (universities and VET centres).
2. Develop **new advanced modules** covering Artificial Intelligence, robotics, and algorithmic thinking to broaden the curriculum.
3. Establish a **certification framework** endorsed by UJI and e-DIPLOMA partners to accredit learning outcomes.
4. Conduct an **international marketing and dissemination campaign** targeting **≥50 institutional clients** and EdTech stakeholders.
5. Strengthen collaboration with **industry and academic partners** to support technical updates and ensure course scalability.

8.10.4 Key Performance Indicators (KPIs):

- Number of participating institutions adopting the course.
- Number of VR/AR modules developed and validated.
- Student enrolment and course completion rates.
- User engagement metrics (average session time, interaction frequency).
- Number of certifications issued through the UJI/e-DIPLOMA framework.
- Revenue generated from institutional licensing and certification fees.

8.11 Financial Outlook

Ensuring the financial viability of the Block Programming Course is crucial for its sustainable exploitation beyond the project's duration. This section provides an overview of the **expected costs, revenues, and funding mechanisms** associated with the course's deployment and scaling.

By analysing short- and medium-term financial projections, it defines a realistic path towards economic self-sustainability, balancing public support mechanisms with institutional licensing and commercial uptake.

Financial Costs:

Year 1 (Initial Phase):

- Finalization of course content and software registration.
- Legal and administrative fees for academic authorisations.
- Initial setup and configuration of VR/AR infrastructure.

Estimated Cost: €35,000

Year 3 (Expansion Phase):

- Marketing campaigns and course dissemination.
- Maintenance and scaling of the VR/AR platform.
- Continuous updates to ensure pedagogical and technical relevance.

Estimated Cost: €60,000

Revenues:

Year 1:

- Revenue mainly derived from internal enrolments and pilot course validations.
- Improved student retention and completion rates (+20%) expected through immersive engagement.

Expected Revenue: €5,000

Year 3:

- Commercial rollout through institutional licensing (€2,000 per license).
- Broader course adoption is expected to generate +20% enrolment growth.

Expected Revenue: €50,000

Year	Activity	Estimated Cost (€)	Expected Revenue (€)
Year 1	Pilot phase, platform maintenance, translation	35,000	5,000
Year 3	Course scaling and commercial expansion	60,000	50,000

Other sources of coverage

- **Internal UJI budgets:** partial coverage from institutional funds and educational innovation programmes.
- **Public grants:** potential support through Erasmus+ Digital Education and national innovation calls.

- **External funding:** applications to educational technology and VR/AR innovation funds.

8.12 Risk Assessment and Mitigation

The risk assessment for KER2 covers a broad range of critical areas, including technology partnerships, market adoption, intellectual property, and user safety. The assessment highlights the importance of early intervention, such as securing intellectual property rights and ensuring technological compatibility, which are essential for minimizing disruptions during the course's development and deployment.

The identified risks, such as potential delays with partners or challenges related to hardware compatibility, are mitigated through proactive strategies like regular meetings with partners and thorough technical analysis. Market risks, such as the adoption of disruptive technologies, are acknowledged, with suggestions to enhance digital literacy and maintain competitive advantages through high-quality content. Overall, the intervention strategies are well planned, with clear KPIs and control measures in place to ensure success in mitigating risks and ensuring smooth course execution.

Description of Risks	A	B	C	D	E	Concl ^u sion	Potential intervention
Partnership Risk Factors							
1. Collaboration with technology providers for VR/AR integration may lead to compatibility or timeline issues.	8	6	48	-	9	Control	Meetings with technological partners aim to clarify the minimum requirements from the outset of the project to prevent compatibility issues among technologies.
2. Coordination with educational institutions for course adoption may face administrative or procedural delays.	7	7	49	-	8	Control	The ultimate course outcome will stem from collaborative design and creation efforts involving various stakeholders, guaranteeing a precise course definition. Furthermore, the course will be flexible enough to accommodate specific requirements.
Technological Risk Factors							
3. Hardware and software compatibility: risk of inconsistent performance across VR/AR devices and platforms.	7	6	42	-	8	Control	A comprehensive analysis of the technical requirements has been conducted during the course definition phase, ensuring compatibility among the various elements involved, hardware and software. However, given the ever-evolving nature of technology, continuous monitoring is necessary.
4. Maintenance and technical support: ensuring long-term stability and updates for VR/AR tools.	8	5	40	-	8	Control	As a university, UJI consistently remains at the forefront of existing technology to deliver the highest quality in its degree programs.
Market Risk Factors							
5. Slow adoption of immersive educational tools in conservative institutions.	6	6	36	-	7	Control	The market is poised to embrace technologies like VR and AR, but enhancing digital literacy and skills is essential to ensure their successful implementation. Government and policymakers play a crucial role in this regard and must be informed through technological partnerships.
6. Competition from existing e-learning and programming platforms offering alternative solutions.	8	8	64	(*)	9	Action!	Continuous monitoring of user experience, coupled with the implementation of new co-design and co-creation activities, will ensure the delivery of high-quality content, responsive customer support, and intuitive platform navigation. This competitive advantage will position us ahead of competitors.
7. Limited digital literacy among educators, slowing adoption of immersive technologies.	7	5	35	-	7	Control	
IPR / Legal Risk Factors							
8. Intellectual property ownership: risk of unclear rights over course content or co-created materials.	6	5	30	-	8	Control	Conducting a thorough audit of all course content, algorithms, software codes, and educational materials developed for VR/AR-based learning activities. Identifying and document all intellectual property assets, including copyrights, trademarks, and patents.
9. Data protection and privacy compliance for immersive learning users (GDPR).	8	6	48	-	9	Control	During the course development, comprehensive Data Management and Ethics Plans were formulated, encompassing various aspects including data privacy, security measures, and the system's robustness.
Financial / Management Risk Factors							
10. Cost management: potential underestimation of resources for platform scaling or content updates.	6	6	36	-	8	Control	To reduce expenses, we opted for open-source software and educational resources throughout the course development process. Additionally, the competitive nature of the VR market has led to cost reductions.
11. Resource allocation: ensuring sufficient human, technical, and financial resources for ongoing support.	7	6	42	-	8	Control	Establish clear budgets and objectives for each aspect of course development, and post project initiatives. Ensure that resource allocation aligns with predefined goals and targets.
Environmental / Regulatory / Safety Risk Factors							
12. Ethical and health considerations related to user well-being in immersive learning (VR fatigue, accessibility).	7	5	35	-	8	Control	The Ethics Plan incorporates a dedicated section focused on safeguarding user well-being. Furthermore, the informed consent form comprehensively outlines all potential side effects and establishes a protocol to address any eventualities.
							All protocols, regulations, and laws were documented in a report generated at the project's outset. This report undergoes regular updates to integrate emerging topics at both national and European levels.

8.13 Expected Impact in 3 Years

The implementation and large-scale adoption of the VR/AR Block Programming Course are expected to generate significant educational, technological, economic, and societal benefits within three years after the project's completion.

1. Educational Impact:

The course will increase student engagement and retention in programming education by transforming abstract coding concepts into interactive, visual experiences. This approach will improve computational thinking, creativity, and problem-solving abilities, while fostering inclusion of non-technical learners through accessible and gamified teaching.

2. Technological Impact:

By integrating Extended Reality (XR) into formal programming education, the course will accelerate the digital transformation of learning environments and strengthen institutional

capacities to implement immersive pedagogies. UJI will consolidate its leadership in XR-based education, contributing to the broader adoption of immersive tools across European universities.

3. **Economic Impact:**

The commercial deployment of the course and its licensing model will stimulate new collaborations between universities, EdTech companies, and VR/AR providers. This will lead to the creation of new services, training modules, and employment opportunities in immersive education and digital content production.

4. **Societal Impact:**

The course will democratize access to digital skills and reduce the digital divide by making programming more approachable and inclusive. Learners from diverse backgrounds—including adults and vocational students—will gain practical and employable skills, contributing to Europe’s competitiveness and digital resilience.

Overall, this KER supports the objectives of the **EU Digital Education Action Plan (2021–2027)** by fostering innovative, inclusive, and technology-driven learning ecosystems that prepare citizens for the challenges of the digital era.

9. KER 3 – Social Entrepreneurship course

Leading Partners: Budapest Metropolitan University (BME) / ARIS

9.1 Overview and Rationale

The **Social Entrepreneurship Course** developed by **BME and ARIS** aims to foster entrepreneurial mindsets oriented towards social innovation and sustainable impact.

This KER responds to the growing need for **educational programmes that integrate business acumen with social responsibility**, preparing learners to address societal challenges through entrepreneurial action.

The course combines theoretical and practical components, offering participants hands-on experiences in designing, prototyping, and implementing socially impactful business models. Its blended-learning format and focus on real-world applications make it suitable for a broad audience – from students and professionals to entrepreneurs and NGO members.



Figure 11. Business Model Canvas Exercise

9.2 Problem Statement

While social enterprises are increasingly recognized as key drivers of sustainable and inclusive growth in Europe, the knowledge and tools required to establish and manage them remain fragmented and often inaccessible. Traditional entrepreneurship education tends to prioritise profit maximisation, neglecting social impact and community value creation – a misalignment with the European Union’s strategic objective of promoting a fair, green, and inclusive economy.

Aspiring social entrepreneurs, particularly those without prior experience, often face difficulties in acquiring the practical skills needed to transform mission-driven ideas into viable business models. Existing educational resources are typically theoretical, lacking actionable guidance or opportunities to apply learning in realistic contexts. Moreover, small and medium organisations working in social innovation frequently operate without access to tailored training or mentorship.

The absence of experiential tools that simulate real-world decision-making processes further limits learners' ability to test strategies and understand the social and economic implications of their choices. As a result, there is a growing demand for immersive, hands-on educational programmes that combine social purpose with entrepreneurial innovation – empowering participants to design, implement, and scale impactful initiatives through experiential learning.

9.3 Alternative Solutions

A number of courses on Social Entrepreneurship are available across higher education institutions and online platforms. However, most of these offerings remain highly theoretical and lack interactive or experiential components. They generally rely on traditional lecture formats, static readings, and automated tests, providing limited opportunities for teamwork, co-creation, or the practical application of knowledge.

Some innovative materials, such as those developed within the *Innovative Keys for Social Entrepreneurship (IKSE)* project, demonstrate the growing academic interest in the topic. Nonetheless, even these resources face challenges in helping learners translate theoretical knowledge into actionable entrepreneurial skills.

Global learning platforms like **Coursera**, **edX**, and **FutureLearn** also feature courses related to entrepreneurship and corporate social responsibility. Yet, these programmes tend to be asynchronous, generic, and detached from the European context – particularly the policy priorities surrounding sustainability, inclusion, and social innovation. Similarly, NGO- or university-led initiatives are often project-based, limited in duration, and lack long-term scalability or continuity beyond their funding cycles.



Figure 12. Alternative Solutions (Coursera, edX, Future Learn)

Furthermore, recent AI-generated learning modules can deliver well-organised information but offer little added value in terms of interaction, creativity, or user engagement. The absence of **edutainment** – learning experiences that merge education with game-like, multimedia interactivity – limits their ability to captivate learners and sustain motivation.

In contrast, the **BME/ARIS Social Entrepreneurship Course** fills this gap by introducing a **modular, experiential learning approach** aligned with European frameworks such as **EntreComp (Entrepreneurship Competence Framework)**. It combines immersive content, gamified exercises, and collaborative activities designed to foster practical skills, creativity, and social impact – transforming traditional learning into a dynamic, co-creative experience.

9.4 Unique Value Proposition

The **Social Entrepreneurship Course** introduces a transformative approach to training the next generation of socially conscious innovators by merging **edutainment**, **Virtual Reality (VR)**, and **collaborative learning** into a unified pedagogical model – a combination not found in any existing solution.



Social enterprises and service providers frequently operate under resource constraints, where cost-efficient and scalable training solutions are essential. This course responds to these challenges by offering a sustainable, engaging, and inclusive educational framework that improves the quality and reach of social entrepreneurship training.

Its distinctive advantages include:

- **Practical Orientation:** Learners develop their own social venture projects during the course, applying theoretical knowledge to real-world challenges.
- **European Policy Alignment:** The programme is structured around EU sustainability and innovation policies, including the **Sustainable Development Goals (SDGs)** and the **European Green Deal**, ensuring direct relevance to current policy frameworks.
- **Immersive Edutainment:** By integrating VR-based simulations, gamified scenarios, and group-based interaction, the course enhances motivation and knowledge retention while fostering teamwork and creativity.
- **Hybrid Delivery Model:** Designed for both **online and in-person learning**, the course can be seamlessly implemented across universities, NGOs, and business accelerators.
- **Community Building and Mentorship:** The platform facilitates peer-to-peer collaboration and mentorship across institutions and sectors, reinforcing the European learning ecosystem for social innovation.
- **Certification and Recognition:** Participants receive a **joint BME/ARIS certificate**, validating their entrepreneurial and social innovation competences.

Together, these elements make the course a **scalable, policy-aligned, and socially impactful learning solution** – enabling both individuals and organisations to lead and sustain positive societal change.

9.5 Description and Functional Design

The **Social Entrepreneurship Course** is an innovative educational programme designed to teach the principles of social entrepreneurship through a combination of interactive learning methods and immersive technologies. It provides participants with both theoretical foundations and practical competencies to design, manage, and scale social ventures that create measurable social and economic impact.

The course employs **Virtual Reality (VR)**, **serious games**, and **group-based experiential learning** to simulate authentic business and community scenarios. These tools allow participants to make strategic decisions, analyse their outcomes, and understand the systemic implications of their choices within a risk-free environment. This **experiential learning approach** bridges the gap between theory and practice, fostering entrepreneurial thinking and problem-solving skills while maintaining high levels of engagement and motivation through **edutainment** techniques.

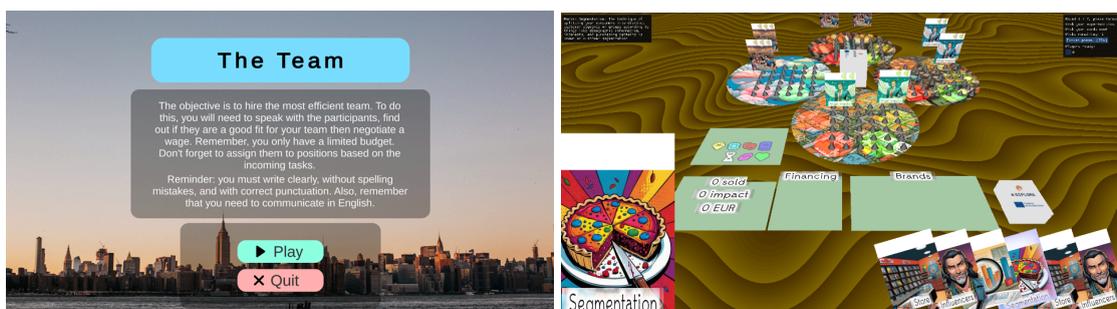


Figure 13. Example of a serious game

The programme is structured into **six thematic modules**, each addressing a core dimension of social entrepreneurship:

1. **Foundations of Social Innovation** – Introduction to the principles, values, and typologies of social enterprises.
2. **Sustainable Business Models** – Exploration of hybrid economic models balancing profit and social value.
3. **Impact Measurement** – Methods and tools for assessing social and environmental outcomes.
4. **Funding and Financial Planning** – Guidance on fundraising, investment readiness, and financial sustainability.
5. **Communication and Storytelling for Change** – Development of persuasive narratives for visibility, advocacy, and stakeholder engagement.
6. **Scaling and Policy Integration** – Strategies for replicating and embedding social innovation within broader institutional and policy frameworks.

Each module combines **interactive lectures, case studies, mentoring sessions, and VR-based simulations**, enabling participants to experiment collaboratively and learn from practice.

The course is delivered through a **dedicated online learning environment** developed by **BME**, featuring discussion forums, project templates, evaluation tools, and integrated analytics for tracking progress. This platform ensures **flexibility and adaptability**, allowing the programme to be deployed across universities, NGOs, and professional training contexts – either as a **standalone course** or as a **complementary module** within broader entrepreneurship and sustainability curricula.

9.6 Target Market and Early Adopters

The target market for the Social Entrepreneurship Course spans the rapidly evolving ecosystem of organisations and individuals engaged in **social innovation, sustainability, and community development**. While social enterprises and socially responsible business models remain at an early stage in Europe, they represent a growing market opportunity driven by EU policy priorities such as the **European Pillar of Social Rights**, the **Green Deal**, and the **Social Economy Action Plan**.

The **primary market** consists of:

- **Universities and business schools** integrate sustainability and social entrepreneurship into their curricula.
- **Accelerators, incubators, and NGOs** supporting mission-driven entrepreneurs and community-led initiatives.

The **secondary market** includes:

- **Private companies and public institutions** (e.g., local governments) seeking to embed social innovation training in their workforce development programmes.
- **Non-formal education providers** offering upskilling and reskilling courses in social value creation, management, and sustainability.

Overall, the market is expanding steadily across Europe as demand for qualified professionals in the **social economy sector** increases, positioning the course as a cost-effective, policy-aligned, and pedagogically advanced solution.

The **early adopters** will be drawn from ARIS's and BME's existing academic and professional networks, ensuring strong institutional support during the initial validation phase.

- **Budapest University of Technology and Economics (BME)** will act as the leading early adopter, offering the course as a **two-credit elective** within its entrepreneurship and innovation

curriculum. The course’s success among students will determine its long-term integration and funding continuity beyond the project duration.

- BME will also make the course available to the **business community through microcredit programmes**, targeting entrepreneurs, start-up founders, and professionals in the social innovation sector.
- Additional early adopters will include **partner institutions in Hungary, Greece, and Italy**, leveraging ARIS’s existing network of entrepreneurs, mentors, and training centres.
- **Pilot sessions and certification schemes** will be used to validate the course structure, collect user feedback, and build momentum for broader European adoption.

This multi-segment strategy ensures a **progressive and evidence-based rollout**, combining academic validation with commercial pathways for long-term scalability.

9.7 Competitors and Market Position

The social entrepreneurship education market includes a variety of well-established players – from **prestigious universities** to **online learning platforms** and emerging **gamified solutions**. Institutions such as the **University of Oxford**, the **London School of Economics**, and **Philanthropy University** offer online courses on social entrepreneurship. While these programmes benefit from strong academic reputations and comprehensive theoretical content, they are typically **non-interactive**, rely on **asynchronous reading and testing**, and lack **practical, team-based, or immersive learning components**.

Similarly, **massive open online courses (MOOCs)** such as those on **Coursera** or **edX** provide accessible and low-cost content, yet remain disconnected from European policy frameworks and lack mentoring or project-based application. Other competitors include **AI-generated course platforms** (e.g., AnyLearn), which offer adaptable content at minimal cost but no experiential learning, and **serious games** such as Basel University’s *WaterImpact* or the *e-SOCIAL* simulation, which focus on specific sustainability issues but fail to deliver a complete social entrepreneurship curriculum.

In contrast, the **BME/ARIS Social Entrepreneurship Course** integrates the most effective aspects of each approach – combining **edutainment**, **Virtual Reality**, **serious gaming**, and **collaborative learning** – into a cohesive and scalable educational solution. This ensures **active participation**, **contextualised decision-making**, and **practical skill acquisition** aligned with the **EU’s Green Deal** and **Social Economy Action Plan**.

Competitor	Main Features	Limitations vs. BME/ARIS Course
Oxford / LSE Online Courses	Reputed institutions; strong theoretical base.	Limited interactivity, no practical or team-based training.
Coursera / edX MOOCs	Self-paced, accessible online courses.	Lack European alignment, mentoring, or certification.
NGO / CSR Training Programmes	Community-based, project-oriented initiatives.	Short-term focus; limited scalability and academic recognition.
AI Course Generators (e.g., AnyLearn)	Adaptive, low-cost, automatically generated content.	No practical context or experimental learning.
Serious Games (e.g., WaterImpact, e-SOCIAL)	Gamified learning addressing specific topics.	Narrow focus; no full curriculum or VR-based engagement.

By offering a **comprehensive, immersive, and policy-aligned learning experience**, the **BME/ARIS Social Entrepreneurship Course** establishes itself as the **first fully experiential European training model** for mission-driven entrepreneurs.

Its hybrid methodology – merging academic depth with technological innovation – provides a **competitive edge** over existing solutions, fostering **real-world impact** and **long-term scalability** in both academic and professional contexts..

9.8 Go-to-Market and Use Model

9.8.1 Use Model

The **Social Entrepreneurship Course** will be deployed through the **e-DIPLOMA platform**, a cloud-based framework that integrates interactive educational tools, VR/AR simulations, serious games, and AI-enhanced learning analytics. The platform provides an intuitive, scalable environment for delivering immersive educational experiences while maintaining compatibility with existing academic and institutional systems.

The **use model** follows a **subscription-based or pay-per-course structure**, ensuring a continuous revenue stream. Educational institutions, NGOs, and socially conscious businesses will be able to **license access** to the course, while individual learners can **enroll directly** through the platform. The content, including interactive modules, simulations, and assessments, will only be fully accessible within the e-DIPLOMA environment, encouraging sustained platform engagement and reducing the risk of content duplication.

The platform’s **ease of deployment**—automatic updates, simple device installation, and centralised management of cloud services—reduces the technical and administrative burden for instructors. This model enables flexible scaling from **university electives** to **professional training courses** and **micro-credit certifications**, ensuring both academic and commercial viability.

To maximise reach, the course will be marketed through **partnerships with universities, NGOs, and social innovation networks**, supported by **targeted communication campaigns**. Promotional activities will focus on educational and entrepreneurial ecosystems, including **EU innovation networks, development agencies, and social impact events**, positioning the course as a reference for experiential education in the social economy.

Access Model	Description
Pilot phase	Free participation for academic and NGO partners
Institutional licence	Paid access (€1,500 per institution) for course integration
Certification scheme	Fee-based participation for professionals and entrepreneurs

9.8.2 Go-to-Market – Timing

The market launch timeline for the **Social Entrepreneurship Course** is strategically aligned with the project’s completion, ensuring a direct transition from prototype to operational deployment.

A **fully functional version** of the course will be finalised at the end of the project, followed by a **six-month pilot phase** involving validation with academic partners, NGOs, and early adopters from the ARIS and BME networks. During this phase, user feedback will be collected to refine the learning experience, optimise the digital infrastructure, and strengthen institutional collaboration.

Following this **validation stage**, the course will enter its **commercial rollout**, expanding availability to universities, business schools, accelerators, and NGOs through the e-DIPLOMA platform. This phased approach balances the urgency to address the growing demand for social entrepreneurship training with the need to guarantee high-quality content, pedagogical effectiveness, and technical stability.

Parallel efforts in **content enhancement, localisation, and certification development** will support the internationalisation of the course, while **marketing and partnership activation** will ensure long-term sustainability and visibility across European innovation and education ecosystems.

9.9 IPR Background and Foreground

The IPR background for the **Social Entrepreneurship Course** derives primarily from the expertise and prior assets developed by **BME** and **ARIS** in the fields of social innovation, educational design, and entrepreneurship training. These include pedagogical methodologies, curriculum structures, and previous research outputs that have been refined and adapted during the e-DIPLOMA project. This existing know-how serves as the foundation for the course's instructional framework, multimedia design, and technical integration within the e-DIPLOMA platform.

Both partners contribute complementary intellectual assets – BME with its extensive experience in entrepreneurship education and ARIS with its innovation ecosystem and business development tools – ensuring that the background IPR remains institutionally owned and fully compliant with consortium agreements.

To safeguard the results generated under this KER, a comprehensive set of IPR protection measures will be implemented and refined based on the final exploitation plan. These include:

1. **Copyright Protection** – Registration of all creative elements (software components, course materials, interactive content, and multimedia resources) to establish clear ownership and prevent unauthorised reproduction.
2. **Confidentiality and NDAs** – Mandatory non-disclosure agreements for all collaborators, subcontractors, and partner institutions involved in course deployment or commercialisation.
3. **IP Policy Framework** – Adoption of internal guidelines defining ownership, usage rights, and distribution protocols for all course-related assets.
4. **Awareness and Training** – Education of employees and contractors on best practices in IPR protection, copyright law, and data handling.
5. **Regular IPR Audits** – Periodic reviews to identify potential infringements, vulnerabilities, and areas for improvement.
6. **Trademark Registration** – Protection of the course's title, branding, and associated visual identity to reinforce market positioning and ensure legal recourse against misuse.

These combined actions will ensure that the **Social Entrepreneurship Course** maintains its **legal integrity, brand recognition, and commercial readiness**, enabling secure replication and scaling across European institutions.

9.10 Exploitation Roadmap

The exploitation roadmap defines the sequence of strategic actions required to ensure the successful market entry, long-term sustainability, and continuous evolution of the **Social Entrepreneurship Course** after the project’s conclusion. These actions focus on consolidating the course’s pedagogical, technical, and commercial foundations, ensuring its integration into educational ecosystems and social innovation networks across Europe.

9.10.1 Actions

1. **Business Plan Finalisation:**

Complete the business model, revenue streams, and market strategy for institutional and professional users. Define pricing models (licensing, certification, and subscription) and prepare financial projections aligned with partner exploitation interests.

2. **Intellectual Property Protection:**

Secure copyright for course materials, interactive simulations, and software components. Establish a monitoring process for content use and renewals.

3. **Authorisation and Certification:**

Obtain necessary institutional approvals for curricular use and certification. Define accreditation pathways with universities and NGOs to ensure compliance and recognition.

4. **Infrastructure Setup:**

Complete the integration of the course within the **e-DIPLOMA platform**, including the hosting, testing, and deployment of VR/AR learning modules. Ensure interoperability with learning management systems (LMS).

5. **Marketing Strategy Development:**

Design a targeted marketing plan addressing universities, accelerators, NGOs, and socially driven businesses. Define promotional assets, visibility campaigns, and participation in social innovation events.

6. **Partnership Building:**

Establish collaborations with educational institutions, social incubators, and accelerators to expand course adoption and co-create specialised modules on impact investment and policy advocacy.

Action	M-3	M-2	M-1	M+1	M+2	M+3	M+4	M+5	M+6	Milestone
1. Business Plan Finalisation					✓					Milestone 1
2. IPR Protection					✓					Milestone 2
3. Authorisation and Certification				✓						Milestone 3
4. Infrastructure Setup			✓							Milestone 4
5. Marketing Strategy Development							✓			Milestone 5
6. Partnership Building									✓	Milestone 6

9.10.2 Roles

- BME: **Leads** Infrastructure Setup, Authorisation & Certification, **and** IPR protection.
- ARIS: **Coordinates** Partnership Building, Business Plan Finalisation, **and overall exploitation strategy.**



- **BRA: Provides technical advice for later-phase infrastructure optimisation within the e-DIPLOMA framework.**
- All partners: **Contribute to marketing dissemination, pilot validation, and network activation through their institutional ecosystems.**

9.10.3 Milestones and KPIs

- **Milestone 1 (3 months):** Business plan finalised, including revenue model, pricing strategy, and institutional partnerships for pilot delivery.
KPI: Business plan approved; initial institutional agreements with ≥ 3 universities or NGOs established.
- **Milestone 2 (4 months):** Intellectual Property protection completed, with all course materials, interactive content, and software modules registered.
KPI: All copyrights and NDAs implemented; IPR documentation validated internally.
- **Milestone 3 (5 months):** Authorisations and certifications obtained for course accreditation and integration into BME's continuing education framework.
KPI: Certification standards approved; course listed in at least 2 academic catalogues.
- **Milestone 4 (6 months):** Course infrastructure fully deployed within the e-DIPLOMA platform, enabling user enrolment and pilot operation.
KPI: Platform live; ≥ 50 active learners enrolled across 3 partner institutions.
- **Milestone 5 (12 months):** Expansion phase initiated through partnerships with educational institutions, NGOs, and social incubators in at least 5 EU countries.
KPI: ≥ 10 institutional partners onboarded; certification completions exceed 200; course satisfaction $> 85\%$.

9.10.4 Medium-Term Actions (6–18 months)

To consolidate market presence and ensure the long-term adoption of the Social Entrepreneurship Course, the following medium-term goals are defined:

1. **Expand course delivery** to ≥ 10 institutions across at least five European countries, including universities, NGOs, and social innovation hubs.
2. **Develop advanced modules** on impact investment, circular economy, and social policy advocacy to strengthen the programme's relevance and scalability.
3. **Establish partnerships** with social incubators, accelerators, and business networks to promote entrepreneurship mentoring and post-training support.
4. **Implement multilingual localisation** of the course (English, Hungarian, Greek, Italian, and Spanish) to facilitate broader access across Europe.
5. **Launch an international outreach campaign** targeting ≥ 500 learners, leveraging EU innovation networks, social entrepreneurship forums, and academic conferences.
6. **Integrate continuous feedback mechanisms** from partner institutions and participants to improve content quality, pedagogical design, and technical performance.

9.10.5 Key Performance Indicators (KPIs)

- **Number of institutional partners** (universities, NGOs, accelerators) integrating the course into their educational or training offer.
- **Number of registered learners** and completion rate across participating institutions.
- **Course satisfaction index** (target $\geq 85\%$) based on participant and instructor feedback surveys.

- **Number of certified graduates**, validated through the BME/ARIS joint certification framework.
- **Revenue generated** from institutional licensing, certification fees, and professional training activities.
- **Geographical reach**, measured by the number of countries where the course is adopted or piloted.
- **Number of new partnerships** with social innovation ecosystems (incubators, business networks, and EU initiatives).
- **Media and dissemination impact**, tracked through mentions in academic events, EU innovation platforms, and social entrepreneurship forums.

9.11 Financial Outlook

The financial outlook for the Social Entrepreneurship Course ensures a balanced approach between initial development investments and long-term scalability.

During the first year, the focus will be on finalising core assets – including content validation, IP registration, and certification processes – while subsequent years will prioritise marketing expansion, infrastructure consolidation, and partnership development to secure sustainable revenue streams.

- **Year 1:** Initial costs for business plan finalisation, IP protection, and course authorisation are estimated between €5,000–€10,000.
- **Year 3:** Additional investments for marketing, partnership development, and infrastructure setup are projected between €20,000–€50,000, covering translation, certification setup, and continuous platform maintenance.

Revenues

Revenue generation will follow a gradual trajectory, beginning with institutional partnerships and certification fees during the pilot phase, and expanding towards professional training and international licensing as the course gains recognition.

This progressive approach ensures both accessibility for early adopters and the establishment of a sustainable business model over time.

- **Year 1: Initial revenues from course licensing and pilot institutional agreements are estimated between €1,000–€5,000, primarily from certification fees and professional enrolments.**
- **Year 3: With broader adoption across universities, NGOs, and accelerators, revenues are expected to reach €5,000–€10,000, generating profits between €3,000–€7,000.**

Other Sources of Coverage

To ensure continuity and risk mitigation, additional funding streams will complement direct revenues. These include institutional and public support mechanisms, as well as European and private initiatives fostering innovation and digital education.

- **State and institutional funding** for higher education and lifelong learning initiatives.
- **Grants and European programmes**, including Erasmus+, regional innovation schemes, and private sponsorships supporting digital and social entrepreneurship education.

Year	Activity	Estimated Cost (€)	Expected Revenue (€)
Year 1	Pilot phase, certification setup, translation	30,000	6,000
Year 3	Course expansion and professional training programmes	55,000	60,000

The financial plan demonstrates a feasible path toward economic self-sustainability, combining cost efficiency with diversified income streams. By leveraging institutional partnerships, EU funding opportunities, and professional training activities, the Social Entrepreneurship Course is positioned to achieve financial viability within three years while maximising its educational and societal impact.

9.12 Risk Assessment and Mitigation

As with any innovative educational product entering a competitive and rapidly evolving market, the success of the **Social Entrepreneurship Course (SEC)** depends on anticipating, monitoring, and mitigating potential risks that could impact its exploitation, adoption, or long-term sustainability.

A comprehensive **Risk Assessment Map** has been established to identify, categorise, and evaluate these risks according to their **importance (A)**, **probability (B)**, **combined risk grade (C)**, **potential intervention (D)**, and **feasibility of mitigation (E)**.

This structured methodology ensures that all foreseeable challenges – including **technological, pedagogical, market-related, legal, and financial** aspects – are systematically addressed to secure the course’s operational continuity and impact.

Most identified risks are assessed as **low to medium** in probability and impact, since the course is supported by the **e-DIPLOMA platform**, an established and validated technological environment.

Only one risk – **competition from established online learning providers** – has been classified as requiring **active mitigation**, as it could influence market share, institutional uptake, and enrolment rates in the medium term.

Description of Risks	A	B	C	D	E	Conclusion
Partnership Risk Factors						
1. Dependence on Educational Institutions: Relying on partnerships with educational institutions for adoption and distribution may pose risks if institutions face budget constraints, policy changes, or organisational restructuring that limits collaboration capacity.	4	8	32	(1)	-	Action!
2. Technology Integration Partnerships: Collaboration with technology providers for implementing disruptive technologies (e.g., VR, gamification) may lead to compatibility issues, reliance on third-party software, or maintenance dependencies.	2	6	12	(2)	-	Action!
Technological Risk Factors						
3. Technology Reliability: Risks related to system stability and reliability of immersive tools, such as potential software bugs, hardware failures, or platform compatibility issues.	6	2	12	-	-	No Action
4. Data Security and Privacy: Ensuring protection of user data collected during immersive course activities, including measures to prevent unauthorised access, breaches, or non-compliance with regulations.	8	1	8	-	-	No Action
Market Risk Factors						
5. Competitive Landscape: Competition from traditional educational institutions or online platforms offering similar courses may reduce adoption or enrolment rates.	3	9	27	-	-	No Action
6. Market Acceptance of Disruptive Technologies: Possible hesitation among institutions to adopt VR or gamified learning tools due to limited resources or technological readiness.	4	5	20	-	9	No Action
IPR / Legal Risk Factors						
7. Intellectual Property Rights: Risks related to ownership and licensing of course content, especially when using third-party materials or technologies.	6	1	6	-	-	No Action
8. Compliance with Education Regulations: Ensuring course accreditation and compliance with national and EU-level educational standards across different jurisdictions.	8	1	8	-	-	No Action
Financial / Management Risk Factors						
9. Cost Management: Managing development, licensing, and operational costs to ensure long-term financial sustainability.	2	9	18	-	-	No Action
10. Resource Allocation: Allocating resources efficiently across marketing, course updates, and institutional partnerships to maximise adoption under budget constraints.	2	2	4	-	-	No Action
Environmental / Regulation / Safety Risk Factors						
11. Ethical Considerations: Addressing potential psychological or social effects related to immersive technologies and gamified learning experiences.	6	1	6	-	-	No Action
12. Regulatory Compliance: Adapting to evolving legal frameworks governing online education, accessibility, and content moderation.	5	1	5	-	-	No Action

- (1) Engage with more potential customers to decrease dependence on individual entities.
(2) Develop support for alternative technologies, add support for alternative hardware.

9.13 Expected Impact in 3 Years

The **Social Entrepreneurship Course** will generate significant educational, economic, and social value within three years following project completion.

It will empower individuals and organisations with the skills and tools needed to address societal challenges through sustainable entrepreneurship, contributing to inclusive growth and social innovation across Europe.

- **Educational Impact:** Integration of social innovation and entrepreneurship competences into higher education and lifelong learning curricula, supported by immersive and experiential learning methods.

- **Economic Impact:** Support for the creation of sustainable start-ups and social enterprises, driving job creation and strengthening the social economy sector.
- **Social Impact:** Promotion of social responsibility, ethical leadership, and community engagement, fostering a culture of positive societal transformation.
- **European Impact:** Contribution to the **EU Social Economy Action Plan** and **Green Transition** objectives, aligning with European priorities on inclusion, sustainability, and innovation.

Ultimately, this KER reinforces **e-DIPLOMA's mission** to integrate digital, entrepreneurial, and societal dimensions into education, creating lasting benefits for learners, institutions, and communities.

10. After-project communication plan

10.1 Maintenance and evolution of the e-DIPLOMA website

The e-DIPLOMA website (www.e-diplomaproject.eu) will remain active for three years after the project's completion (October 2025), with the aim of ensuring continuous access to the results obtained and facilitating their adoption by stakeholders in the educational, technological, and industrial sectors. To achieve this, a maintenance plan will be implemented, focusing on four main areas:

- **Content updates:** To ensure continued visibility and promotion of the Key Exploitable Results (KERs), periodic updates will be made on the website. These updates will reflect the latest developments, progress, and milestones of each KER, keeping stakeholders informed and engaged with the project's outcomes.
- **Structural optimization:** The site's structure will be reorganized to improve its navigability and facilitate access to the most important resources. The KERs will be the central focus of this reorganization, with dedicated sections detailing their features, applications, and implementation guides, allowing users to easily access the most recent information.
- **Document repository:** During the project, a document repository was established to house all project deliverables. It provides direct access to technical reports, methodologies, and other documents that support the adoption and replicability of the results across different contexts and sectors. This repository is available under the "[Results](#)" tab on the project's website.
- **Technical maintenance:** The site's operation and security will be ensured, making sure it remains accessible and functional over time.

In addition, e-DIPLOMA will continue to be featured on the websites of partner institutions, highlighted in the projects section. This will help increase the project's visibility and ensure its long-term continuity. The presence on partner institution websites will expand the project's reach and facilitate the dissemination of its results beyond the main website. To date, e-DIPLOMA can be found on the following websites:

Partner	Website
EuroFUE-UJI	https://eurofue.com/ediploma/
INIT	https://www.linkedin.com/posts/init-institute-of-new-imaging-technologies-_ivacei-retoavi-federala-activity-7313473997952684033-qKPM/?originalSubdomain=es
UJI	https://www.uji.es/serveis/opei/historico/he/pilar2/ediploma/
CSICY	https://csicy.com/project/e-diploma/
LabLeni	https://lableni.webs.upv.es/project/e-diploma/
Aris formazione e ricerca	https://www.arisformazione.it/progetti/e-diploma
InnoGrowth	https://innogrowth.org/newsevents/

10.2 e-DIPLOMA Year in Review e-newsletter

The e-DIPLOMA e-newsletter will continue to be used as a means of sharing updates even after the project's completion. While regular editions will no longer be issued, an annual recap will be published to provide a summary of the most important developments related to the project's outcomes, including updates on the adoption and further evolution of its KERs. This will ensure that stakeholders remain informed about the long-term impact of e-DIPLOMA. Additionally, audiences will be encouraged to follow the project's website and social media channels for ongoing updates.

10.3 e-DIPLOMA helpdesk

e-DIPLOMA will maintain a dedicated email channel to handle enquiries related to the project's outcomes, reports, and KERs after its completion. This contact point will serve as a helpdesk for educators, researchers, and other stakeholders interested in the project's developments and potential applications.

Project partners will oversee this communication channel, ensuring that inquiries are addressed appropriately.

10.4 Social media strategy

Social media will continue to play a pivotal role in disseminating the results of the e-DIPLOMA project, with a particular emphasis on promoting and facilitating the adoption of its three KERs. LinkedIn, X, and Facebook will continue to be used to share updates, articles, and materials related to the progress of the KERs, ensuring ongoing communication with the educational and technological communities. While the content will remain consistent across platforms, it will be adapted to match the tone and format of each one to maximize its impact.

The strategy will be organized into three-month content cycles, with each period dedicated to a specific KER. During each cycle, materials will be published to explain its features, advancements, applications, and use cases, ensuring visibility of its development and encouraging its adoption. This approach ensures a balanced promotion of all KERs over time. The first three-month cycle will focus on the Social Entrepreneurship course, as it will be fully developed, published, and ready for market deployment by the end of the project. The following cycle will highlight the Block Programming course through VR and AR, aligning with the planned implementation of its promotion strategy by the third month. The final cycle will center on the Repository of Educational 3D Assets, the KER led by Brainstorm, ensuring its visibility after the launch of the repository, scheduled for six months after the project's completion.

KER		Leading partner	Timing (months after project completion)
1	Social Entrepreneurship course	ARIS/BME	Months 1-3
2	Block Programming course through VR and AR	INIT/UJI	Months 4-6
3	Repository of educational 3D assets	Brainstorm	Months 7-9

The table represents the first nine months of the project, corresponding to the first three-month cycle for

each KER. This cycle will repeat four times over the 36 months after-project, with the same structure applied to each subsequent cycle. This structured approach aligns with the exploitation plan, ensuring continuous support and visibility for each KER at the main stages of its development and market introduction.

In addition, YouTube will serve as an audiovisual repository, hosting videos related to the project, including KER demonstrations, event recordings, partner interviews, and other pertinent materials to reinforce the dissemination of results. Through this approach, e-DIPLOMA will maintain an active digital presence aligned with its exploitation strategy.

Furthermore, as the social media landscape evolves, the possibility of establishing a presence on emerging platforms such as BlueSky may be explored if its growth and engagement within scientific and academic communities proves to be beneficial for e-DIPLOMA's objectives.

10.5 EU research platforms coverage

Although the primary focus of e-DIPLOMA's after-project communication will be digital channels, traditional media will continue to play a role in extending its reach. Consortium partners will explore opportunities to publish articles in digital newspapers, research platforms, and industry-specific outlets to highlight project results and their impact on education and technological innovation.

After the completion of the project, efforts will be focused on ensuring e-DIPLOMA is featured in CORDIS and other Horizon Europe publications. The aim is to have the project included in the [“Results in Brief”](#) section on CORDIS, which offers a concise overview of project achievements. Furthermore, we will actively pursue the opportunity to have e-DIPLOMA showcased in the CORDIS [“Results Pack”](#), a highly visible publication that showcases project outcomes and their potential impact on European research and innovation.

In addition, we plan to incorporate e-DIPLOMA into the [Horizon Results Platform](#) (HRP). This matchmaking platform helps EU-funded beneficiaries showcase their research and get discovered by the right audiences.

10.6 Participation in scientific events

Following the project's conclusion, attendance at events will remain a primary means of disseminating e-DIPLOMA's outcomes and fostering its implementation. KERs will be presented by the project partners at conferences, fairs, workshops, and gatherings related to education, e-learning, technological innovation, and European projects.

In addition to participating in external events, partners will also have the opportunity to organize activities within their own institutions. These initiatives, such as talks or workshops, will allow them to present e-DIPLOMA's progress and demonstrate how its results can be applied in various contexts. This will ensure that the project's results continue to be shared with a wider audience after its completion.

Updates on participation in these events will be reflected on the project's website and social media, while any generated audiovisual content will be stored on YouTube for future reference.

The events that e-DIPLOMA is expected to attend through its partners during the first year following the project's conclusion are as follows. While the exact dates for these events are yet to be confirmed, they are anticipated to take place around the indicated months.

Event	Description	Partner	Month
Eurographics	Conference on computer graphics and visualization	TU Delft	April/May
SIGGRAPH	Conference on computer graphics and interactive techniques	TU Delft	August
EGSR	Eurographics Symposium on Rendering	TU Delft	June/July
IEEE VR	IEEE Conference on Virtual Reality and 3D User Interfaces	TU Delft	March
EuroVis	European Conference on Visualization	TU Delft	May/June
Cyprus Network Forum	Networking event on tech and innovation in Cyprus	CSICY	August/ September
Cyprus Network Forum-Education Edition	Networking event on tech and innovation in Cyprus, focusing on education	CSICY	October
Larnaka Makers Fair	Fair focusing on innovation, technology, creativity and inspiration	CSICY	May/June
BETT	Global education technology trade show	Brainstorm	January
Integrated Systems Europe (ISE)	Conference for AV and systems integration	Brainstorm	February
EXPOEARNING	Event focused on e-learning technologies	Brainstorm	March
Congreso de Enseñanza Bilingüe (CIEB)	Conference on bilingual education	Brainstorm	October
EdTech Congress BCN	Conference on educational technology	Brainstorm	February
NAB show	National Association of Broadcasters show	Brainstorm	April

International Broadcasting Convention (IBC)	Event for broadcasting technology	Brainstorm	September
Congreso Español de Informática Gráfica (CEIG)	Spanish Computer Graphics Conference	UJI	June
MIS4TEL	Conference on Methodologies and Intelligent Systems for technology-enhanced learning	UJI	June
Education and New Developments (END)	Conference on advancements in education and learning methods	UJI	June/July
ICITL	International Conference on Innovative Technologies and Learning	UJI	August
SIGCSE	Special Interest Group on Computer Science Education	UJI	February/ March
EDULEARN	International Conference on Education and New Learning Technologies	UJI	June/July
INTED	International Technology, Education and Development Conference	UJI	March
ICERI	International Conference of Education, Research and Innovation	UJI	November

Events, fairs, and workshops are dynamic by nature, making it difficult to anticipate them a year in advance. Therefore, we continuously conduct a systematic review to identify events of relevance to technology, innovation, and education. As a result, the planned activities may be adjusted or updated as new opportunities arise.

10.7 Promotional materials and media kit

During the course of the project, a variety of promotional materials, including brochures, leaflets and other resources, have been developed and implemented to support dissemination efforts. Following the project's conclusion, these materials will continue to be used by partners during events and activities to ensure the project's results and impact remain visible. Additionally, a "Media Kit" section will be created on the project's website, providing digital versions of these materials for download. This will allow stakeholders to easily access and share information about e-DIPLOMA beyond the project's duration.

10.8 Policy monitoring and dialogue

e-DIPLOMA's specialists in digital education and innovation will continue to monitor policies and legislation at both the EU and national levels in order to identify opportunities for dialogue and contribution to the making of educational and technological policies. As part of this ongoing process, they will actively seek opportunities to share and advocate e-DIPLOMA's policy recommendations.

The project's three policy recommendation reports will serve as the primary tools for informing and influencing policymakers, legislators, and other stakeholders, ensuring that the insights gained throughout e-DIPLOMA contribute to shaping the future of digital education.

10.9 Collaboration with Sister Projects

Following the completion of the project, e-DIPLOMA will continue its collaboration with sister projects dedicated to enhancing e-learning through innovative technologies. These partnerships, focused on knowledge exchange, joint development of methodologies, and widespread dissemination of results, will ensure the ongoing impact of the project's outcomes. To date, e-DIPLOMA has been collaborating with the following sister projects:

- **i-MASTER:** Integrating Adaptive Learning in Maritime Simulator-Based Education and Training with an Intelligent Learning System.
- **augMENTOR:** Augmented Intelligence for Pedagogically Sustained Training and Education.
- **EMPOWER:** Design and Evaluation of Technological Support Tools to Empower Stakeholders in Digital Education.
- **Exten.D.T.2:** Extending Design Thinking with Emerging Digital Technologies

In addition, e-DIPLOMA will explore opportunities to engage in future clusters, networks, and relevant initiatives to further amplify its visibility and impact. One such opportunity is potential collaboration with the [BeyondXR cluster](#), which brings together several EU projects focused on Extended Reality (XR) and emerging technologies. This collaboration aims to integrate advanced technologies such as XR, AI, and robotics into transformative educational solutions, aligning with the mission to enhance e-learning through innovative technologies. These collaborations are highlighted on the e-DIPLOMA website under the "[Sister Projects](#)" section.

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ANNEX I – 3D REPOSITORY TECHNICAL DEPICTION

- TECHNICAL DESCRIPTIVE REPORT - 3D REPOSITORY WEBSITE



e-DIPLOMA



BRAINSTORM

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1. General information about the repository website

The e-Diploma repository, available at <https://ediploma-assets.com>, is one of the **Key Exploitable Results (KER)** of the **e-Diploma project**, developed by **Brainstorm Multimedia** as part of the Exploitation plan. The platform was created with the goal of enabling access to, reuse of, and collaborative creation of 3D educational content. Additionally, the repository is designed to be integrated into **Edison**, functioning as a module accessible to Edison users for enriching virtual learning environments with 3D educational assets.

Technical details

The platform provides a limited backoffice interface for contributors, tailored to allow content creation and metadata management through a simplified and user-friendly WordPress environment.

This setup facilitates contribution without requiring full administrative access, while ensuring consistency and educational value through moderation workflows.

Domain: https://ediploma-assets.com
Platform: WordPress
Main Custom Post Type: al_product
Languages: Spanish and English
Current Status: Pilot phase
Access: Public browsing; login required to upload models

2. Overall site architecture

The site is organized into the four menu sections: *Main, How it works, Assets, and New assets.*

2.1 Section 1: Main

This section serves as the **landing page** for the repository and displays the platform's purpose, scope, and educational mission.

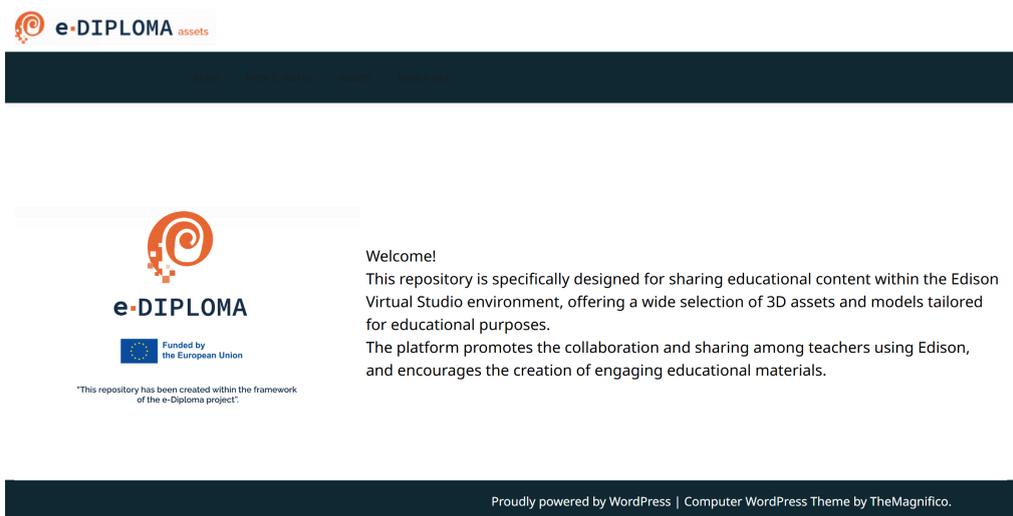


Image 1. Main section

2.1.1 Header and Navigation

- Consistent with other sections:
 - **Logo:** Top left (e-DIPLOMA assets).

- **Navigation bar** with the following tabs: Main, How It Works, Assets, New Asset.
- Navigation uses a **dark blue background** with light blue highlighted links.

2.1.2 Main Content Area

- **Two-column layout:**
 - **Left column:**
 - Displays the **e-DIPLOMA logo** (spiral symbol).
 - EU funding acknowledgement: **“Funded by the European Union”**.
 - Caption: *“This repository has been created within the framework of the e-Diploma project.”*
 - **Right column:**
 - Text block with a **welcome message:**
 - Emphasizes that the repository is designed to share **educational 3D content** for the **Edison Virtual Studio**.
 - Mentions that the repository contains a **wide selection of assets** for **educational use**.
 - Encourages **collaboration and content creation** among teachers using Edison.

2.2 Section 2: How It Works

The "How it works" section explains the basic structure and functionalities of the platform. It describes how users can browse, search, preview, download, and upload 3D assets. It also outlines the main user roles and the workflow for publishing content in the repository. This section also includes a list of recommended free tools for creating 3D models, with technical information on supported formats, platforms, and usage requirements

How it works



Edison users can now easily create and share 3D objects in a simple and agile way. To enhance accessibility, the objects have been organized into knowledge categories following the UNESCO ISCED classification, making it easier to find relevant content.

The platform fosters collaboration among teachers, researchers and students using Edison, encouraging the development and sharing of engaging educational materials.

How to include 3D Objects in your classes created with Edison

- > Browse through the 3D object categories or use the search bar to find the object you need
- > Download it
- > Drag it to Edison's desktop
- > Done!

How to create your own 3D Objects to add to the repository

- > Use any of the free 3D object creation tools available online (*)
- > Fill out the form in the "New Asset" tab and send it
- > The more fields you complete in the form, the more useful the object will be for others
- > Done!



And don't forget to add reviews! ★★★★★ Share your insights and suggest possible educational uses—your feedback helps your colleagues and the entire educational community find the best resources and feel encouraged to share their own. Together, we can make the repository even more valuable for everyone!

(*) Here are some of our recommendations, but there are more:

Tool	Platform	Processing Type	3D Export Formats	Ease of Use	Free Version	Comments
EyesCloud 3D	Web (cloud-based)	Online (requires internet)	OBJ, STL, GLB	Easy (simple web interface)	Limited number of scans	No installation needed, ideal for non-technical users.
RealityScan	iOS, Android	Cloud-based	OBJ, GLB	Very easy	Free, but some formats may not be available	Direct integration with Sketchfab.
KIRI Engine	iOS, Android	Cloud-based	OBJ, STL	Easy	Limited to 3 scans per week	Good for beginners with cloud processing.
Polycam	iOS, Android	On-device (LIDAR or photogrammetry)	OBJ, FBX, STL	Very easy	Limited scans and exports	Great for quick scans on LIDAR-enabled devices.
3DF Zephyr Free	Windows	On PC	OBJ, PLY, FBX, STL	Complex (requires a powerful PC)	Up to 50 images per project	More technical, recommended for advanced users.
Meshroom (AliceVision)	Windows, Linux	On PC	OBJ, PLY	Difficult (requires a powerful GPU)	Fully free (open-source)	Powerful option but requires technical knowledge.

Image 2. How it works section

2.2.1 Header and Title

- Page title: **"How it works"** in large bold text.
- The navigation menu and logo bar remain consistent at the top, with the same layout as the homepage.

2.2.2 Introductory Description

- A brief introductory paragraph explains:
 - **Purpose:** How Edison users can create and share 3D objects simply.
 - **Structure:** Objects are organized into categories using **UNESCO ISCED classification**.
 - **Goal:** Facilitate collaboration among **teachers, researchers, and students**, promoting educational content creation.

2.2.3 Two Main Instructional Blocks

A. How to include 3D Objects in your classes created with Edison

- Instructions formatted as a bullet list:

- o Browse by categories or search bar.
 - o Download the object.
 - o Drag it to Edison's desktop.
 - o Done!
- B. How to create your own 3D Objects to add to the repository
- Users are encouraged to use **free online 3D creation tools**.
 - Then, they must:
 - o Fill out the submission form under the "New Asset" tab.
 - o Submit it with as much detail as possible.
 - o Done!

A large orange e-DIPLOMA spiral logo appears to the right of this section.

2.2.4 Encouragement to Review

- Highlighted box encouraging users to:
 - o Leave ★★★★★ reviews.
 - o Suggest educational uses.
 - o Share their insights to enrich the repository.

2.2.5 Tool Recommendations Table

- Introduced by: "Here are some of our recommendations..."
- **Table Columns:**
 1. **Tool**
 2. **Platform**
 3. **Processing Type**
 4. **3D Export Formats**
 5. **Ease of Use**
 6. **Free Version**
 7. **Comments**
- **Tools Listed:**
 1. EyesCloud 3D
 2. RealityScan
 3. KIRI Engine
 4. Polycam
 5. 3DF Zephyr Free
 6. Meshroom (AliceVision)

Each tool includes practical info on formats, usability, technical requirements, and pricing, helping users select the most appropriate tool for their skill level and device.

2.3 Section 3: Assets

This section functions as the **gateway to browsing and downloading 3D content**, organized by educational domains (following the **ISCED taxonomy**). It's designed for ease of access and intuitive navigation.

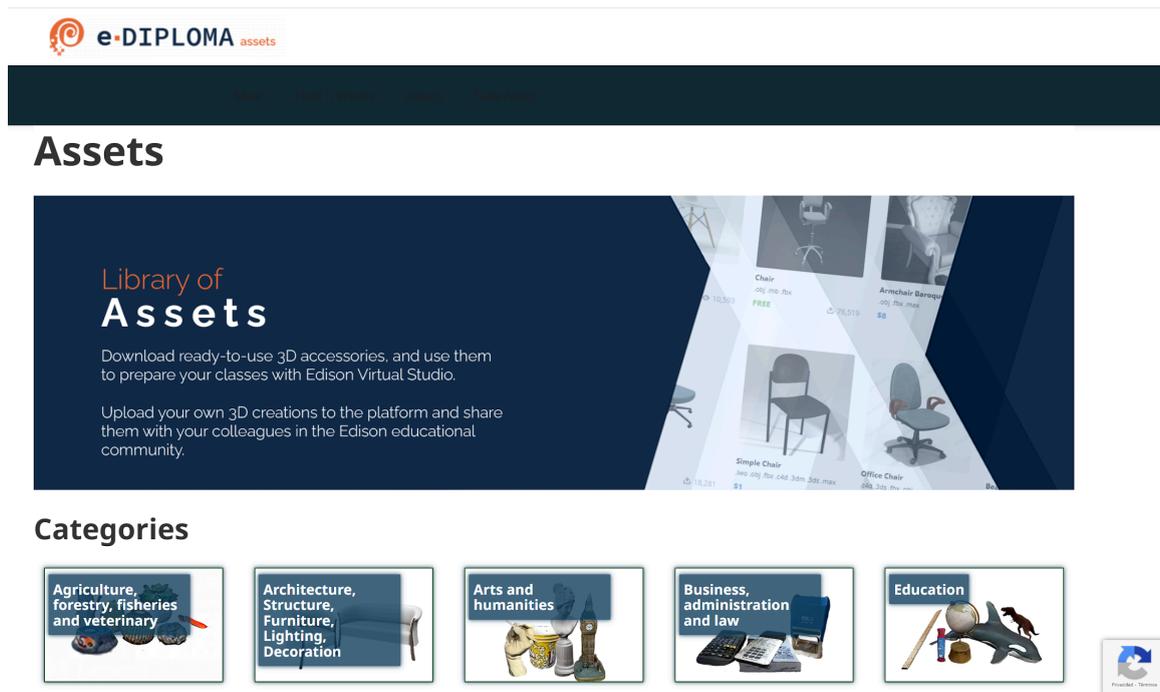


Image 3. Assets section

2.3.1 Header

- As in the other sections:
 - **Logo** on the top left.
 - **Navigation bar** with four tabs: Main, How It Works, Assets, New Asset.
 - Consistent dark blue background for the menu.

2.3.2 Section Title

- Large heading: **“Assets”**
- Subheading section titled: **“Library of Assets”**
- Description block in white text over a blue background:
 - Encourages downloading **ready-to-use 3D accessories**.
 - Mentions the utility of the objects for **Edison Virtual Studio**.
 - Invites users to **upload their own 3D creations** and share with the educational community.

2.3.3 Background Graphic

- A banner image shows a blurred view of several 3D models (mostly chairs), including metadata such as file name, download count, or license type.

When selecting any asset, it displays an image, a short description and a download button.

Buddha Head Sculpture



A model of an ornamental Buddha head sculpture, often used as a decorative piece or symbol of peace and mindfulness.

Download

Gallery | Attributes | Reviews

Image 7. Buddha asset example

Below, there are three tabs:

- **Gallery** includes 4 captures of the asset

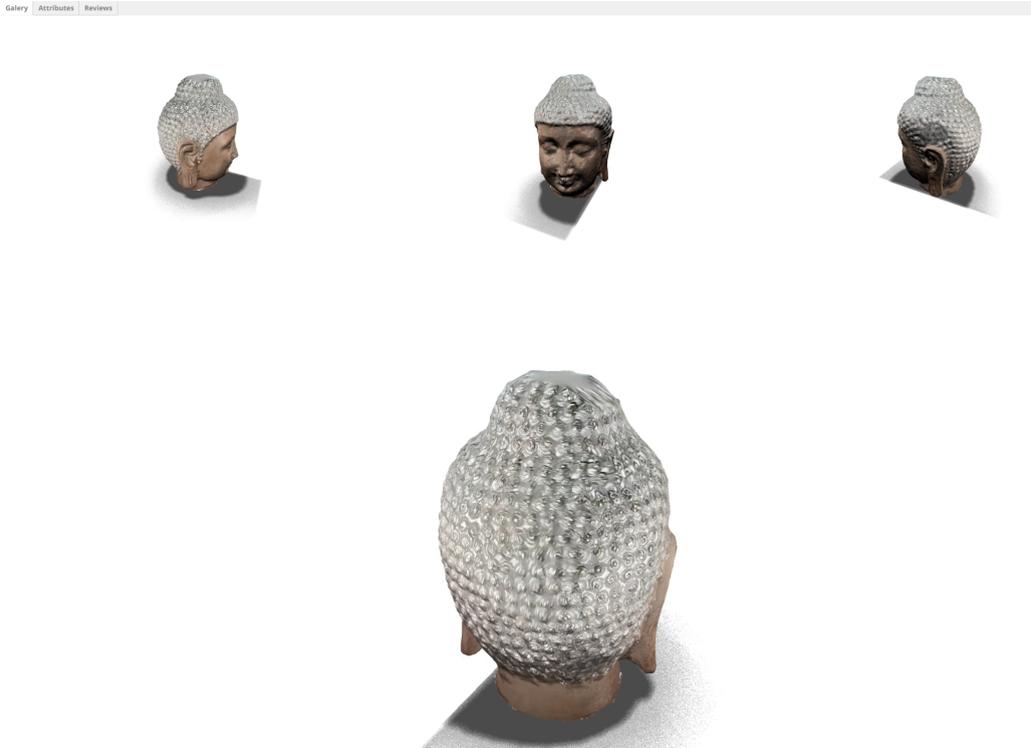


Image 8. Gallery

- **Attribute** display the main characteristics:



Keywords	Buddha, Sculpture, Mindfulness, Ornament
Education Level	Other
License Type	Creative Commons
Creation Date	06/01/2025
Educational Use Cases	Useful for teaching about Buddhist art, cultural symbolism, and the historical significance of Buddhism in promoting peace and spirituality.
Generation Methodology	Scanned

Image 9. Attributes

- **Reviews** allows registered users to rate each asset, so other users can access 5 stars score and comments:

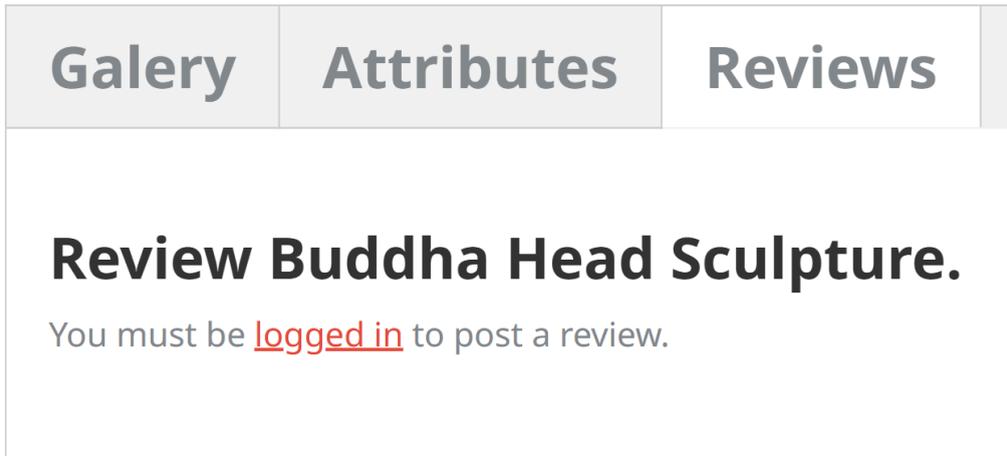


Image 10. Review

2.4 Section 4: New asset

This page provides a **form interface** that allows authorized users to submit new 3D models (assets) to the platform. The layout is vertical and form-based, guiding users step-by-step through the necessary information fields.



New asset

Product Name

Description

Keywords

Main image
 Ningún archivo seleccionado

Additional image 1
 Ningún archivo seleccionado

Additional image 2
 Ningún archivo seleccionado

Additional image 3
 Ningún archivo seleccionado

Category

Subcategory

Educational Level

License Type

Educational Use Cases

Additional Notes

Generation Methodology

Model
 Ningún archivo seleccionado



Image 11. New assets form

2.4.1 Form Fields and Upload Options

Field	Description
Product Name	Text input for the asset title.
Description	Large text box to describe the 3D object and its purpose or features.
Keywords	Text box to enter relevant tags or search terms.
Main Image	File upload for the primary visual representation of the object.
Additional Image 1, 2, 3	Optional image uploads to show different angles or usage examples.
Category	Dropdown menu to select the main thematic classification (aligned with ISCED).
Subcategory	Dropdown for a more specific classification within the selected category.
Educational Level	Dropdown to indicate the intended education level (e.g., Primary, Secondary, etc.).

Field	Description
License Type	Dropdown menu (e.g., Creative Commons) to define usage rights.
Educational Use Cases	Text box to describe how the asset can be used in teaching.
Additional Notes	Optional text box for extra information or clarifications.
Generation Methodology	Dropdown to select how the asset was created (e.g., photogrammetry, manual modeling, etc.).
Model	File upload field to attach the 3D model (format likely OBJ, STL, etc.).

2.4.2. Submission

- At the bottom of the form: **[Enviar]** button (Spanish for "Submit").
- Ensures users can upload all relevant files and metadata in one step.

Repository entries are managed via the custom post type `al_product`. URLs are optimized and allow navigation through categories and tags.

3. User workflow: Creating, uploading and accessing 3D Objects

The e-Diploma repository is designed to facilitate the *sharing and reuse* of educational 3D assets among teachers and educators. To contribute to the platform, users must follow a structured process. This section outlines the step-by-step procedure for creating a 3D object and uploading it to the repository, as well as accessing and downloading assets.

(1) Steps to contribute with new assets:

1. **Creating the 3D Object.** The first step involves designing or creating the 3D object using **free and compatible modeling tools**, such as those recommended in the previous section. It is important to export the final version in a **supported file format**, such as .glb, .gltf, .fbx, or .obj.
2. **Preparing Metadata and Description.** Before uploading the object, the teacher should prepare the information that will appear on the object's asset page. This metadata includes:
 - **Title of the object**
 - **Short description** explaining the object and its possible educational uses
 - **Category** (from the repository's list of predefined categories)
 - **Suggested education level**
 - **Related subject areas**
 - **Tags** (keywords for searchability)
 - **Usage license** (e.g., Creative Commons)

3. **Accessing the Platform.** The user must **log in** with an authorized account. Once logged in, they should navigate to the **“New Asset”** section (available from the dashboard or top menu, depending on permissions).
4. **Filling in the Object Form.** The object upload form must be completed with all the required information. Additionally, the user must:
 - o Upload the 3D file
 - o Upload a **preview image** (recommended)
 - o Optionally attach complementary documents such as usage instructions, worksheets, or additional links
5. **Choosing the Correct Category.** The object must be assigned to one of the existing categories. These are the current categories available in the repository:
 - o **Agriculture, forestry, fisheries and veterinary**
 - o **Architecture, structure, furniture, lighting, decoration**
 - o **Arts and humanities**
 - o **Business, administration and law**
 - o **Education**
 - o **Engineering, manufacturing and construction**
 - o **Health and wellbeing**
 - o **Information and communication technologies (ICTs)**
 - o **Natural sciences, mathematics and statistics**
 - o **Other**
 - o **Services**
 - o **Social sciences, journalism and information**
6. **Publishing the Object.** After completing all the fields and uploading the files, the teacher can:
 - o **Save the object as a draft**, or
 - o **Publish it directly**, making it visible to other users

In some cases, publishing may be subject to **prior review by the repository administrators**, depending on internal workflow settings.

7. **Post-Publication Editing.** The author can return at any time to edit the object's information, update the files, or reassign categories and tags, as long as they retain upload permissions.

(2) Steps to access and download an asset:

1. **Access the repository.** Visit the e-Diploma repository homepage by entering the URL: <https://ediploma-assets.com> in your web browser.

2. **Navigate to the “Assets” section.** From the main menu or homepage, click on the “**Assets**” tab. This section displays all the available 3D objects in the repository.
3. **Browse or filter by category.** Use the **category filters** on the page to narrow down the list of assets. Categories include areas such as *Health and Wellbeing, Engineering, Arts and Humanities*, among others.
4. **Search using keywords.** If you are looking for a specific asset, scroll down to the **search bar** to enter keywords related to the topic, subject, or name of the asset.
5. **Select an asset.** Click on the **title or image** of any asset in the list to open its individual asset page.
6. **Review the asset information.** On the asset’s page, you will find a detailed description, tags, suggested educational uses, file format, license type, and preview image or model.
7. **Download the 3D file.** Locate the **download button or file link** (usually in .glb, .gltf, .fbx, or .obj format) and click to download the file directly to your device.
8. **Use the asset in your Edison educational project.** Once downloaded, you can import the asset into Edison work space and add it as part of the materials to be displayed in your virtual classroom.

4. Contributor management panel (limited Backoffice)

This panel is a simplified Backoffice environment designed specifically for users who have been granted permission to upload and manage 3D assets within the repository. This interface allows contributors (such as teachers, researchers, or content creators) to publish educational materials without needing full administrative access.

Authorized users can perform the following actions:

- **Create and edit al_product items.** Each 3D object is managed as a custom post type (al_product) within the WordPress backend. Contributors can create new items and update existing ones, ensuring that the object’s information remains accurate and relevant.
- **Upload 3D files.** Contributors are allowed to upload 3D files in supported formats, such as **.GLB**, **.FBX**, or **.OBJ**, either by dragging and dropping them into the media area or selecting them from their device. The uploaded file becomes part of the asset’s downloadable content.
- **Assign or create categories.** Users can assign the object to one of the **existing educational categories**, ensuring proper classification. Depending on permissions, they may also be able to create **new categories**, expanding the taxonomy of the repository when necessary and relevant.
- **Fill in descriptive metadata.** Each object must include a **title**, a **short and informative description**, the **suggested educational level**, and optionally a **featured image** (used as a visual preview). A **license type** (e.g., Creative Commons) must also be specified to clarify usage rights.
- **Submit objects for review and publication.** After completing the asset’s metadata and uploading the necessary files, contributors can **submit their object for review**. Depending on the repository settings, a moderator or administrator may need to **approve the content before publication**. This ensures quality control and alignment with the repository’s educational standards.

5. Plugins and technologies used

The specific plugins and technologies integrated into the platform will likely combine a set of WordPress plugins and web technologies to enable both 3D visualization and interactive form management.

For the 3D visualization component, the implementation may rely on a WebGL-based viewer or a dedicated 3D model display plugin, allowing users to explore interactive 3D content directly within the webpage.

For the form management and data handling, solutions such as Advanced Custom Fields (ACF) may be used to create and manage structured data, while WPForms or Gravity Forms could provide an intuitive interface for user input and submissions.

The final selection of technologies will depend on performance, compatibility, and integration with the overall design and user experience objectives of the platform.

6. Integrations and compatibility

The platform is designed with **responsiveness** and **interoperability** in mind to ensure seamless user experiences across different environments and devices.

- **Cross-device compatibility:** The interface is fully responsive, allowing smooth navigation and interaction on desktop, mobile, and tablet devices.
- **Future integrations:** The system architecture anticipates potential connections with external platforms, such as Learning Management Systems (LMS) or Virtual Reality (VR) environments, to expand its educational and immersive capabilities.
- **Physical integration:** The platform is also integrated with the Edison classroom at the University of Alicante, enabling users to physically explore the repository and interact with its digital assets in an immersive educational setting.

Annex: Current categories and objects in the repository

Image	Name	Description	Count
	Agriculture, forestry, fisheries and veterinary	—	23
	Architecture, Structure, Furniture, Lighting, Decoration	—	70
	Arts and humanities	—	18
	Business, administration and law	—	7
	Education	—	17
	Engineering, manufacturing and construction	—	17
	Health and wellbeing	—	28
	Information and communication technologies (ICTs)	—	17
	Natural sciences, mathematics and statistics	—	12
	Other	—	23
	Services	—	9
	Social sciences, journalism and information	—	7

ANNEX II – VALIDATION OF THE 3D REPOSITORY AT THE UA

- VALIDATION DESCRIPTIVE REPORT - 3D REPOSITORY AT UNIVERSITY OF ALICANTE

(KER 1 OF THE EXPLOITATION PLAN)



ANNEX II - CONTENTS

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0. Summary

The present report documents the validation activity carried out to assess the perceived value, usability, and potential impact of the 3D object repository developed within the framework of the e-Diploma project (KER1). This validation process is a key step in the iterative design and refinement of the platform, which aims to provide university educators and students with easy access to educational 3D content. The repository is conceived not only as a resource library but also as a collaborative space that encourages users to contribute, share, and integrate 3D objects into their teaching and learning practices. As such, ensuring the alignment of the repository's structure, categories, and functionalities with the real needs of users is essential to its long-term adoption and success.

The main objective of this activity was to collect qualitative and quantitative feedback from actual and potential users of the repository through a structured validation process. This objective is twofold: first, to verify whether the repository meets the pedagogical and technical expectations of the target audience; and second, to explore ways in which its adoption could be maximized within educational contexts. To do this, a Google Form-based online questionnaire was designed and distributed among members of the University of Alicante (UA), including both faculty and students. These participants represent a diverse user base, offering valuable perspectives from different disciplines and levels of digital proficiency.

A noteworthy aspect of this validation is that the University of Alicante has integrated Edison, the software platform that hosts the repository, since mid-2023. This strategic decision places UA in a unique position: it currently includes both experienced Edison users—already familiar with 3D content creation and integration—and potential new users who may engage with the platform for the first time in the near future. By involving both profiles in the validation process, the study captures a broad spectrum of expectations, experiences, and needs, which enriches the analysis and strengthens the validity of the feedback collected.

The repository under evaluation was developed as part of the e-DIPLOMA initiative with the overarching goal of fostering a culture of content co-creation in higher education. This goal responds to the growing need to equip students and teachers with the skills and tools required for active participation in digital education ecosystems. In particular, 3D content is increasingly relevant across multiple domains, from science and engineering to art, design, architecture, and heritage studies. By allowing users to access, visualize, download, and even upload their own 3D models, the repository not only enhances digital pedagogy but also empowers users to become content creators in their own right.

From a methodological standpoint, the validation activity relied on a non-intrusive, flexible approach to data collection through an online questionnaire. The choice of Google Forms ensured accessibility and ease of use for all participants, while also enabling the research team to gather structured feedback at scale. The questionnaire included both closed-ended and open-ended questions. The closed-ended items focused on measuring satisfaction, perceived utility, ease of navigation, clarity of categories, and motivation to contribute content. In contrast, the open-ended questions aimed to uncover deeper insights into users' experiences, expectations, and suggestions for improvement. This combination of quantitative and qualitative data provides a well-rounded picture of user perceptions and allows for a more nuanced understanding of how the repository is received in real educational contexts.

Participants were selected through targeted invitations sent to faculty from various departments at the University of Alicante. Teachers from areas such as education, engineering, humanities, and computer science were included. This diversity allowed the validation to reflect a range of educational uses and needs, as well as different levels of digital literacy. Some participants had already used Edison as part of previous educational or research projects, while others were introduced to the platform and its functionalities through the validation process itself.

Although the online questionnaire was designed to be accessible from any device and location, allowing some participants to complete it independently using their own mobile phones or laptops, the majority of the responses were collected in person at the Edison classroom located at the University of Alicante. Over the course of four weeks, participants were invited to attend scheduled sessions in this dedicated space, where they had the opportunity to explore the repository directly on screen, ask clarifying questions, and engage in informal dialogue with the researcher before completing the questionnaire. This setting not only ensured that users could interact firsthand with the platform, but also provided a supportive environment for reflection and feedback, enhancing the overall quality and depth of the responses collected.

Importantly, the validation was designed not as a test of technical functionalities alone, but as a user-centered reflection on the repository's potential within the academic ecosystem. Participants were encouraged to reflect on the relevance of the categories used to organize content, the clarity of the metadata included in each object's file, and the extent to which the platform facilitates the reuse and remixing of 3D content for educational purposes. In doing so, the validation activity functioned both as a feedback mechanism and as an awareness-raising exercise, helping to introduce the repository to new users while also involving them in its future development.

In summary, this report details the structure and rationale of the validation activity, including the objectives pursued, the characteristics of the product being assessed, the methodological tools employed, and the profile of participants. It serves as a foundational step towards refining the repository based on actual user input and ensuring that the platform remains aligned with the pedagogical goals and digital practices of higher education institutions. The results of this activity provided valuable guidance for future improvements and will contribute to the broader vision of supporting digital co-creation practices in university settings.

1. Introduction and objectives

This report presents the results of the validation process for the 3D object repository designed for university teaching use, specifically targeting faculty members at the University of Alicante, where the Edison Virtual Production Compact Studio has been installed and available for almost two years prior to the development of the repository.

As stated in the e-Diploma proposal, the repository is one of the Key Exploitable Results and is intended to serve as an innovative and accessible resource to enrich teaching activities across various academic disciplines through the integration of three-dimensional models.

It is conceived to be used within the Edison software, offering educators additional tools for immersive and interactive educational practices.

The validation process pursued two main objectives: first, to assess faculty perceptions regarding the repository's usefulness, usability, and potential applications; and second, to identify areas for improvement to optimize its deployment and encourage its adoption within the university educational environment.



Image 1. Edison Virtual Production Compact Studio at the University of Alicante

2. Methodology

The validation was carried out through an **online questionnaire** consisting of **16 questions**, combining closed-ended questions, rating scales, and open-ended responses to collect both quantitative and qualitative data.

Prior to answering the questionnaire, faculty members were invited to watch the [videos of Edison capabilities](#) and were offered short **demonstrations in case they needed it**. It is important to highlight that many of the teachers who finally answered the questionnaire were already familiar with Edison studio (not with the repository), either they have used or not in the past, because, as previously mentioned, it had been at the University premises for almost two years.

Once we made sure that every respondent knew about Edison, the next step was to **introduce the 3-D repository** so they can fulfil the questionnaire. Respondents were invited to [access the repository](#) directly or to attend any of the multiple demonstrations conducted throughout December 2024 and February 2025 at the Edison Studio of the University of Alicante.





Image 2. Demos about Edison and the repository

Invitations were made via **personalized emails** and also **in-person**. Those who visited the Edison Studio either watched the videos or attended a short **demonstration** where the repository’s operation was displayed on-screen, or they were allowed to **explore the platform independently**. That said, 28 out of 64 total respondents attended the demonstration personally.

After the demonstrations or individual exploration of the repository, the attendants answered the questionnaire (Annex 1) on site. Additionally, those already familiar with the Edison environment completed the survey **remotely from their own devices** without the need to visit the studio physically.

The methodological approach combines, therefore, **hands-on experience** with **systematic data collection**, allowing for a more comprehensive and realistic evaluation of the faculty’s perceptions and needs regarding the new 3D repository.

3. Results

3.1. Block 1. Context questions (Q1-Q5)

Question 1. Gender. The survey shows a relatively balanced distribution between male and female respondents, with a slight majority of female participants:

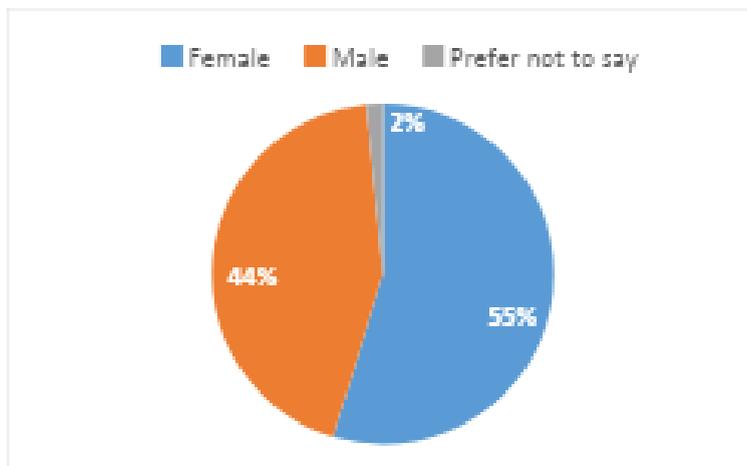


Chart 1. Gender of participants

Question 2. Age. Respondents span a wide age range, with the majority concentrated between 30 and 50 years old. This age spread is typical in the university context:

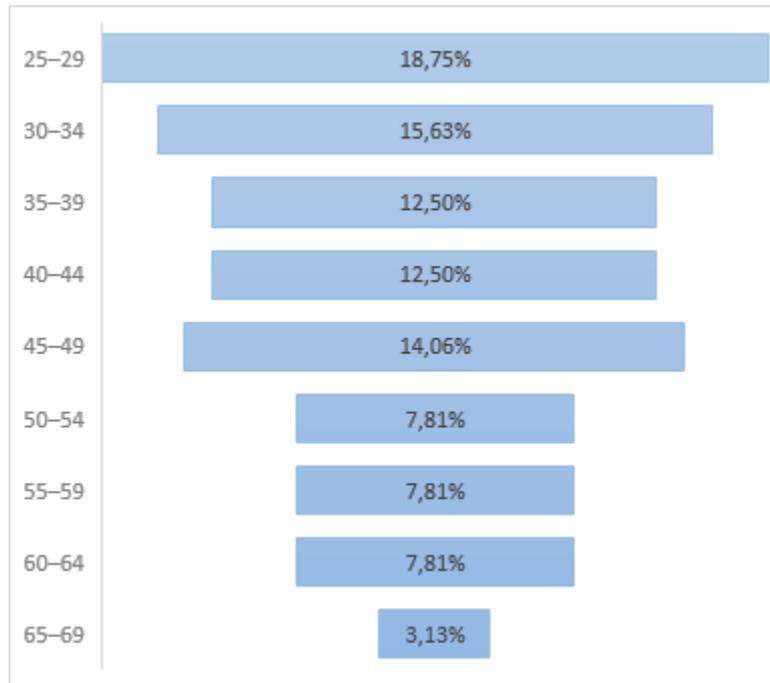


Chart 2. Age spread

Question 3. University role. This question was finally excluded from the analysis because all respondents are faculty members involved in teaching and research (PDI). We keep the questions so the order of the results outlined is not affected.

Question 4. Area of knowledge. Respondents come from a wide range of academic disciplines, with a notable representation in Social and Legal Sciences

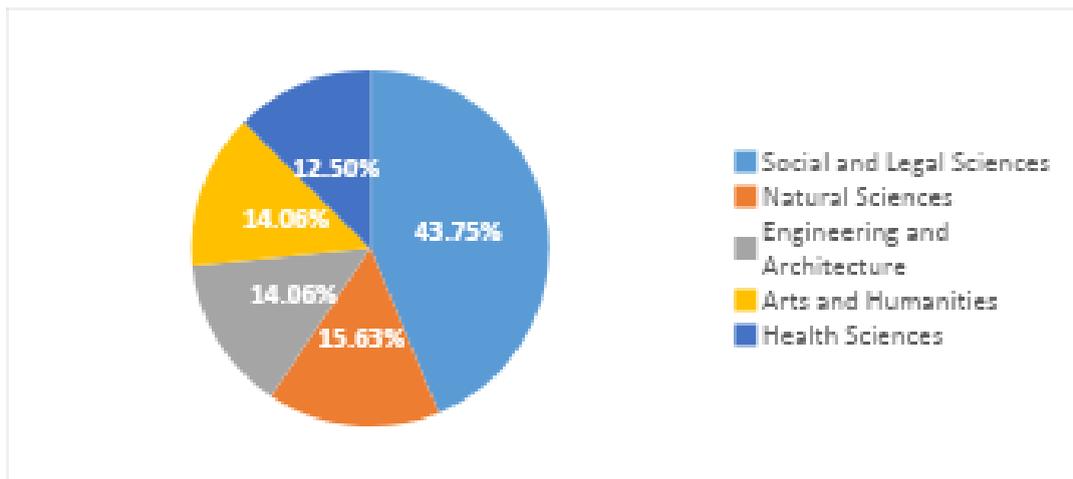


Chart 3. Area of knowledge

Question 5. Prior Use of 3D Models in Education. Most respondents have not yet used 3D models in their teaching, but there is a strong level of interest in doing so. This indicates a promising scenario for introducing the repository as a new teaching tool. Breakdown of responses:

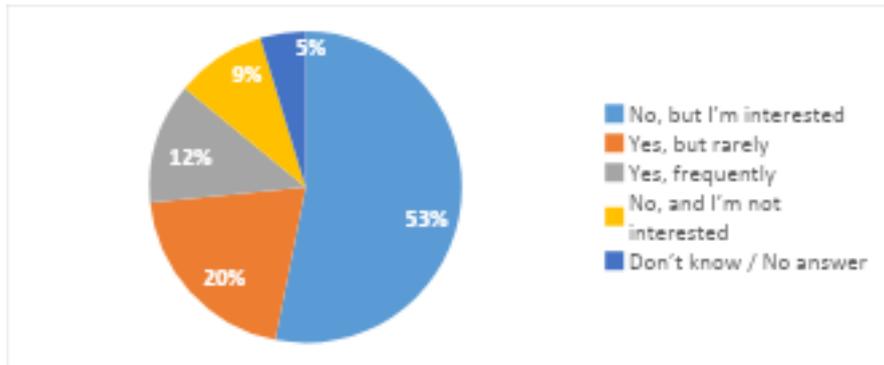


Chart 4. Previous 3D use

This response profile suggests that the repository can serve as a gateway for teachers who are curious about 3D models but haven't yet incorporated them into their practice.

3.2. Block 2. Structure, navigation, and key features (Q6-Q10)

Question 6. What did you think of the structure and organization of the repository? Overall, participants evaluated the structure of the repository positively. Most respondents found it clear and easy to use, though many also noted opportunities for minor improvements. It is noticeable that there were no responses for "Unclear, requires adjustments" and "Confusing or very difficult to navigate" which is very positive.

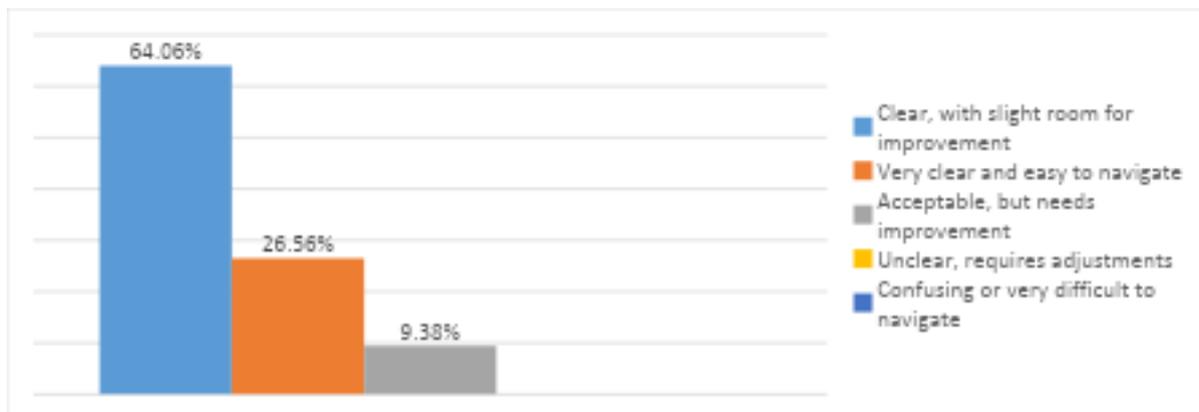


Chart 5. Opinion about structure and organization

These responses suggest that while the current interface is functional and intuitive, there are still ways to fine-tune aspects of the layout or user experience to improve overall usability.

Question 7. Did you find the 3D models you were looking for or that might interest you? Most respondents reported a generally positive experience finding relevant 3D models. However, the results also highlight a common desire for better search tools:

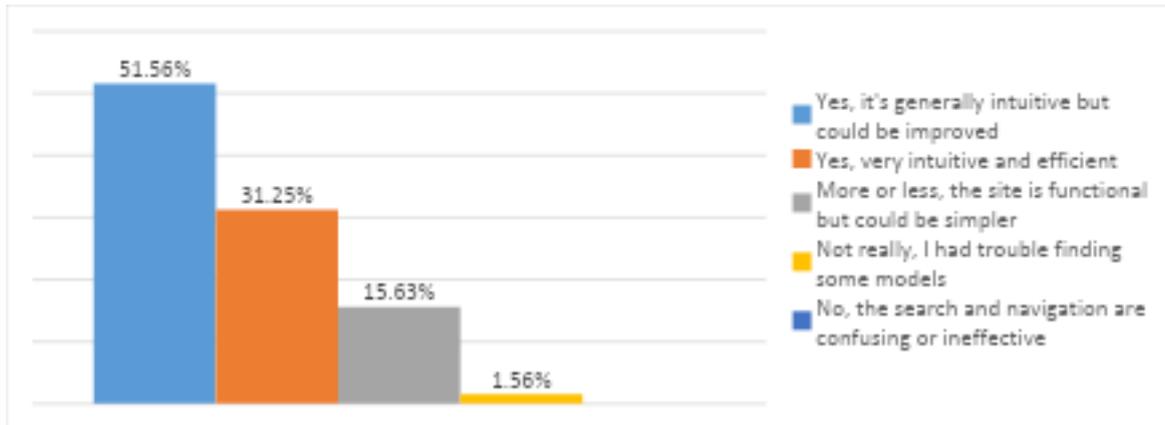


Chart 6. Browsing models

These findings suggest the platform's search system works well for most users but could benefit from refinement, particularly to support more diverse search strategies and personalized browsing as the number of items hosted is expected to grow.

Question 8. What do you think of the categories used to display the 3D models? Respondents generally viewed the categorization system as helpful, but many also suggested improvements:

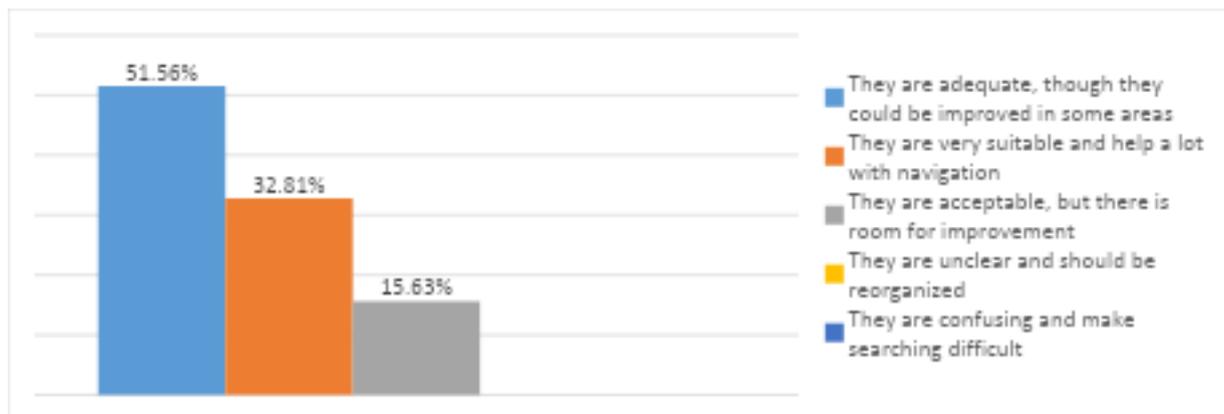


Chart 7. Categories used

This distribution indicates that while the structure is useful, a more detailed or flexible categorization scheme might better serve the needs of university educators in different disciplines.

Question 9. Do you think any important feature or aspect is missing from the repository website? (*Open-ended response*). This question generated 50 unique responses, demonstrating a high level of engagement from faculty participants. The suggestions were rich in content and spanned six major thematic categories:

- Search and navigation enhancements.** Many participants emphasized the need to make the **search bar or magnifying glass more visible**. A **site map or index** was also suggested to improve navigation. Other responses requested a **more advanced filtering system**, enabling users to sort by **educational level, technical category, subject, historical era, or anatomical system**, depending on the academic discipline.
- Category expansion and refinement.** Several participants pointed out that the current categories are **too broad or generic**. They proposed the addition of **optional subcategories**, division by **subject areas**, or **more granular thematic groupings** to improve clarity and ease of use. This was particularly important for

users in fields like **health sciences, engineering, and arts**, who need specific kinds of models grouped accordingly.

3. **3D model visualization tools.** A common request was for **better model previews**. Respondents wanted to be able to **rotate models, zoom in**, and see them from different angles **before downloading**. Some proposed integrating a **3d viewer** directly into the website to allow model inspection without having to download files.

4. **User interaction and community building.** Another strong theme was the need for **interaction tools**, such as the ability to **rate models, leave comments, or share personal experiences**. Several respondents suggested creating a **forum for collaboration or model requests**, and some proposed **sharing model collections or personal folders** with peers. These ideas point toward building a community of practice where users not only consume but also contribute and reflect together.

5. **Pedagogical support materials.** Many respondents felt that the repository should offer **teaching resources alongside the models**, including classroom use guides, sample lesson plans, example presentations using 3d models or links to related multimedia resources. This requests the repository to evolve into a true teaching support tool—not just a database of files.

6. **Advanced functionalities for specific use cases.** Some suggestions were more technical, such as ensuring **compatibility with e-learning platforms** (e.g., moodle, google classroom) and **3d modeling tools** (e.g., blender, unity). Other ideas included the ability to download models in **different formats, customize colors or textures, see quality indicators** for each object or group related models into **custom sets or collections**. However, these requests mostly came from participants with more specialized or advanced digital teaching practices.

Question 10. What do you think of the idea of allowing users to rate 3D models (using stars and comments)? This proposal received an overwhelmingly positive response. Most educators viewed the ability to rate models as a highly valuable feature to help identify the most relevant and high-quality content: 73,44% said that it was **“Very useful to help users identify quality or relevant models”**, while **23,44% answered “Could be useful in some cases”**, which makes almost the total of responses, adding the **3,13% of “Unsure” responses**.

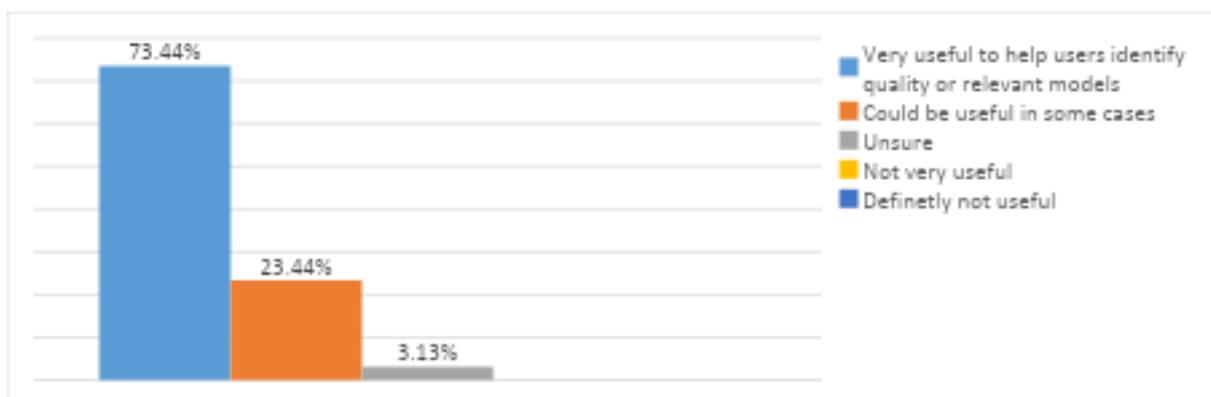


Chart 8. Rating models usefulness

This high level of support indicates that a rating and comment system would not only add functionality but also contribute to a sense of **community feedback and shared criteria**. It aligns well with the principles of peer-based recommendation systems and adds credibility to model selection.

3.3 Block 3: Usefulness and potential applications (Q11-Q13)

Question 11. Do you think this repository responds to a real need among teachers and/or students?
 Responses show a **generally positive perception** of the repository’s value. Nearly half of the participants believe it **partially meets real needs**, while one-third assert that it does so **completely**. A minority remain unsure or believe its usefulness depends on specific contexts:

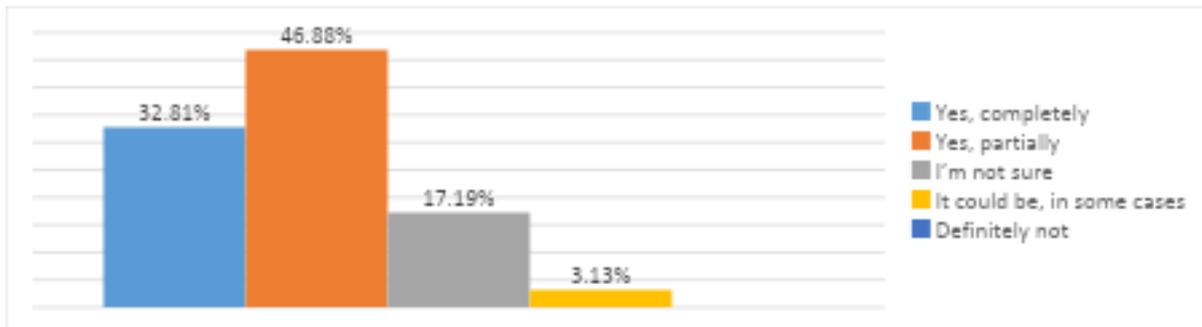


Chart 9. Response to real needs

These findings suggest that the concept of a 3D model repository is widely accepted as relevant in higher education. The hesitation observed in some responses likely relates to concerns about alignment with specific subjects or the ease of integrating it into course design.

Question 12. How useful do you think this repository could be in the following educational settings?
 Participants were asked to consider the potential usefulness of the repository among different educational contexts. The following chart summarizes their responses, with the blue colour representing an extreme usefulness:

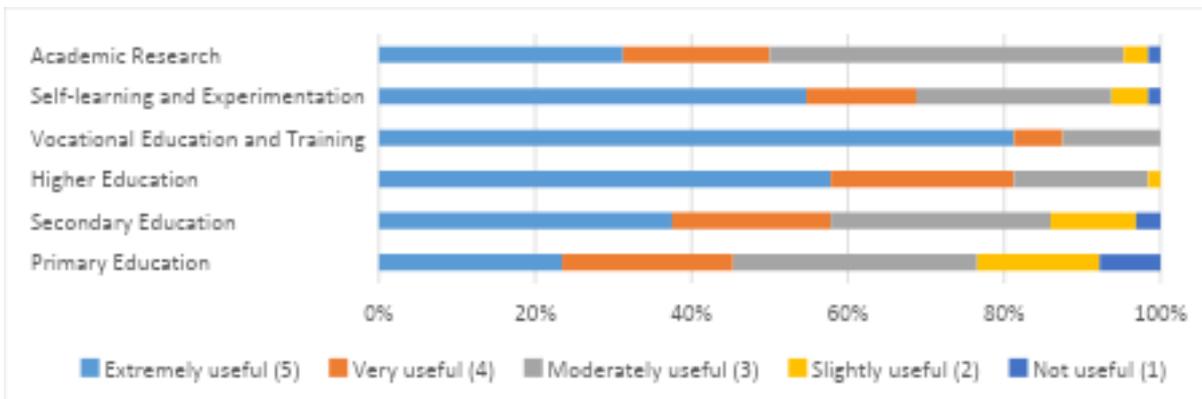


Chart 10. Perceived usefulness

- **Primary Education:** At this level, there is some skepticism, though nearly half of respondents recognize moderate to high utility. This implies that 3D models could support the development of **visual learning and tangible explanations**, as long as they are appropriately adapted to children's cognitive level. Data: **Extremely useful:** 23,44%; **Very useful:** 21,88%; **Moderately useful:** 31,25%; **Slightly useful:** 15,63%; **Not useful:** 7,81%
- **Secondary Education:** The potential for secondary education appears significantly higher. Almost 60% of participants consider the repository very or extremely useful for this level. It is seen as a resource that could **enhance lessons in biology, chemistry, technology, and history**. Data: **Extremely useful:** 37,50%; **Very useful:** 20,31%; **Moderately useful:** 28,13%; **Slightly useful:** 10,94%; **Not useful:** 3,13%

- **Higher Education:** This is the most favorable scenario. Over 81% rate the repository as very or extremely useful at university level. This confirms that **specialized and autonomous learning environments** are ideal for integrating 3D objects in teaching. Data: **Extremely useful:** 57,81%; **Very useful:** 23,44%; **Moderately useful:** 17,19%; **Slightly useful:** 1,56%; **Not useful:** 0,0%
- **Vocational Education and Training (VET):** The highest score of all. The 3D repository is perceived as particularly well-suited for VET, where **practical training** and **procedural skills** are fundamental. Teachers see clear potential for simulating tools, processes, and equipment. Data: **Extremely useful:** 81,25%; **Very useful:** 6,25%; **Moderately useful:** 12,50%; **Slightly useful:** 0%; **Not useful:** 0,0%
- **Self-learning and Experimentation:** The repository is also considered useful for informal learning contexts. It appeals to **independent learners, hobbyists, or educators preparing personalized material**. Data: **Extremely useful:** 54,69%; **Very useful:** 14,06%; **Moderately useful:** 25,00%; **Slightly useful:** 4,69%; **Not useful:** 1,56%
- **Academic Research:** Usefulness in research is moderate. While some researchers find strong applications, many see the repository as **supportive**, but **not essential**, depending on the nature of their field or methods. Data: **Extremely useful:** 31,25%; **Very useful:** 18,75%; **Moderately useful:** 45,31%; **Slightly useful:** 3,13%; **Not useful:** 1,56%

Question 13. As a potential user, what type of 3D models would you like to find in this repository? (*Open-ended*) The diversity of responses to this question is remarkable. Teachers from various disciplines envision the repository as a **versatile tool tailored to their teaching needs**. Their suggestions can be grouped into three major categories:

- A. **Instructional, content-specific models.** This is the most frequent type of response. Teachers want models that help **explain complex or inaccessible topics**—objects that are difficult to bring to class due to size, fragility, cost, or unavailability. Examples include: “Models of hard-to-find historical objects”, “Prototypes for engineering and manufacturing” or “Instruments and artifacts relevant to biology or medicine”. This group of responses clearly illustrates the pedagogical goal: **to bring abstract or remote content into a tangible, visual form**.
- B. **Anthropological, cultural, and symbolic representations.** Some educators requested models that represent **human diversity** or serve as tools for **cultural reflection and analysis**. These models are less about function and more about **stimulating dialogue, empathy, or critical thinking**. A notable example is the quote “Anthropological models: various human profiles by age, race, culture, expression...”. It is remarkable that the responses highlight the potential of 3D models to **complement qualitative and humanistic learning**, not just STEM fields, which is one of the expected outcomes of the repository.
- C. **Subject-specific models aligned with the curriculum.** Teachers also called for models explicitly linked to their subjects. They do not want generic models, but **those aligned with syllabi and learning outcomes**. In this sense, the quotes “For history classes, 3D reconstructions of historical buildings or tools”, “Anatomical models for health science courses”

“Art objects for teaching heritage and visual culture”, This feedback suggests that the repository should evolve to **curate content by discipline**, allowing educators to easily find what’s relevant for their context.

3.4 Block 4. Motivation to contribute and improvements (Q14 – Q16)

Question 14. If it were easy to create and upload 3D models from a mobile phone, would you be interested in contributing your own? This question gauged educators’ willingness to become active

contributors. The majority responded positively, though many emphasized that **ease of use would be key** to their participation:

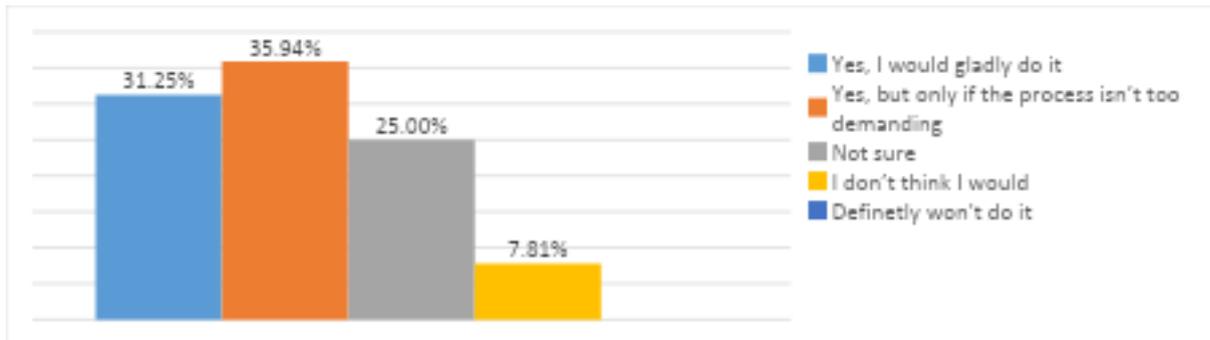


Chart 11. Interest in contributing

These results show that **over two-thirds would contribute** under the right conditions. However, many remain cautious, indicating that **a simple, guided, low-effort creation process** would be essential to activate their involvement.

Question 15. What would motivate you to contribute your own 3D models? Participants were invited to check between 1 and 3 options but were able to check on as many options as desired, which some of them did.

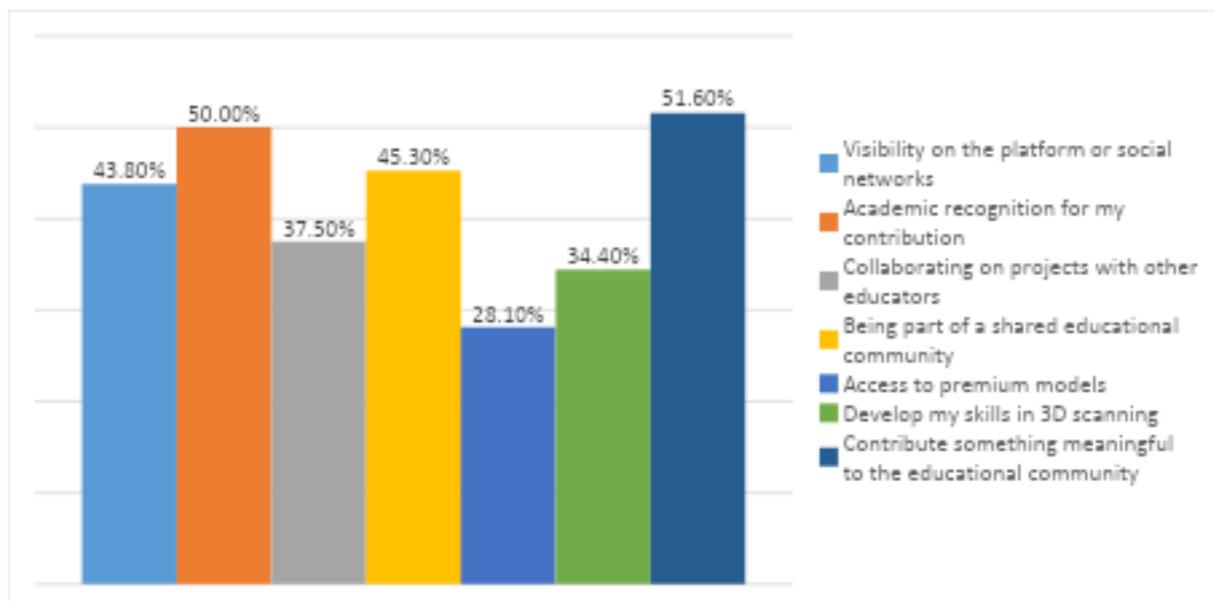


Chart 12. Motivation for contributing

Teachers' motivations can be grouped into three core themes:

a) Recognition and visibility. Many respondents would feel motivated if their work were recognized or visible on the platform and in academic or professional circles.

- "Visibility on the platform or social networks" (43.8%)
- "Academic recognition for my contribution" (50.0%) This reflects a desire to integrate content creation into their professional identity and advancement.

b) Collaboration and community. Others are drawn to the possibility of collaborating with peers and students, and exchanging experiences with other educators:

- “Collaborating on projects with other educators” (37.5%)
- “Being part of a shared educational community” (45.3%) This points toward a social and participatory model, where contribution is tied to a sense of belonging and exchange.

c) Access and skill development. Some were motivated by practical benefits, such as access to exclusive content or the chance to improve their digital skills:

- “Access to premium models” (28.1%)
- “Develop my skills in 3D scanning” (34.4%)
- “Contribute something meaningful to the educational community” (51.6%). These motivations blend personal development with altruistic contribution and suggest that incentive structures should support both aspects.

All in all, this block reveals a **strong interest in both using and contributing to the 3D repository**, especially when usability, relevance, and recognition are prioritized. Educators envision this platform not just as a storage space, but as a **shared educational ecosystem**—a place for co-creation, innovation, and discipline-specific teaching enrichment.

Question 16: Finally, what improvements or features could be added to make the repository more attractive? Unlike Question 9—which focused on identifying missing or insufficient features—Question 16 prompts a more forward-looking perspective, asking educators to envision how the repository could evolve to become more engaging. The responses go beyond diagnostics and reflect a design-thinking approach, suggesting strategies for improvement in user experience, interactivity, pedagogical support, and community participation.

In this case, the responses can be grouped into six main thematic areas:

1. Improvements in search and categorization. One of the most frequently mentioned points was the need for a more visible and functional search tool. Respondents specifically said that the current search bar or magnifying glass icon is not prominent enough and should be more clearly accessible from the homepage. There were also calls for more refined filtering options, such as:

- Search by specific academic subjects, not just broad areas.
- Ability to search within object descriptions, not only titles or keywords.
- Filters based on teaching use cases (e.g., “introduction to structures”, “human body”, “sustainable design”).
- Filters based on symbolic or thematic value (e.g., religion, nature, gender, power).

Furthermore, several suggested creating subcategories within main categories, including ideas like “Notable figures in a specific field” or “Major historical events”

As can be seen from the analysis, while Question 9 already raised concerns about overly broad categories, Question 16 adds an explicit pedagogical logic: educators want better organization, but also organization that reflects the educational content and use.

2. A more visually appealing and immersive interface. Several responses emphasized the importance of visual design and user experience. Teachers suggested that the landing page should include more images and fewer blocks of text, with larger and more engaging thumbnails for the models. They also proposed the ability to zoom in or rotate models directly on the webpage and to provide a side-by-side comparison mode to view multiple models simultaneously.

3. Examples of classroom use and practical guidance. Another interesting set of suggestions focused on showing real examples of how teachers use the models in class. This could take the form of:

- A gallery of practical examples of classroom use.

- Short tutorial videos explaining how to navigate or use the repository.
- Pedagogical cases to inspire other educators.

This would help onboard new users, lower the barrier to entry, and show the repository not just as a source of objects, but as a teaching support tool.

4. Integration with other educational tools. Many teachers expressed interest in seeing the repository integrated with tools they already use, apart from the Edison Virtual Production Tool, in which the repository will be integrated. Respondents refer mainly to the creation of an Edison mobile-friendly 3D model creation tool (so the users don't have to find out which tool in the market is better), and potentially including a built-in 3D slide editor.

Others suggested the possibility of downloading full model sets for use directly in Edison or related platforms, so users wouldn't need to manage multiple environments to access, edit, or display models.

5. Interactivity and model customization. There is strong interest in personalizing and interacting with models directly through the platform. Desired features include:

- Adding visible measurements or annotations
- Highlighting parts of the model with color or labels
- Exporting models with transparent backgrounds to better integrate them into presentations

These suggestions reflect a need for tools that go beyond static viewing—teachers want to adapt the models to their own teaching strategies.

6. Collaboration and community building. Several responses emphasized the importance of creating a collaborative ecosystem around the repository. Suggestions included being able to see who created or uploaded each model, facilitating contact between teachers to co-create model sets and enabling users to collaborate on shared categories or projects. One respondent even proposed a contribution-based access system, where users would only be able to download models if they had uploaded some of their own—like a point system or reciprocity model.

While many of the points raised in Question 16 echo concerns from Question 9, the tone here is more constructive and visionary. Educators aren't just asking for fixes—they are reimagining the repository as an attractive, pedagogically meaningful, and socially connected platform.

They want a tool that is not only functional, but also aesthetically rich, pedagogically supportive, and embedded in real teaching practices. Ultimately, they envision the repository not just as a collection of resources, but as a collective process of educational innovation.

4. Summary of results

The validation process of the 3D object repository, intended for educational use within the Edison Studio at the University of Alicante, has provided highly valuable insights regarding its perception and potential among university faculty members.

The participant profile showed a representative diversity in terms of age, gender, and academic fields, with a notable presence from the Social and Legal Sciences. Although most faculty members had not previously used 3D models in their teaching practices, there was a clear interest in doing so, indicating a highly favourable context for the implementation of this type of resource.

Regarding the repository's structure and navigation, feedback was very positive. Most participants considered the organization to be clear and functional, although several pointed out opportunities for improvement, particularly concerning the visibility of the search tool and the refinement of the

categorization system. Far from being negative criticism, these observations reflect an active engagement from the faculty in contributing to the optimization of the resource.

As for the functionalities, respondents highly valued the idea of introducing a rating and comment system for the models, considering it a feature that could bring transparency, relevance, and a greater sense of community among users. There was also strong interest in improving model visualization tools (such as integrated 3D previews) and in incorporating supporting educational materials, including usage guides and classroom application examples.

Regarding potential use, participants found the repository especially useful for vocational education and higher education levels, but they also expressed interest in its application for other educational stages and for self-learning purposes. Furthermore, many faculty members indicated a strong willingness to contribute their own models, provided the creation and upload process is easy and accessible.

Finally, the open-ended suggestions pointed towards a future development of the repository as a more visual, interactive, and discipline-specific tool. There was also a strong desire for the repository to foster a culture of collaboration among educators, based on the exchange of innovative educational resources and experiences.

5. Conclusion

The survey results allow us to conclude that **having a 3D object repository integrated within the Edison environment can be a key factor in promoting the use of immersive technologies among university faculty members**. The ease of access to well-organized and categorized 3D models, combined with search, rating, and browsing functionalities, can **lower the barriers to adoption** for faculty members who are less familiar with advanced digital tools.

Moreover, the repository shows **significant potential to create an active community of engaged professors**, who will not only use the resource but also enrich it through participation and collaboration. Such a community could serve as a **transmission belt** to reach and support colleagues who are more reluctant or hesitant to incorporate new technologies into their teaching practices, facilitating a broader and more organic adoption of the repository within the university environment.

Furthermore, the project of integrating the repository into Edison **opens new opportunities for fostering innovation in traditionally less technology-oriented disciplines**, such as the **humanities and social sciences**. By providing easy access to discipline-specific models and tools, the repository can encourage faculty from these areas to experiment with active, visual, and innovative teaching methodologies, thus enriching their educational practices and expanding the impact of the Edison project as a transversal innovation platform.

6. Validation Questionnaire for the e-DIPLOMA Assets Repository

This document is a translation from the original questionnaire in Spanish, that can be found [HERE](#).

Introduction

The e-Diploma Assets repository (<https://ediploma-assets.com/>) is a resource developed by the University of Alicante, currently in its pilot phase. It allows teachers and students to access educational 3D models and upload their own models using free online tools. The objective of this questionnaire is to assess the usefulness and usability of the repository, as well as to explore its potential in the educational field.

Your feedback is key to improving the platform. Answering this questionnaire will take no more than 5 minutes. Thank you for your collaboration!

Block 1: Context (Q1-Q5)

1. Gender: Male Female Other Prefer not to say
 2. Age: 1- 99
 3. What is your role at the university?
 Teacher
 Administrative staff
 Student
 Other (please specify): _____
 4. In which field of study or work are you involved?
 Arts and Humanities
 Natural Sciences
 Health Sciences
 Social and legal Sciences
 Engineering and Technology
 Other (please specify): _____
 5. Have you ever used 3D models in an educational setting?
 Yes, frequently
 Yes, but only a few times
 No, but I am interested
 No, and I am not interested
-

Block 2: Usability of the assets repository (Q6-Q10). Please answer after browsing the repository's website: <https://ediploma-assets.com/>

1. What do you think about the structure and organization of the repository?
 Very clear and easy to navigate
 Acceptable, but could be improved
 Not very clear, needs adjustments
 Confusing or difficult to navigate

2. Did you find the 3D models you were looking for or that might interest you easily?
 - Yes, searching and browsing are intuitive
 - Somewhat, but it could be easier
 - No, I had difficulty finding models
 3. What do you think about the categories chosen to display 3D models?
 - They are appropriate and make searching easier
 - They are acceptable but could be improved
 - They are not clear and should be reorganized
 - I am not sure
 4. Do you think any important functionality or feature is missing from the repository's website?
(Open-ended response)
 5. What do you think about the possibility of providing feedback on 3D models (users will be able to rate them up to 5 stars and leave comments)?
 - I think it's very useful for users to identify high-quality or interesting models
 - It could be useful in some cases
 - I don't think it's very useful
 - It is not useful at all
-

Block 3: Usefulness and potential uses of the repository in Education (Q11-Q13). Let us know about your perception of the usefulness of the repository in the field of education by answering the questions in this section.

1. Do you think this repository addresses a real need for teachers and students?
 - Yes, absolutely
 - Partially
 - I am not sure
 - Probably in few cases
 - No, I do not consider it necessary
 2. For each of the following educational settings, please indicate how useful the repository might be (*1 = useless to 5= Very useful*)
 - Secondary education
 - Higher education
 - Vocational training
 - Self-learning and experimentation
 - Academic research
 - Other (please specify): _____
 3. As a potential user, what type of 3D models would you like to find in a repository like this?
(Open-ended response)
-

Block 4: Motivation to participate and improvements (Q14-Q16). Users of the repository can create 3D objects themselves and upload them to the platform so that other users can use them in their classes. To do this, they can use free tools that are compatible with E-Diploma. It is also possible to add information about potential uses of the object in specific lessons.

1. If there were an easy way to create 3D models with a mobile phone and upload them to the repository, would you be interested in contributing your own models?
 - Yes, I would gladly do it
 - Yes, but frequency will depend on the process
 - I don't know if I would do it
 - I don't think I would do it
 - No, I am not interested

2. What would motivate you to contribute your own 3D models to the repository? (*You can select multiple options*)
 - Recognition within the educational community
 - Certificates or mentions on the platform
 - Opportunity to share resources with other teachers/students
 - Personal satisfaction of contributing knowledge
 - Other (please specify): _____

3. What improvements or additional features would you add to the repository to make it more attractive? (Open-ended response)

Thank you for your time and participation!

Your feedback will help improve e-Diploma Assets and turn it into an even more useful tool for education using immersive technologies.

ANNEX III – GUIDE TO THE BLOCK PROGRAMMING COURSE

- TECHNICAL DESCRIPTIVE REPORT - BLOCK PROGRAMMING COURSE



ANNEX III - CONTENTS

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0. Block Programming and Electronics

This course is available on the e-DIPLOMA platform for all enrolled students. It consists of five modules organized into two thematic blocks: Block Programming and Electronics.

Modules 1 and 2 focus on Block Programming, with Module 1 covering theoretical concepts and Module 2 providing practical exercises. Similarly, Modules 3 and 4 address the Electronics topic, with Module 3 dedicated to theory and Module 4 to hands-on practice.

The fifth and final module is a collaborative activity that integrates and applies the knowledge acquired throughout the previous modules.

1. Module 1 - Basis of Programming (block programming theory)

1.1 Concept

This module consists of audiovisual content distributed over four videos covering the fundamental concepts of programming. This content, made with the Edison tool, has been designed to provide an introductory foundation for preparing students for the practical activities in the second module.

1.2 Activity Flow

In this module, the user experience is based on watching the four theoretical videos, each lasting approximately 1 to 3 minutes.

All videos can be accessed through links on the Moodle page of the e-DIPLOMA platform. This module is available from any computer or smartphone with an internet connection.

The course adopts a visual programming approach, where programming is done by manipulating graphics blocks that fit together like puzzle pieces. Block programming is presented as a great option for introducing programming to beginners of all ages, helping them develop essential programming competencies.

In the first video titled What's Programming All About?, the concept of programming is explained in general terms, along with the approach that will be used throughout the course. Specifically, this first video illustrates what programming is, the importance of sequentiality in code, and the programming language that will be used throughout the course.

The second video (Loops: The Repeaters of Coding) and third video (The conditional: Making Decisions in Code) introduce common control structures in programming, such as loops and conditional statements. In the case of loops, the video teaches the repetition of instructions using the "for" loop. For conditionals, it shows how to make decisions based on whether a condition is true or false using the "if" statement.

This module finishes with the fourth video (Integrating What We Have Learned so Far) in which an example is provided where the previously covered concepts are integrated, and a block program's execution is broken down step by step. This video prepares students more concretely for the practical exercises they find in the next module.

The first and last videos must be watched in the same order, but the videos about loops and conditionals can be watched interchangeably.

Figures 1 and 2 show some frames of these videos.



Figure 1: A frame from the video Loops: The Repeaters of Coding

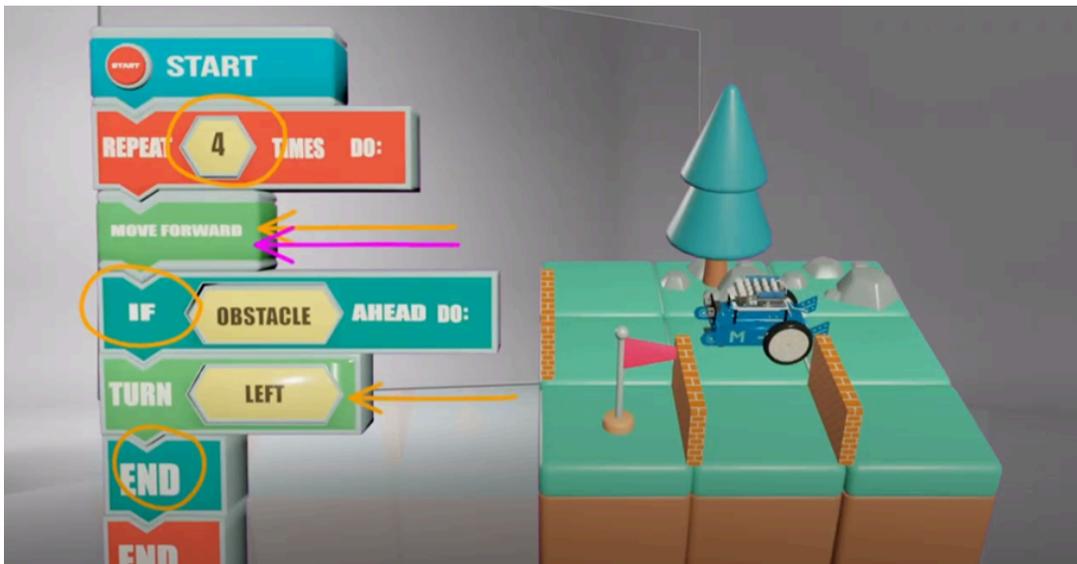


Figure 2: A frame from the video Integrating What we Have Learned so Far

2. Module 2 - BlockDrive Rescue (block programming practice)

2.1 Concept

This module consists of an interactive experience in an iVR environment. It proposes various challenges that require the application of fundamental programming competencies to solve them. Through this engaging and hands-on approach, students practice all the concepts covered in Module 1.

2.2 Activity Flow

To launch this module, it is necessary to access the *e-DIPLOMA Lobby Tool* through the corresponding link provided in the course. A user with a teacher role must create a room that the student user will then join. Once the student is inside, the teacher should lock the room and launch the application.

In order for the application to run properly, the *e-DIPLOMA launcher* must be installed on the user's computer. Additionally, a VR headset such as the HP Reverb G2 Omnicept must be connected to ensure full functionality of the module.

BlockDrive Rescue represents 6 exercises to be solved through block programming. The objective in each exercise is to program the behavior of a virtual robot car based on an Arduino system that must reach the plants in an environment composed of cubes to capture their humidity. The proposed exercises are of increasing and incremental difficulty.

Figure 3 shows what this module looks like and indicates all the elements of which this experience is composed.

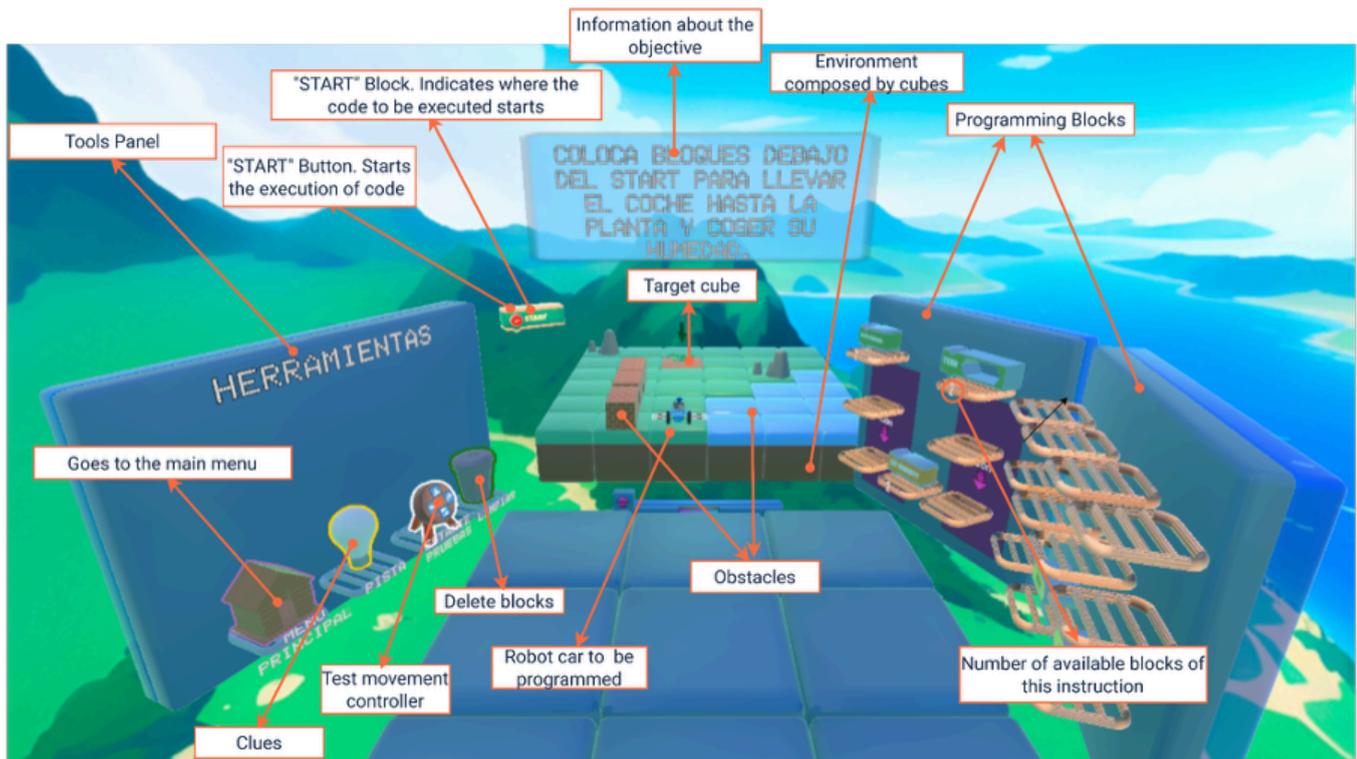


Figure 3: Elements of the environment of Module 2

At the beginning of the experience, the student has the possibility to access two tutorials. One of them, the *Controls tutorial*, prepares the student to get familiarized with the controls through an interactive manner. The *Dynamics tutorial* explains the rules of the exercises interactively.

After completing the tutorials, the students must solve the exercises by dragging and dropping blocks that represent code instructions under the block "START". The student has to correctly complete the current exercise to move on to the next one. To solve each of the exercises, the student has specific instructions available to compose their code, which increase according to the difficulty of the exercise. Each exercise is designed so that only one correct solution is possible.

The first exercise focuses on practicing fundamental concepts of programming, such as the order of the execution of instructions. Moreover, this exercise allows students to get familiarized with the environment, with block-based programming, and to gain an overview of the broader context for subsequent exercises.

The second exercise incorporates the requirement to use different instructions, introducing a slightly higher level of difficulty. This way, students are challenged to expand their understanding and proficiency with new programming commands. By doing so, it not only reinforces the concepts of sequential programming but also facilitates the acquisition of additional knowledge about various instructions.

Exercise 3 introduces the concept of loops. At this stage, students are required to solve the first proposed exercise using a loop, understanding the operation and advantages of using this control statement.

Exercise 4 encompasses all the elements covered previously, including sequential execution and loops, and introduces the conditional control structure.

In the fifth and sixth exercises, new concepts are not introduced, but they require students to delve deeper into making more complex code using loops and conditionals. These exercises are designed to push students beyond basic instruction usage, encouraging them to explore more complex solutions. Through these exercises, students will not only solidify their understanding of fundamental programming concepts but also enhance their ability to manage and organize code more effectively and refine problem-solving competencies.

At the end of each exercise, students obtain the time they have completed the current exercise. Additionally, when students make a mistake in the code of any exercise, the system provides feedback for them to revise the code. Figure 4 represents the activity flow.

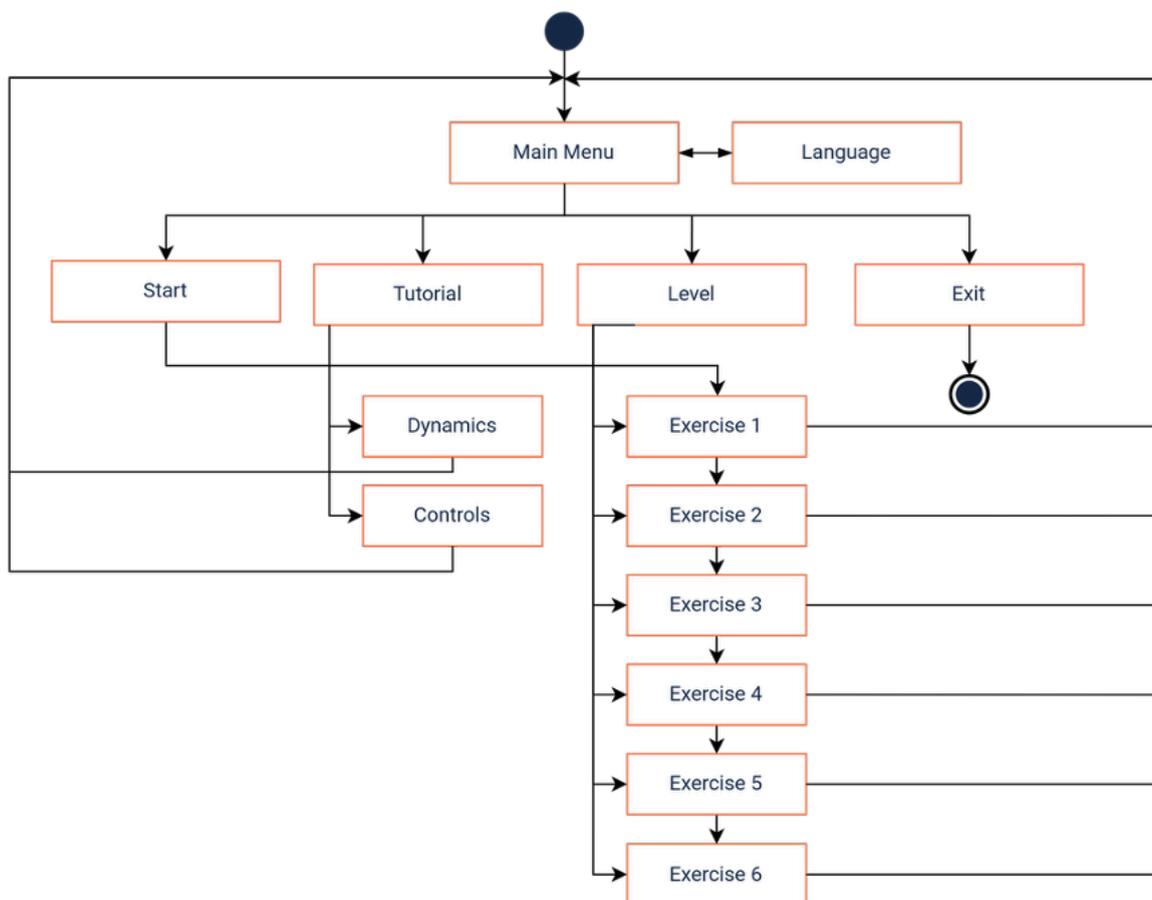


Figure 4: Flow Diagram of Module 2

In this module, users can interact with the environment and perform various actions using the following controls:

- Grabbing Objects: Drag and drop programming blocks by holding down the “Grip Button”.
- Remove Objects: Reset the position of a block by holding down the button “A Button”
- Interaction with buttons: Press buttons or interact with UI elements in the virtual interface by pointing at them and pressing the “Trigger”.

Figure 5 represents the controllers and actions.

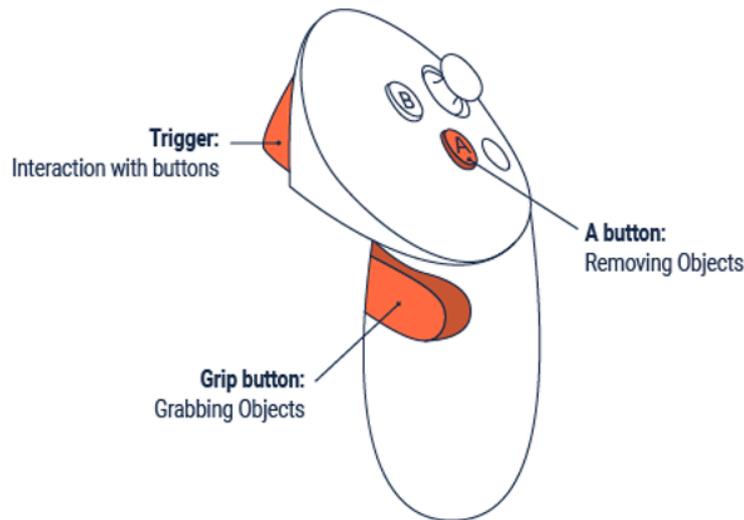


Figure 5: Module 2 controls

3. Module 3 - Basis of Electronics (electronics theory)

3.1 Concept

Same as the first module of the course, this module consists of audiovisual content made with the Edison Desk. This module prepares the students to **understand key concepts** of microcontroller board, sensors, and actuators. To produce these videos, 3D objects with animations from Module 4 are used to support the explanations. In addition, Edison features have been used to create a more engaging experience.

3.2 Activity Flow

This module is divided into **two videos** of about 2 minutes each. All videos can be accessed through links on the Moodle page of the e-DIPLOMA platform and are available from any computer or smartphone with an internet connection.

The first video, titled *First Steps into the World of Electronics* explains what an Arduino board is and the role of sensors and actuators. As examples of sensors, ultrasonic and humidity sensors are presented. Additionally, actuators are exemplified by servo-driven wheels and LEDs. These sensors and actuators, together with the Arduino board form the system on which the robot car that the student has

programmed in module 2 is based. The blocks of movement, obstacle detection and humidity measurement are instructions that are related to the functionality of this system.

The second video, called *Connecting Arduino, Sensors, and Actuators*, explains the assembly of an Arduino system and how it works. It also presents an additional board that facilitates the connection of the components and that will be used in the subsequent modules. The video ends with an example of the behavior of the robot car, relating the programming modules to the electronics modules.

Figure 6 shows a frame of one of these videos.

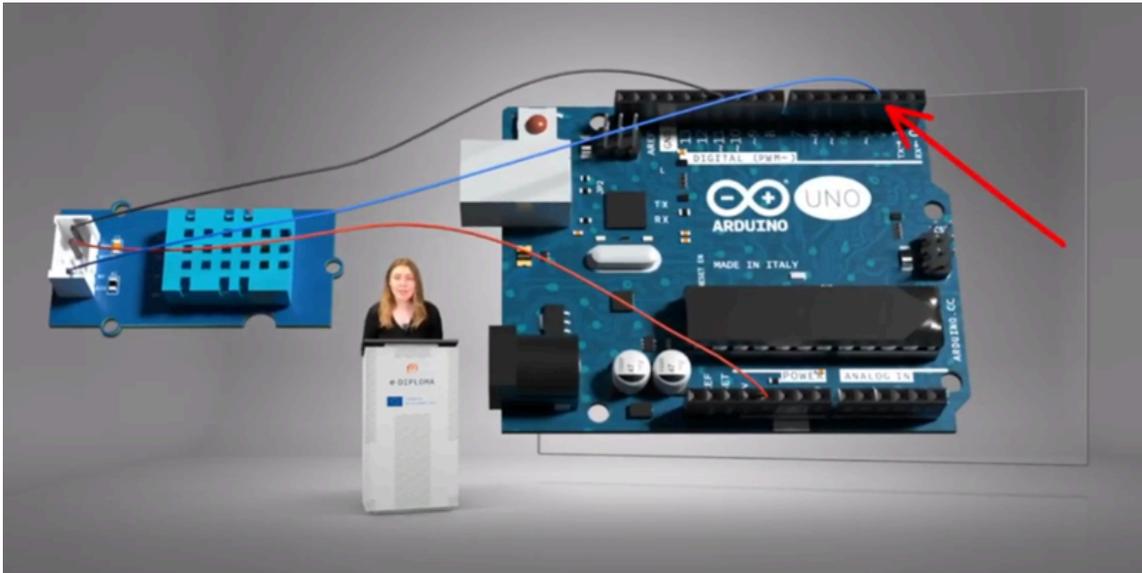


Figure 6: A frame from the video *Connecting Arduino, Sensors, and Actuators*

4. Module 4 - ARduino Learn (electronics practice)

4.1 Concept

This module is based on an Augmented Reality application, which is designed to learn electronic components and their assembly. In this module, students will learn in greater depth what was covered in the previous module by expanding on the actual components, along with an interactive activity.

4.2 Activity Flow

ARduino Learn is designed to teach information about the components of Arduino UNO board, Arduino shield V2, Grove ultrasonic Ranger V2.0 sensor, and DHT11 V1.2 humidity and temperature sensor.

To effectively run and install this module, a smartphone or tablet with Android Operating System is required. It must be capable of running AR applications with an integrated camera. It is recommended that the Android version is 7.0 or higher. It is necessary to allow the installation of applications of unknown origin. If this is not possible, it is necessary to change the device settings.

Additionally, a print template is needed to activate the 3D models in practice mode. Moreover, the following physical electronics components are necessary: Arduino UNO Shield, Base Shield V2, Grove Ultrasonic Ranger V2.0 sensor, and DHT11 V1.2 temperature and humidity sensor.

When the application starts, a main menu is shown (see Figure 7). Four options are available: "Start", "Tutorial", "Instructions", and "Exit". The "Start" option allows the student to begin the activity by choosing one of the two available modes (see Figure 8). The "Tutorial" option teaches how the *Component Mode* activity works in an interactive way. The "Instructions" option displays an overview of how the application works and how to navigate the interface. Finally, the "Exit" option closes the app. Additionally, the language of the application can be changed by touching on the flag icon.

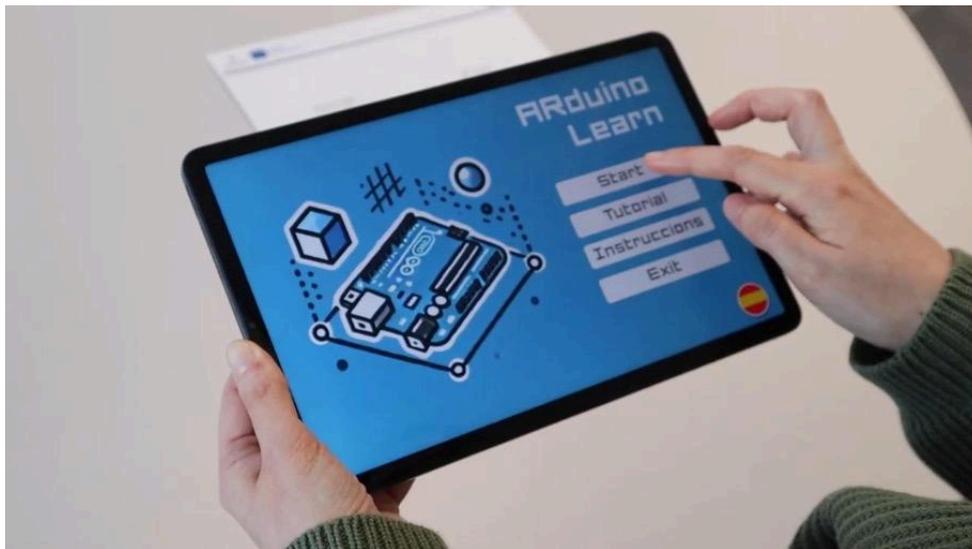


Figure 7: Main menu of ARduino Learn application



Figure 8: Modes selector

The two main modes of the application are the *Component Mode* and the *Assembly Mode*. The *Component Mode* is to explore theoretical information over real components. In this mode, the student must point at the actual components using the device's camera.

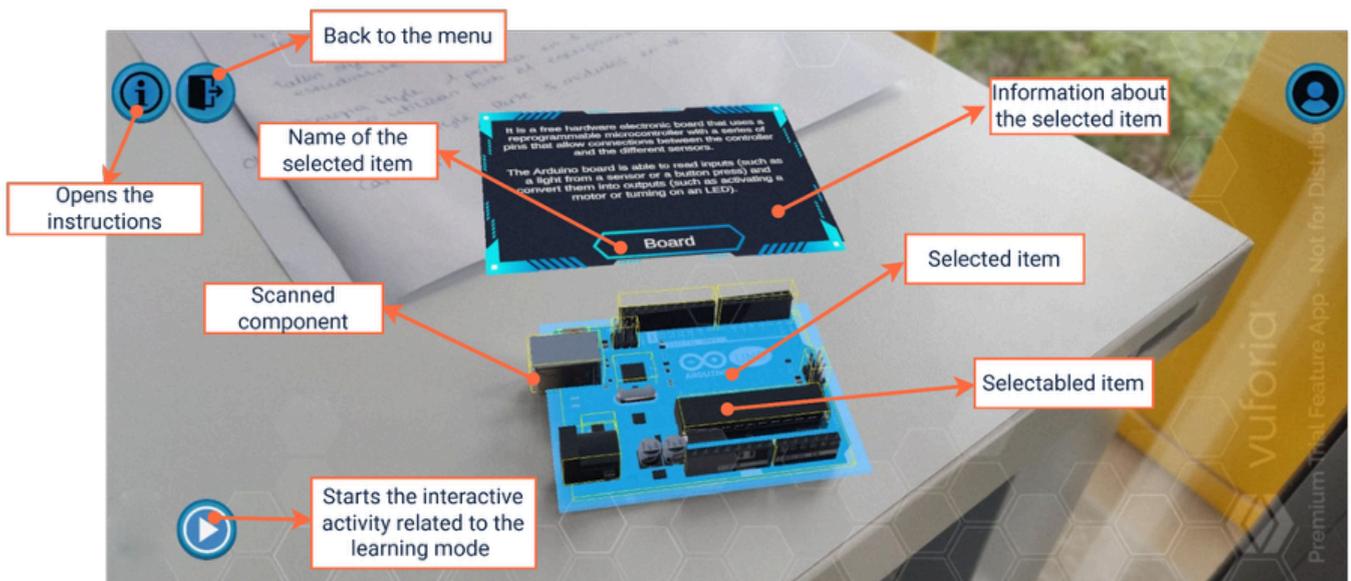


Figure 9: Explore activity of Component Mode

The application overlays detailed information about the parts of each component (see Figure 9). In this mode, there is a “Play” button that starts an interactive activity where the user must select and place the names of each component part in its corresponding description (see Figure 10).

When the name of that component is placed, it becomes transparent, and the corresponding component part is colored in purple. Selected parts are highlighted in blue, and components with the name already assigned appear in grey. The student can end the game by pressing the “Finish” button (represented by the finish flag icon), at which point the results are displayed, indicating how many assignments were correct.

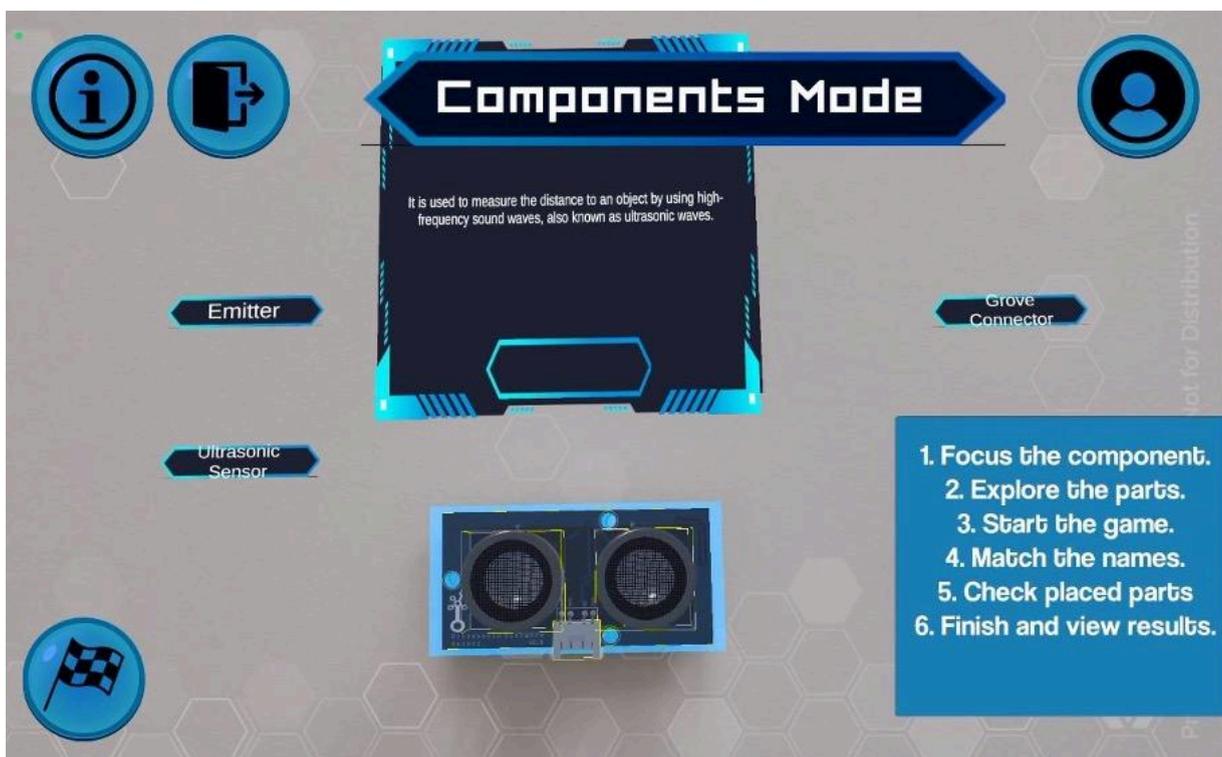


Figure 10: Interactive activity in Components Mode



Figure 11: Paper template and the correct component locations

In the *Assembly Mode*, the student must use the print template to correctly locate the components. Figure 11 shows what the template looks like and the correct location of the electronic components. During this activity, the student will learn how to assemble an Arduino shield with sensors using the Grove connectors. This process is carried out by touching the sensor and then the port on the base shield where it is to be connected. It is important to know that the sensors must connect to digital ports according to what was learned in the previous mode.

Not all connections are allowed; for example, two sensors cannot be connected to the same port on the base shield. If the connections are correct, a message will appear confirming this.

Additionally, there is a button that allows the student to disconnect every cable at the same time if needed. Figure 12 shows what this mode of practice looks like. The flow diagram of this module can be seen in Figure 13.

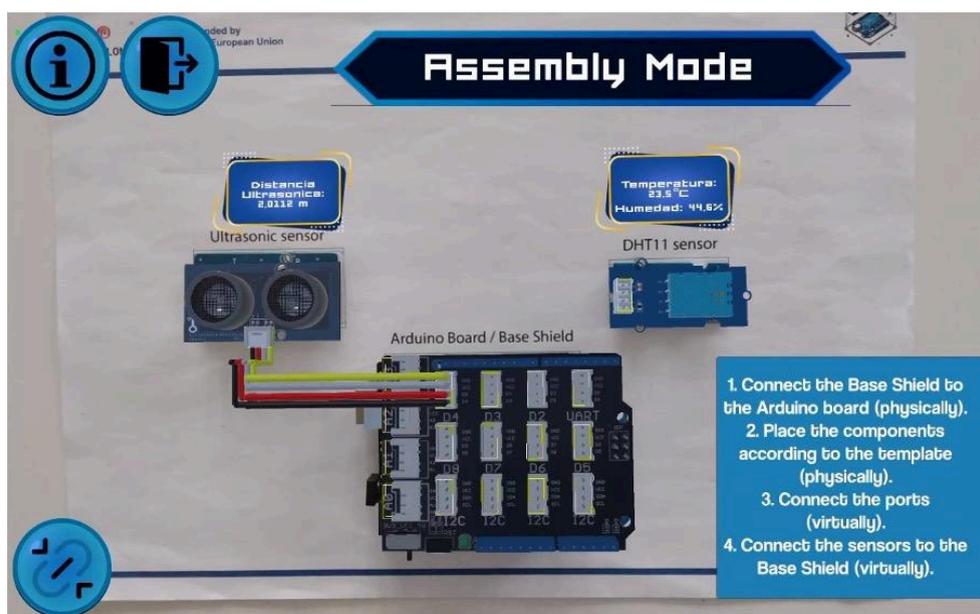


Figure 12: Assembly Mode

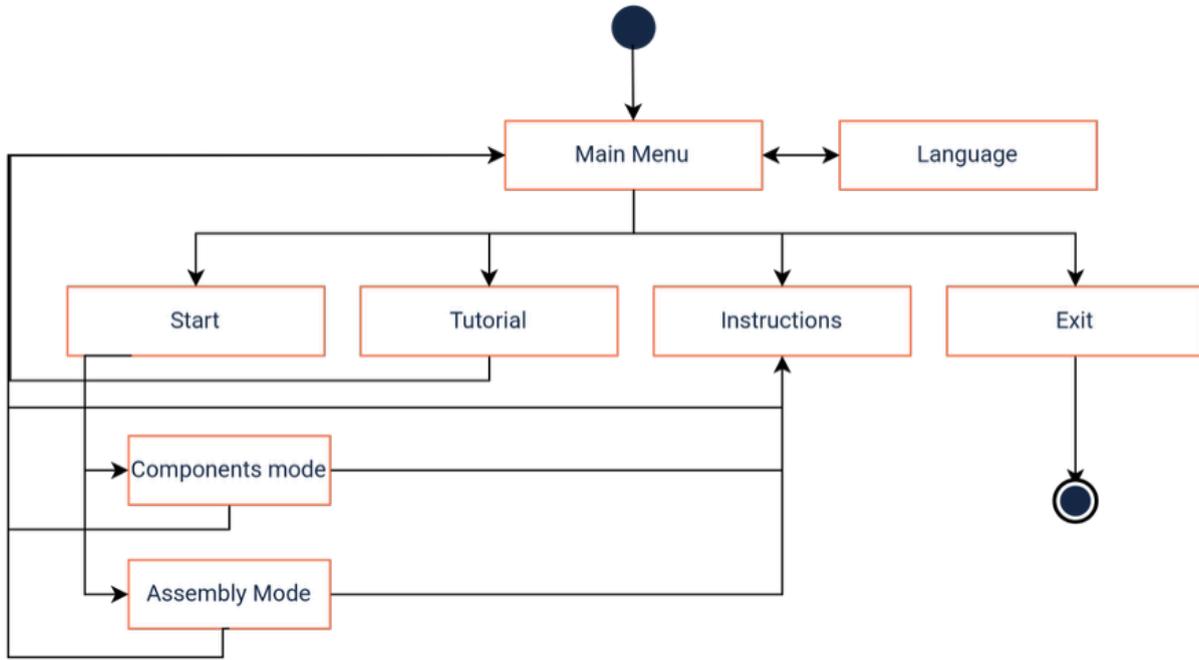


Figure 13: ARduino Learn flow diagram

5. Module 5 - BlockDrive Rescue Collaborative (final practice)

5.1 Concept

This final module is a collaborative activity in an iVR environment for two participants. The activity takes place in a setting already familiar to students from Module 2. The virtual robot car, which was programmed in Module 2 and whose components were detailed in Module 4, is reintroduced here, with its assembly serving as a preliminary step to programming. In this way, the module functions as a culminating activity that integrates both programming and electronics, reinforcing the competencies developed throughout the course.

5.2 Activity Flow

To run this module, both students must access the corresponding resource from a computer with a connected VR headset. Each student must launch the application through the *e-DIPLOMA Lobby Tool*, following the same procedure as in Module 2.

At the beginning of the activity, they are prompted to select a mission from *Save the Amazon*, *Reduce Climate Change* or *Avoid the Zombie Attack*. Each mission has a different narrative and visual goal: in *Save the Amazon*, players monitor the humidity levels of plants; in *Avoid the Zombie Attack*, they activate buttons to raise walls; and in *Reduce Climate Change*, they collect scattered trash throughout the environment. Nevertheless, all missions share the same gameplay objective, the students must collaborate to program their robotic cars to reach the four checkpoints on the grid.

Player 1 is responsible for selecting the mission. Once it has been chosen, both students assemble their robot cars, which they will then program to accomplish the mission's goal (see Figure 14).

The VR robot car used in this module is the same one programmed in Module 2, controlled by an Arduino system covered in Modules 3 and 4. Whether the mission can be successfully completed depends on the sensors installed on the car. For example, if students select the *Save the Amazon* mission, where the goal is to monitor plant humidity, the robot car must be equipped with an ultrasonic sensor to detect obstacles and avoid collisions as it moves through the environment, as well as a DHT11 sensor to gather data on plant humidity.



Figure 14: Building robot car phase

Once both students have assembled their cars, an explanation of the game appears. They share the same virtual environment, positioned face-to-face with a grid made of cubes between them, on which each robotic car is placed (see Figure 15).



Figure 15: Collaborative environment of Module 5

To complete the mission, the students must program the movement of each robot so that it reaches the four checkpoints. The activity is structured as a **turn-based game**, with each round consisting of two phases: the *programming phase* and the *code-execution phase*. The students must work together to complete the objective in the fewest possible rounds.

During the programming phase, each student defines the movement sequence their robot will follow in the next phase using the available code blocks. They can also view their partner’s code blocks to promote collaboration. Once both have finished programming, they must press the *Start* button to initiate code execution.

In the code-execution phase, both robots simultaneously perform the programmed movements. Each time a checkpoint is reached, new programming blocks are unlocked, allowing the robots to progress further within the same round.

The activity concludes when all four checkpoints have been reached. Figure 16 represents the activity flow of Module 5.

The interaction in this module is the same as in Module 2.

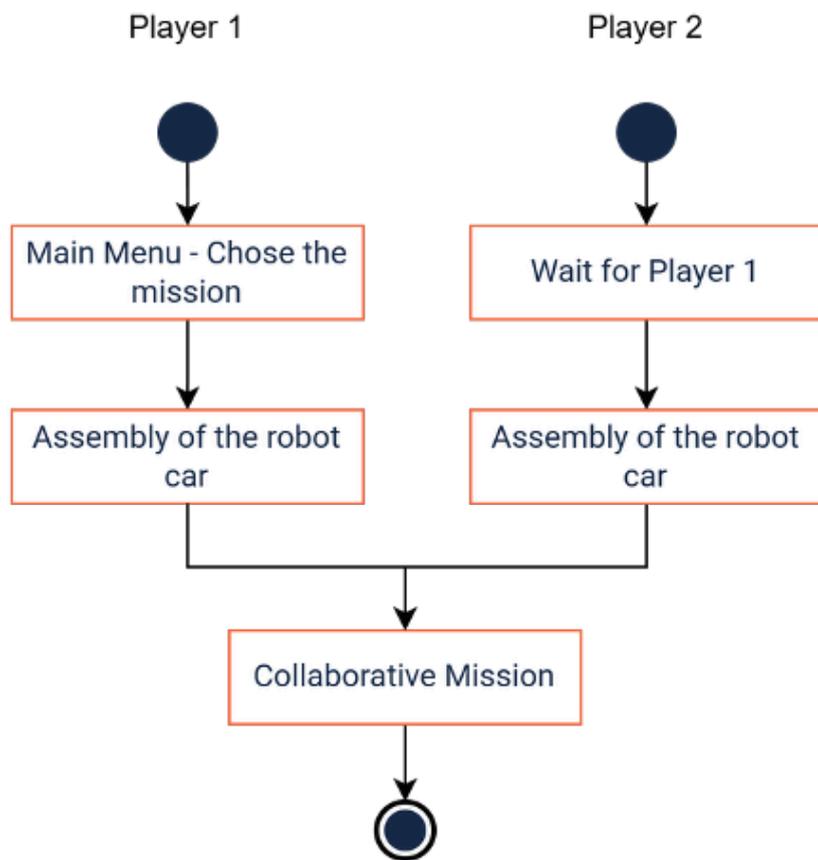


Figure 16: Flow diagram of Module 5

ANNEX IV – GUIDE TO THE SOCIAL ENTREPRENEURSHIP COURSE

- TECHNICAL DESCRIPTIVE REPORT - SOCIAL ENTREPRENEURSHIP COURSE

Guide by BME/ARIS under the e-DIPLOMA
Project



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1. Social Entrepreneurship

Students need to have access to the Moodle LMS as a user, and be enrolled in the Social Entrepreneurship course. On the course page, they can access all course material. The course is divided into five modules. Every module appears as a *topic* on the Moodle course page.

Some modules require the use of VR Headsets. For those, **having a VR headset is essential** to play. Specifically, the material was developed for the **HP Reverb G2 Omnicept** device. The activities should work with any VR headset running on **Windows Mixed Reality**. The activities are exclusively **made for Windows operating systems**.

A web browser (preferably Chrome) and the e-Diploma Launcher application should be installed on all student and teacher computers.

2. e-DIPLOMA Lodestars – The Social Entrepreneur

2.1 Concept

The module introduces social entrepreneurship, through examples, as contrasted with regular enterprises that lack a social focus, social services that lack an entrepreneurial component, and other activities like communal services, crime, or consumption.

The module aims to teach students about the various ways one can be a social entrepreneur, how they can help different communities and social classes in need, while maintaining a tenable business operation. Instead of presenting the classic examples in non-interactive descriptions, students can explore a city, talking to real social entrepreneurs, or at least virtual ones, who know the aspects of their respective activities, and can share their knowledge and ambition. Students must apply critical thinking, as not all characters they can talk to are exemplary social entrepreneurs, or even morally right.

2.2 Activity flow

The title of the VR application used in this module is *e-DIPLOMA Lodestars*. Four students work together as a group.

The students must first read the *e-DIPLOMA Lodestars Handout*. This can be printed for the students, but it can also be read on-screen. The students must also be provided means to make notes on their findings during the activity, and record how they classify the individuals they encountered. They must be able to put down names and marks whether they think the character is an entrepreneur or not, and also if the character is a social entrepreneur or not.

The teacher must open the e-DIPLOMA Lodestars activity on the Moodle course page, and create a room. All students must open the e-DIPLOMA Lodestars activity on the Moodle course page, and join the room. The teacher must lock the room and start the session.

The blinking launch button will appear for all users who have joined the room. The activity proceeds on a single computer, which must be equipped with the Windows Mixed Reality headset.

In this activity, students work in a group. They are rotating roles. One member at a time (the *Investigator*) of the group uses the VR gear to explore the virtual city and interview citizens, impersonated by AI chatbots. Please note that

- Some characters have negative traits or may even be criminals. It is your task to be critical about them and evaluate their activities.

- AI systems can make mistakes, exhibit inherent bias, or hallucinate details they were never instructed about. These are less likely to happen if students keep their conversations on point.

After making two interviews, the VR gear and the role of the Investigator is passed to another participant. The student's task is to explore the city and identify which characters can be considered entrepreneurs, and which are social entrepreneurs. The characters in the game have knowledge about and relationships to other characters. Students can reach more of them if they are mentioned in the conversation, so they should ask characters not only about what they do, but also about their relations to others. Some characters may paint their own activity in a different light than others would, so it could be beneficial to get multiple opinions.

The rest of the group (the *Analysts*) can:

- listen to the what the Investigator says,
- suggest questions to the Investigator, is the Investigator asks for it (but not disturb the Investigator while they are listening to the AI character),
- study the handout,
- take notes,
- discuss the characters they have encountered, and determine
 - which ones are entrepreneurs,
 - which ones are social entrepreneurs.

After starting the program and putting the headset on, the students find themselves in a starting room. There's a floating textbox with a START button. They should use your controller to point on the button, and press the trigger button on the controller.



Figure 1: The trigger button



Figure 2: Start Game Interface

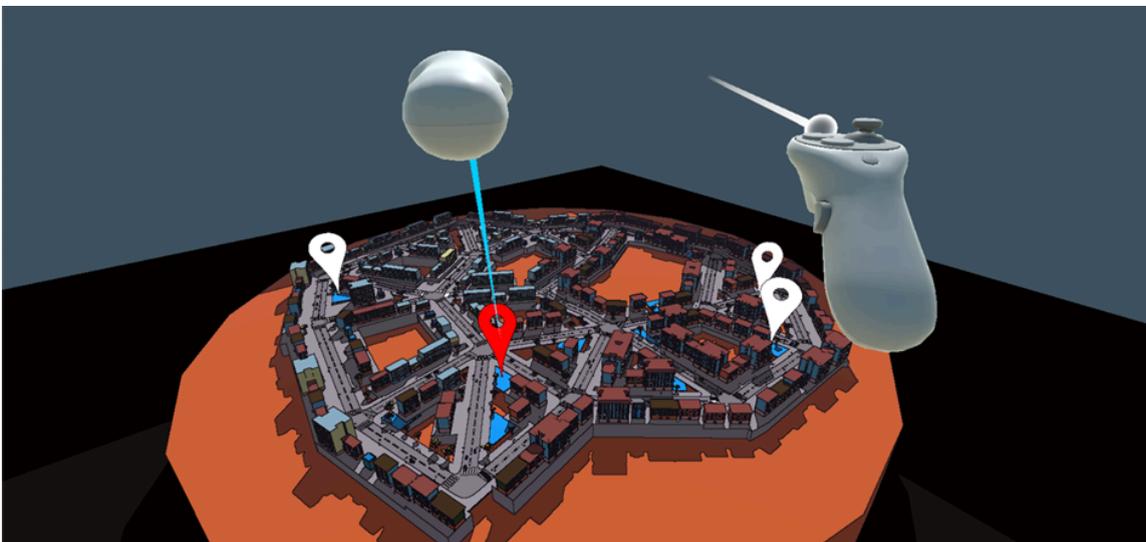


Figure 3: Selection

When in the city mockup scene, students can select destinations by pointing at location indicator pins (the ray changes color to blue) and pressing the trigger button. Each destination has a character they can talk to. The conversation is always an exchange of messages. The students cannot interrupt the character. In order to indicate that they are speaking, the student needs to hold the controller button. The color of the microphone changes to indicate conversation status:

- Red microphone: The AI is listening to the player's voice
- Gray microphone: This is the turn of the AI, the voice is not recorded
- Blue microphone: Player can pull and hold the trigger to start talking

Once they release the button after talking, their message is interpreted by the system, and a response is formulated. This may take some seconds and is indicated by thought bubbles appearing above the character. The conversations are timed, but the student can leave the conversation earlier by saying "good bye" — and nothing else. Saying, "Thank you, good bye" or other variants does not work. Students can re-visit characters they have already talked to, but, as there are 16 characters and limited time, conversations should not be longer than 2-3 minutes.

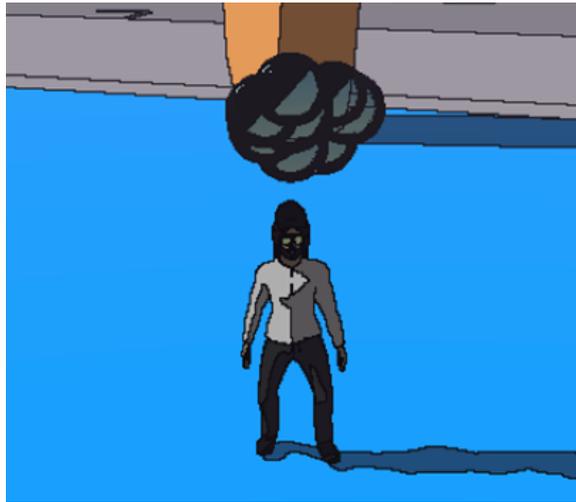


Figure 4: Character

The activity is designed to run for turns, with each participant taking a turn. However, if time allows, it is possible to let them take more turns, as there is enough content in the game to keep the students busy for hours. After the teacher stops the VR exploration, the students should be allowed to finalize their notes and their decisions on the categorization of the characters, while also consulting the handout to apply the principles listed there.

When they are finished, they should briefly study the *e-DIPLOMA Lodestars After Activity Handout*, which can be printed for the, or read on-screen. This document introduces the real-world inspirations (famous social enterprises and other institutions) behind the characters. This is to separate the (possibly biased and inaccurate) AI characters from real-world people and businesses, but still give proper credit to them, and allow the students to verify their decisions.

After the activity, the teacher should delete the room in the e-DIPLOMA Lobby.

If grading is required, the students may be required to complete the knowledge test quiz, but grading can also be performed manually, based on how many enterprises and social enterprises they could identify, or just how well they were applying their knowledge in practice, as judged by the teacher.

3. e-DIPLOMA Heroes: Urban Management for Social Outcomes

3.1 Concept

Heroes is a module about urban management. It teaches about the interaction of social and urban subsystems, and the impact of decisions on business and society, in a practical manner. For that purpose, the workings of a virtual city are simulated.

The players in the game must cooperate to place buildings. These buildings all represent policy decisions and cater to the needs of citizens. Citizens (NPCs) are simulated by tracking their statistics: money, health, nutrition, fatigue, and happiness.

3.2 Activity flow

The title of the VR application used in this module is *e-DIPLOMA Heroes*. Four students work together as a group. All of them participate in a shared VR environment, so four computers equipped with Windows Mixed Reality headsets are needed.

The students must first read the *e-DIPLOMA Heroes Manual* to learn the basics about the goals and controls of the game. This can be printed for the students, but it can also be read on-screen.

The teacher must open the e-DIPLOMA Heroes activity on the Moodle course page, and create a room.

All students must open the e-DIPLOMA Lodestars activity on the Moodle course page, and join the room.

The teacher must lock the room and start the session.

The blinking launch button will appear for all users who have joined the room. All students must click the launch button and put on their virtual reality headsets.

During the game, students float over the city, and they see the other students as floating capsules. They can see the rays coming from their controllers, and see where they are pointing and what they are doing.

Students can **turn their heads** to look around. They can use the **right-hand controller joystick to turn** left or right without physically turning the head, in small jumps. They can move the same **joystick up or down to rise up or sink lower**, also in small jumps.

In order to move around, they can **drag** themselves over the ground. For this, they need to hold down the button on **the bottom of the controller**, and **pull** the controller towards themselves. They can use any or both of the two controllers.

At the beginning of the game, a minimal city with a few plots for buildings is shown.

They can point and on the big concrete squares (the plots) and use the **trigger button**. The building selection menu is displayed as long as they hold the button.

They must point at the appropriate building, and just release the button to finalize their choice.

After selecting the building, a “hologram” version of it appears.

Another player has to point on the hologram and perform the same building gesture to finish the building.

When residential buildings are built, citizens appear in the city. Their most pressing need is indicated above them with an icon.

Once students build facilities that address the citizen’s needs, citizens would walk there.

If any statistic of a citizen drops to zero, they consider the city unlivable, and move out, disappearing from the game. The goal of the students, working together as a group, is to avoid that, while they grow the city as large as possible.

The icon over the citizen’s head always shows its most pressing need, and it moves towards the nearest available building catering for that need. If it appears that the citizen will not be able to reach the building in time, the icon blinks in red. This indicates a shortcoming in the city setup that needs to be remedied.

Students can open the statistics overview to see overall data about the citizens by pressing the top button on the left-hand controller. The pictograms show the average value of each statistic, while the red ones show the lowest value that belongs to any one citizen.

After successfully keeping the happiness of the characters above a threshold by paying attention to their needs, the city will expand. As the city expands, the citizens must travel greater distances if some facilities are not available close by. This can cause them to leave the city if they must do it on foot. **Parking lots** connect parts of the city by letting citizens to use cars between them.

The students should be allowed to experiment with the game, study behaviours, share ideas and try out strategies. It is essential that they communicate during the game, as all actions require a consensus of

at least two players. Audio communication is possible in-game for remote participants, but if the students are in the same room, they can also talk to each other naturally. 20 minutes of gameplay is recommended as an absolute minimum, and there is a timer to stop the game after this period, but if time allows, students should play multiple rounds to be able to capitalize on their previous experiments and arrive at successful strategies. If more 20-minute-long sessions are played, it is recommended that there are breaks in between to avoid fatigue. Students should discuss their experience and design their strategies during these breaks.

If grading is required, students can be asked to complete a knowledge test quiz after the activity — or grades can be based on their performance in terms of population reached in the game, or the improvement during the trials.

4. e-DIPLOMA Painters – Business planning

4.1 Concept

Painters is a module where students work together in a *business model canvas* (BMC) exercise employing co-creation tools in a virtual classroom. They use:

- Microsoft Teams to communicate with each other and AI personas
- remote desktop connection to a virtual machine running Brainstorm's Edison, in which they can manipulate the business model canvas.

The activity has been designed for the participation of four students and a teacher. The teacher acts both as a moderator and guides the BMC process, so they have to be familiar with how Edison is used in the activity, and command an instructive understanding of the BMC.

The teacher must open the e-DIPLOMA Painters activity and start the virtual machine. Once it is running, they should start Edison and open the BMC project. The teacher must also create a room in the e-DIPLOMA Lobby for the students to join.

The students must open the activity, then join the room.

The teacher must close the room, and start the session.

All students should click the blinking launch button. This starts the remote desktop client. All students connect to the same computer. Only one student at a time should attempt to control the virtual machine. The students are invited by the moderator to carry out the completion of the BMC areas in turns during a determined time duration.

The students are allowed and motivated to communicate within the group to discuss the items to add to every canvas area. The communication between the students is allowed by MS Teams conferencing tool. Within the conferencing tool the students can query and consult four AI Personas developed for the prototype. The personas' knowledge is about their needs and preferences that should inspire the planning of social enterprises that address those needs. Students should be guided towards these solutions while they are completing the BMC exercise.

The regions sequence selected for this exercise is the following:

1. Customer Segments
2. Value Propositions
3. Channels

4. Customer Relationships
5. Revenue Streams
6. Key Resources
7. Key Activities
8. Key Partners
9. Cost structure

When the session time elapsed, the moderator should dismiss the students and close the session in Teams. They also have to stop the virtual machine to avoid runaway cloud costs, and delete the room in the Lobby.

4.2 Activity flow

To carry out the exercise the student should edit the text field that is provided in the FORM and DATA section of the presented SW interface (Figure 4 below).

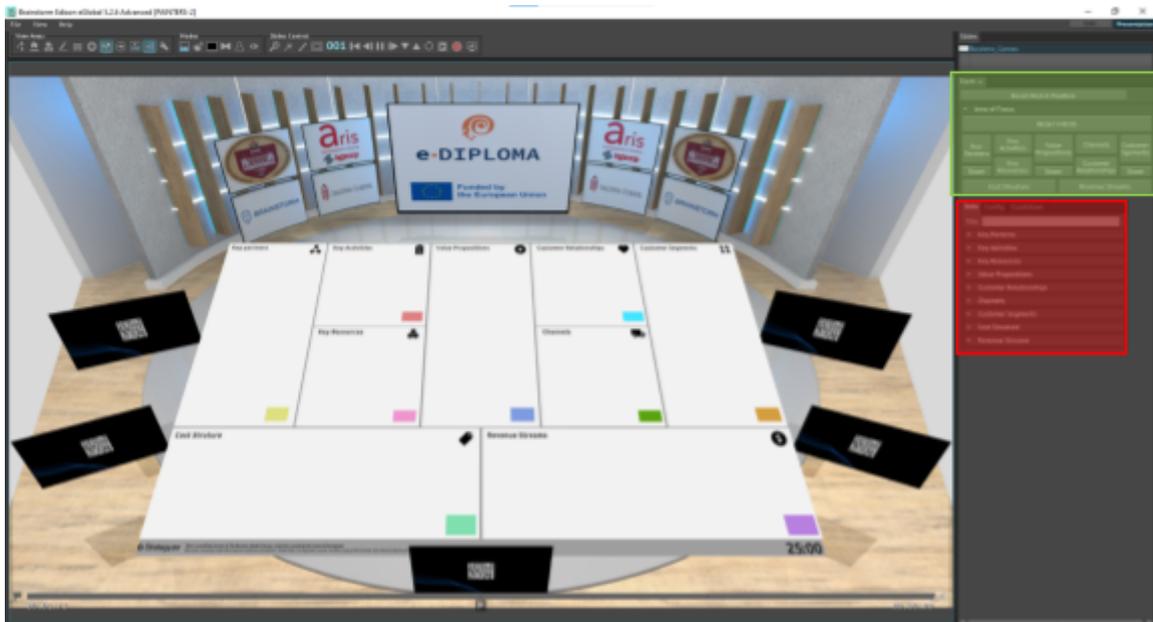


Figure 4: Business Model Canvas Exercise Main View

In the FORM area (Figure 4, Green shaded area) several buttons are presented and allow zooming on the different BMC areas, pushing on the button related to each of the areas.

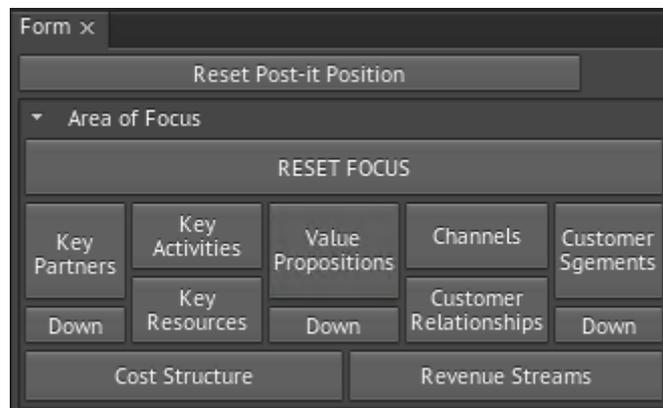


Figure 5: Form Area to control the zoom during the exercise completion

Some areas, due to a doubled size with respect to the others, have double buttons: one to zoom on the upper part and one for the lower part.

In the DATA area (red rectangle in Figure 4) the business model canvas areas can be edited adding up to six tickets in every region. At the start of every control area (Key Partners, figure below) there are two buttons that allow for visualizing the support questions to help to create content on top of these areas.



Figure 6: Question Buttons

The red shaded buttons in Figure 6 allow to visualize the questions in the working area (Figure 6).

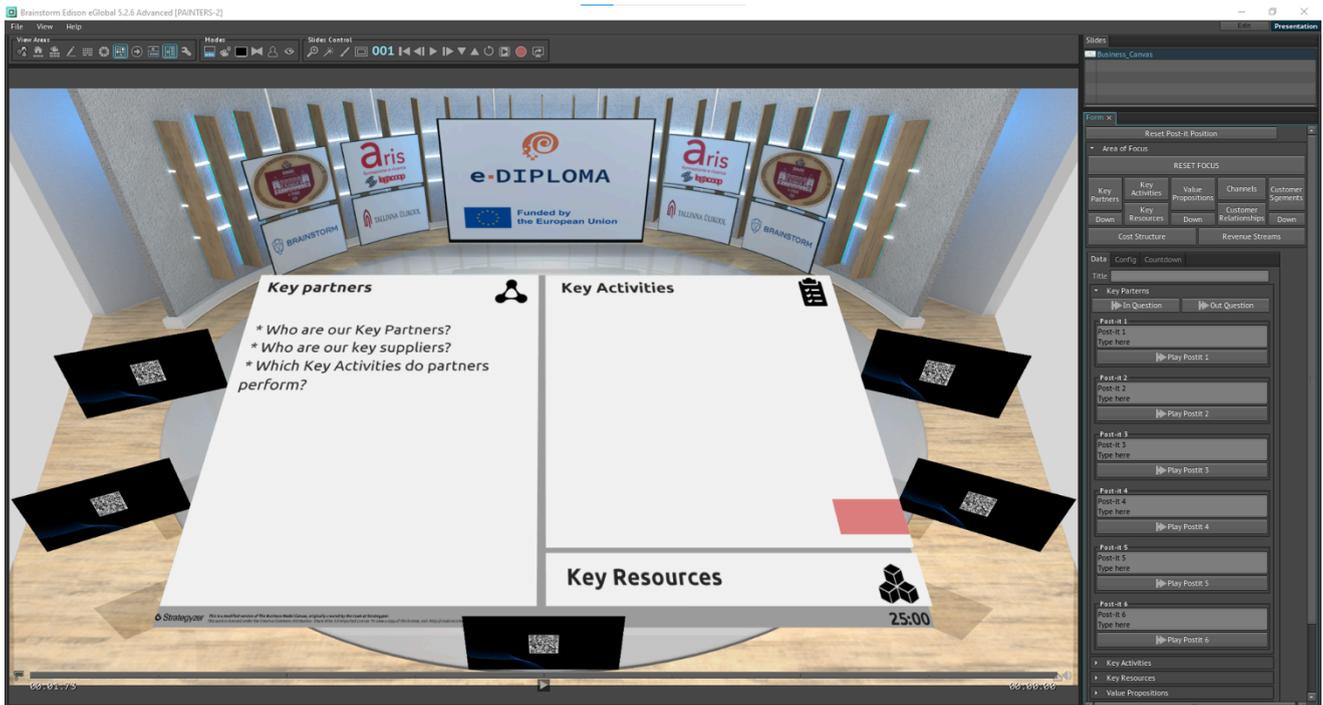


Figure 7: Support questions in working area

The Students can fill the text fields provided to create a post-it to place in every area of the business model canvas. The result is shown in Figure 8.

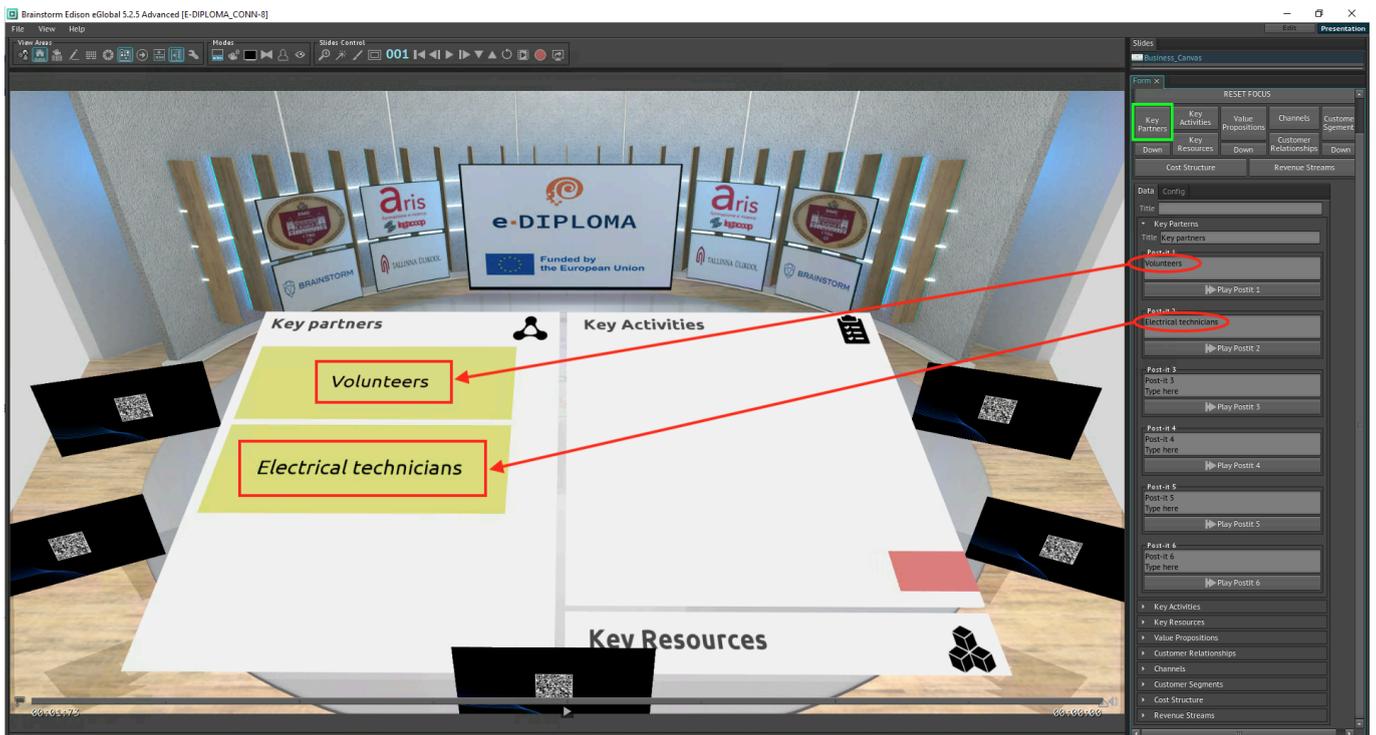


Figure 8: Adding notes to the BMC using Edison interface

Only one student should handle the controls at any time. The moderating teacher is responsible for coordinating whose turn it is to control Edison. However, all students should communicate, collaborate, and co-create during the educational session.

4.3 Personas' support and interaction

The students have the opportunity to communicate with artificial intelligence personas focused on sustainable energy production.

There are 5 personas that can be consulted through the Teams call interface, employing the chat part (see image Below). To activate the chat of the Team's call, the student should press the "chat" (green shaded area) button in the upper part of the window and then write the message to the persona in the yellow shaded area. The response from the persona will be received in the chat history (red shaded area.) This response will be visible for every student and moderator in the Teams call (Figure P2M3.106). Alternatively, students can also chat individually to the personas by starting a one-on-one chat with them.

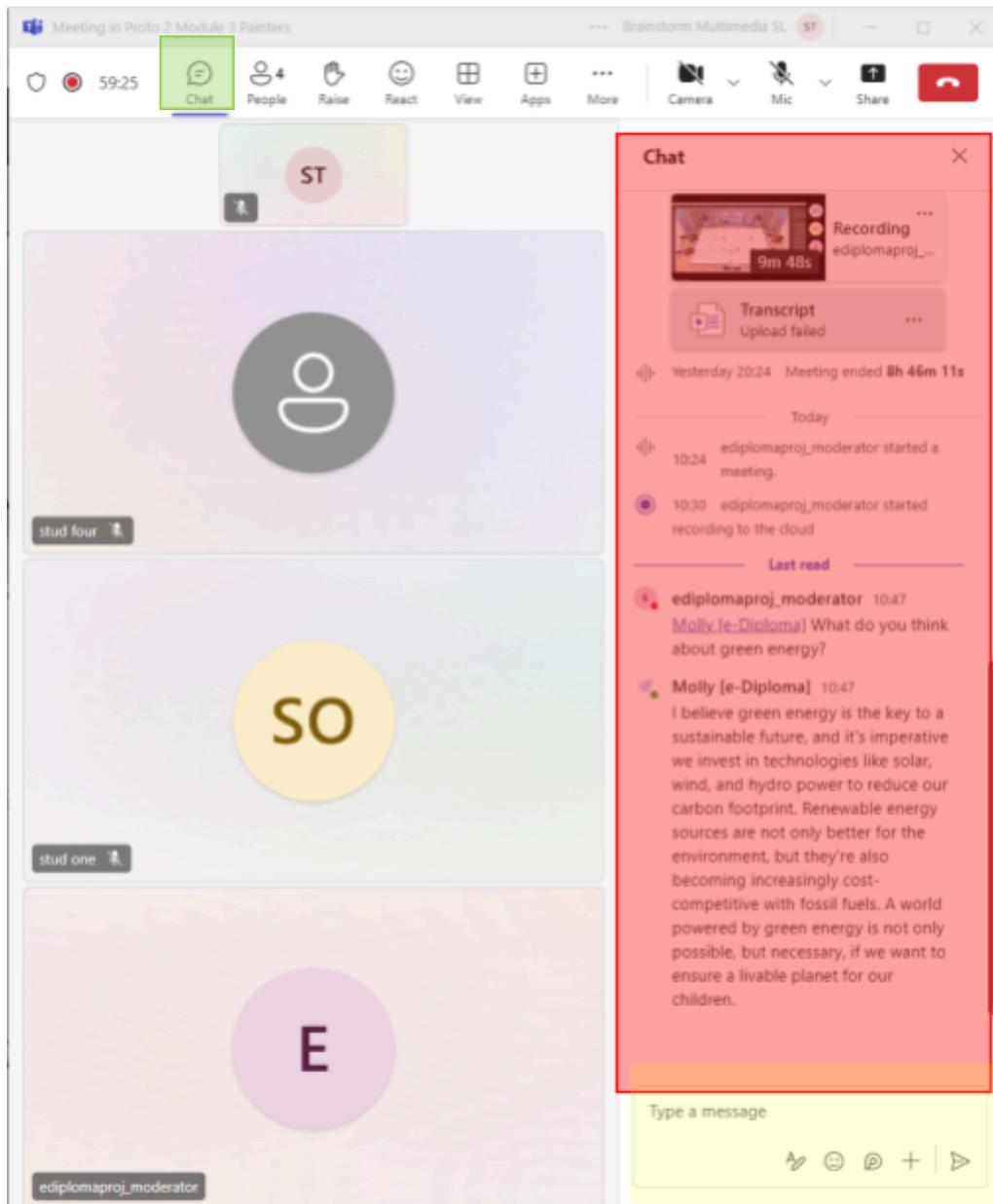


Figure 9: Chatting with the support Personas in the MS Teams Call Window

To contact each of the available personas in the call chat, the student should type the "@" character followed by the name of the persona. For an individual chat, it is enough to write the name (without the "@" character) in the search bar of Teams.

The personas available are the following:

- Molly [e-Diploma]
- Marius [e-Diploma]
- Bob [e-Diploma]
- Ruben [e-Diploma]
- Henry [e-Diploma]

At the end of the activity, the teacher should stop the session, delete the room in the Lobby, and stop the virtual server to avoid runaway cloud costs.

If grading is required, the supervising teacher can evaluate the performance of the students, a separate human grader can review the Edison files produced, or the students can be asked to take the knowledge test quiz.

5. Allies – Social Human Resources and Team Management

5.1 Concept

e-DIPLOMA Allies is a singleplayer educational game, where the player must recruit and manage a team as a social entrepreneur. The game is made up from two parts that must be played simultaneously. In one part the player must interview applicants who are roleplayed by a Large Language Model (LLM) AI. In the other part the player must manage the hired team members by assigning them jobs, monitoring their performance and behavior and reacting accordingly. This is done simultaneously while hiring other team members. There is a limited time to do this, and the performance of the player is primarily measured based on the final team performance accompanied by the growth, income, and impact of the company.

The primary goal is to teach the player how to perform an interview efficiently. This consists of interacting with different personalities, maintaining a healthy conversation and negotiating a wage. The player must also find out how to effectively assess the applicant's abilities, skills and shortcomings. These impact their behavior and performance during the game. Also, the game encourages efficient multitasking as time does not stop during the interview. On the contrary, new tasks and problems can arise dynamically and must be handled swiftly. The player must converse with the applicants in English, Italian, or Spanish (depending on the Lobby language setting), and they will also answer in the same language.

5.2 Activity flow

Only a PC with internet connection is required, without any special equipment. The game is optimized for FullHD screen with 16:9 aspect ratio.

After startup the following screen greets the player:

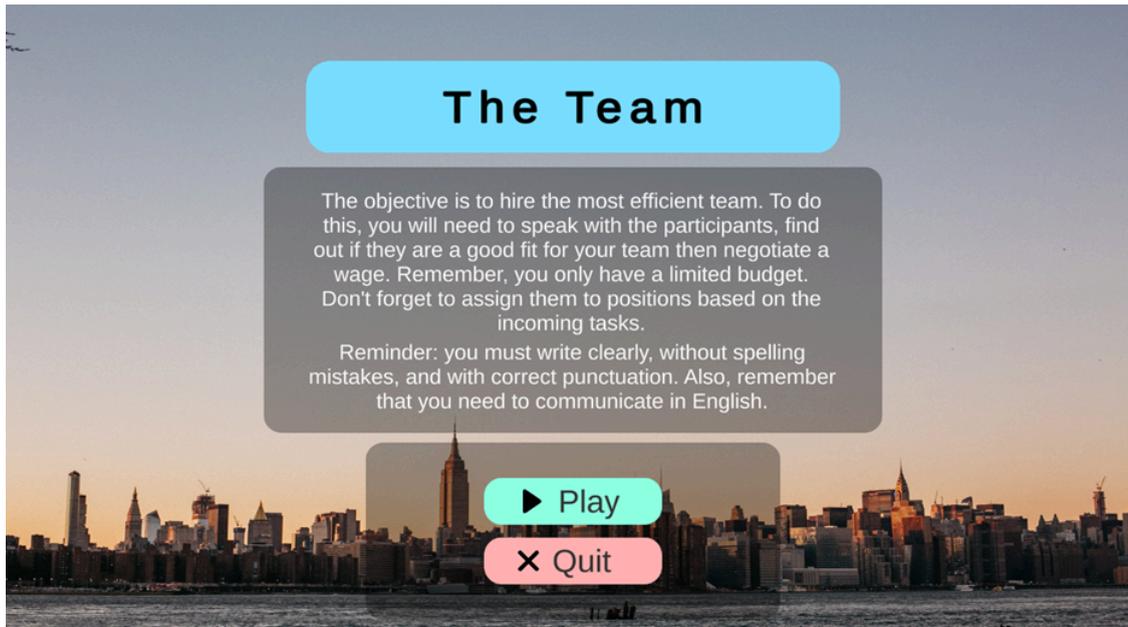


Figure 10: Greet screen for the player

The company that the player must lead is a simplified version of an existing social enterprise model. The goal of the company is to sell used goods. They contact people and try to solicit donations. They arrange the transport of the solicited goods then store and organize them in a warehouse. Later these can be bought by other customers in the store.

The player starts with an initial budget that is displayed on the top of the screen. It is measured in \$/hour, that is how much USD is currently available to spend on recruitment. On the left a scrollable list shows the current applicants with illustrated portraits. In the middle a chat window shows the interview history with each applicant. The player can type messages here and will receive answers from the LLM. Each person has a distinct personality that influences how they react. On the right the current state of the company and its employees is shown.

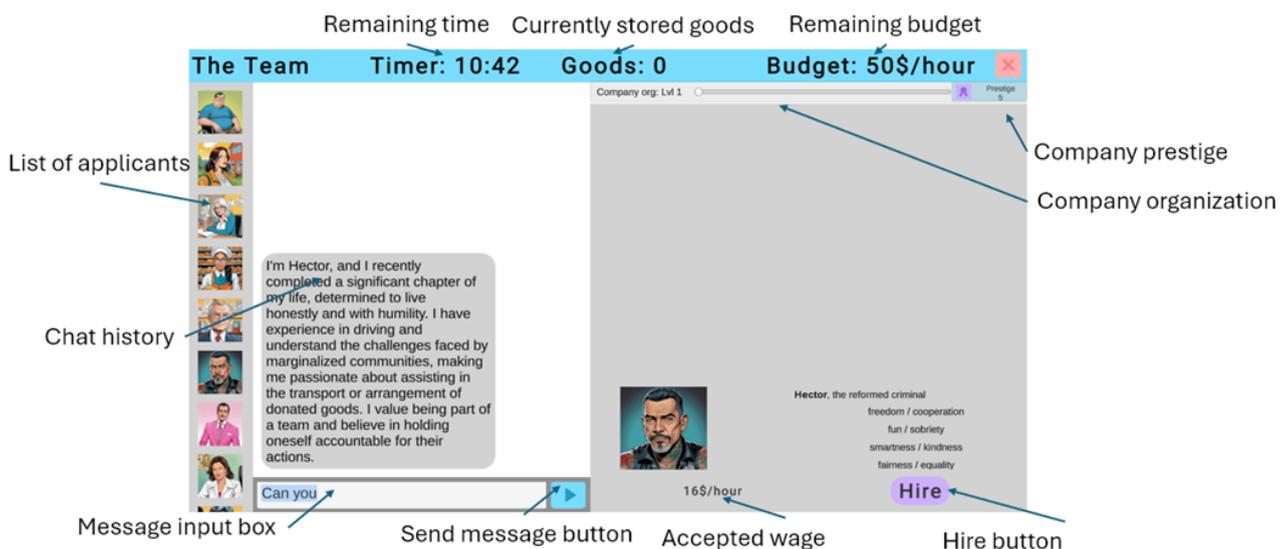


Figure 11: Interface

The left side of the window shows the chat tab. The player can click on the portraits of the applicants to select them which will switch the chat history panel. The top side shows the remaining time from the game and the available budget for hiring alongside the currently stocked goods.

Now the player can select an applicant and start the interview. The applicants will answer the messages. The player can't send another message until the applicant has answered.

The right side shows the state of the company. On the bottom the currently selected applicant can be seen. A widget appears on the right of the portrait while the chatbot is answering or analysing the messages. The discovered traits and values are to the right. Conflicting values are arranged in pairs and the applicable value is underlined if discovered. The traits can be the following: *lone wolf, teamworker, organizer, autonomous, follower, lazy, eager, introvert, extrovert, field worker, office worker, driver, non-driver*. Values are organized as four conflicting pairs:

- freedom-cooperation
- fun-sobriety
- intelligence-kindness
- excellence-equality

The hire button changes to Dismiss if the applicant is already hired.

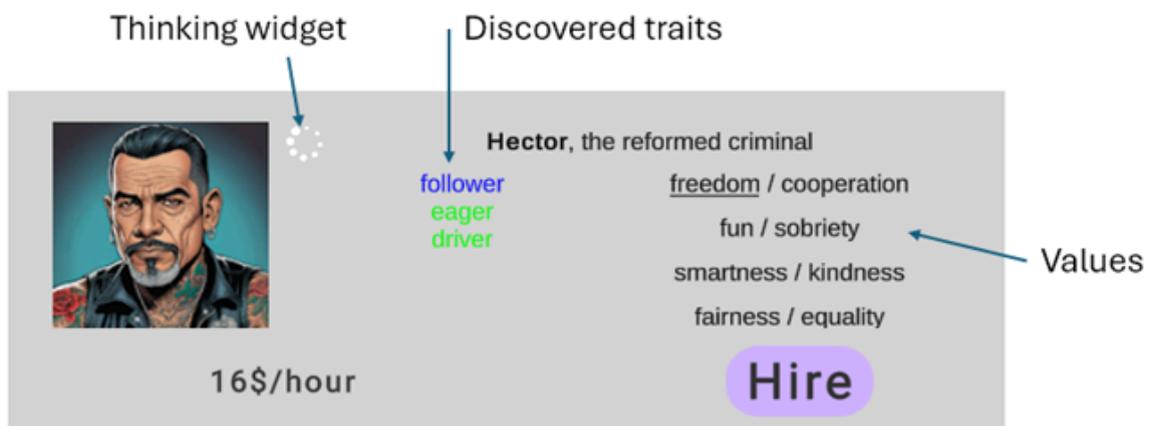


Figure 12: Hire Button

The state of the company is displayed in the area above the applicant panel. On the right tasks are displayed while on the left the employees. If there is a problem in the company, then the employees complain through message bubbles.

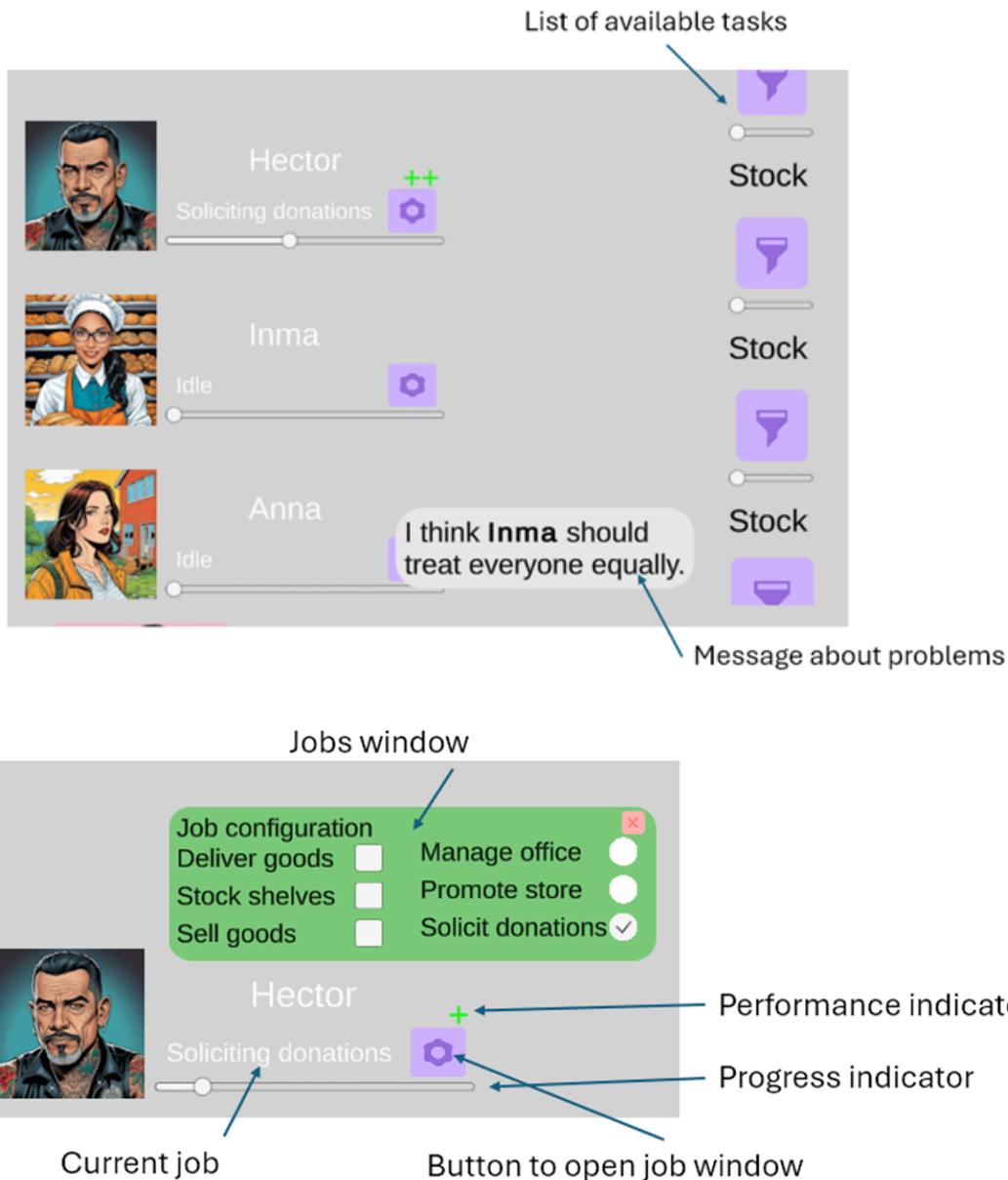


Figure 13: State of the company

If an applicant is hired, then the employee widget is displayed in the company panel. The cogwheel button can be used to open or close the Jobs window. In the jobs window the player can configure the jobs for the applicants with the checkboxes and the radio buttons. The current job is displayed below the name alongside its progress bar. An indicator about the performance of the employee is displayed in the form of „+“s and „-“s.

Jobs and tasks mostly follow a chain. The **Solicit donations job** periodically generates **Delivery tasks**. These are taken by the **Deliver goods job**. If a **Delivery task** is completed, then it generates a **Stock task**. They are taken by the **Stock shelves job**. If it is completed, then it increases the *stored goods* (indicated on the top of the screen) by 1. The **Promote store job** continuously increases the *prestige*. (It is also increased by satisfying customers, that is completing **Delivery** and **Sale** tasks). Based on the current *prestige* (higher is faster) **Sale tasks** are generated if there are available **goods**. These are taken by the **Promote store job** that when completes awards *prestige* and *budget* through revenue (2 USD).

The player can freely change the current jobs of any employee during the game. This is recommended to do during the beginning of the game when there aren't many employees.

The traits of the applicants influence how they will perform in certain positions. **Eager** workers will make better progress than **lazy** workers would do in all positions. **Organizers** are better at managing and stocking. **Lone wolfs** doesn't depend on good team dynamics as much as **team players**. **Non-drivers** are very bad at delivering goods. **Follower** teammates excel when company organization is high but they shouldn't be assigned to manager positions.

The applicants also have preferred and not preferred jobs, where they perform better and worse respectively. These can be found out by speaking with them. They are also mostly covered by the field-worker, office-worker, introvert, and extrovert traits.

If the timer at the top expires the game ends. And the following screen appears:

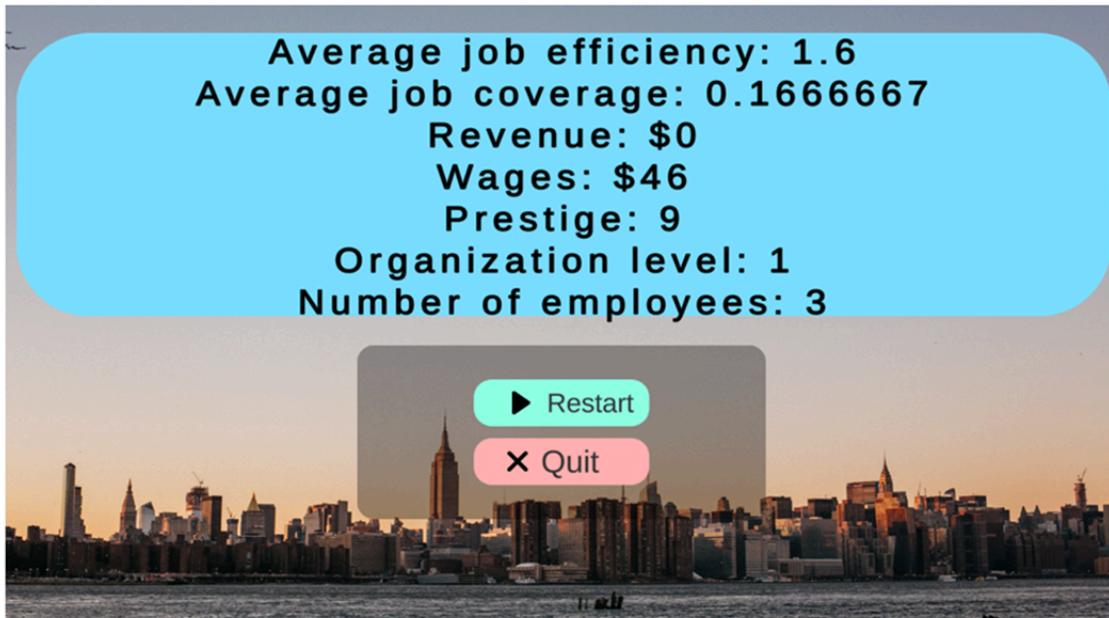


Figure 14: End of the game interface

It shows the performance of the player. Average job efficiency and average job coverage is the most important. They indicate how well the player put together the team. The player can start a new game with the Restart button or quit.

If grading is required, it can be based on the performance scores that are also logged, or the knowledge test quiz after the activity.

6. e-DIPLOMA Angels – Social Product Management and Marketing

6.1 Concept

e-DIPLOMA Angels is an online board game played by four players featuring an underlying market simulation. It teaches financing options, market research, product positioning, and marketing in a learning-by-doing manner. These options are represented by cards, with a choice between several cards being the main mechanism in the game. Making this choice can be based on the knowledge displayed on the cards in the form of imagery, short catchphrases, but also slightly more detailed tooltip explanations. While playing the game is a group activity, it is a competitive game simulating market dynamics, where outcompeting rivals or following leaders could be fruitful strategies.

6.2 Activity flow

The activity is designed for four students, but it can be played by fewer students, or even as a solitaire. A PC with internet connection and the Chrome browser are required, but no special equipment is necessary. All students play concurrently on their own computers. It is possible to play remotely, with or without an additional communication channel. The game does not require out-of-game communication to play. The e-DIPLOMA Launcher must be installed.

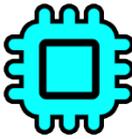
The teacher must open the activity, and create a room in the Lobby. After students have joined the room, the teacher locks the room and starts a session. Then, all students can click the launch button. The game starts on a browser tab.

The game consists of *rounds*. Each round consists of *phases*. The first round one has a single, *starting* phase. In this, players cannot perform any action, but they can navigate the play area, hover the mouse over game elements, and read corresponding tooltips. They learn about the basics of the game in this phase. Later rounds all consist of three phases:

- ★ **Carousel phase:** a set of cards rotates slowly over the game area. Players can pick cards that are in the quarter of the carousel closest to them, as long as they have enough *picks*. Cards represent business development opportunities, and the number of picks depends on the financing and sales the player has. Picked cards move to the player's hand.
- ★ **Planning phase:** players can, independently, play any number of cards from their hands. These actions are not revealed to the other players.
- ★ **Sales phase:** the results of the actions are evaluated and displayed to all players. Sales are performed and tallied.

6.3 The market

The game is played in a fictitious city, with four districts, represented by textured discs. Every district has 36 representative citizens, represented by pawns. All citizens can be categorized into six groups along seven social statistics. The statistics and their representative icons are:

						
Health	Income	Education	Social connectedness	Technical aptitude	Happiness	Age

With appropriate *Market Segmentation* cards, pawns can be ordered in districts according to their levels in any one of the social statistics. In every turn, every citizen is looking to improve one of its social statistics. Therefore, it is looking for a product or service that contributes to that statistic. Using appropriate *Market Research* cards, pawns can be colored to indicate this demand.

Every player has an area on the table where they can set up their business. This consists of the *Research*, *Financing*, and *Brand* areas.

Research area

This area shows the icons of social statistics. The player can play market research cards, dragging them from their hand onto the icons, thereby enabling them to see demand or perform market segmentation.

Financing area

The player can drag financing cards here. How many opportunities (card picks) per round are financed is shown here, as well as the results of sales.

Brands area

The player can build their business, or businesses, by playing cards in this area. Every brand is either a product or a service. Brand cards played represent the capability to manufacture or provide said product or service. Other cards, including distribution cards like *Store*, or promotion cards like *Influencers*, can be played onto the brand cards, thereby enhancing the business with some capability or boosting it with some market effect.

6.4 Cards

Financing

Financing cards provide opportunities, meaning pick of cards in the Carousel phase. Every card specifies the number of picks provided, and *victory points* provided when some conditions are met. There are equity-based financing cards, like *Angel Investor*, *Crowdfunding*, or *Venture Capital*, that offer more picks on completing a given number of sales, and there are government funding cards that offer double victory points on sales improving a certain social statistic. The latter include *Education Grant* and *Cultural Grant*, as examples. The game is won by the player who gathers the most victory points, representing the largest social impact in the targeted statistic.

Market research

Market research cards include *Survey Demand* and *Market Segmentation*. These cards must be dropped on stat icons in the Research Area, whereupon a token appears over the icon. Surveying demand for a kind of social statistic reveals to the player, by coloring the pawns representing the customers, which citizens would buy products promoting that stat. Market segmentation gives the player the ability, by clicking the appropriate icon, to separate citizens according to their level in a given statistic. This makes it possible to do promotion in a targeted manner.

Brands

Brand cards represent a capability to manufacture some product or provide some service. All the products and services in the game are such that they provide for customer needs in two social stats. For example, *Student Loan* would help with both *Education* and *Wealth*, while *Dating Size* would promote *Social Connectedness* and *Happiness*. While some of the cards, like *Soccer Ball* or *Amphetamine*, are less serious, other cards like *Food Sharing* or *Matchmaker* depict genuine social enterprises, and some like *Charity* or *Online Diagnosis* offer subtle social commentary. Brands should be played to the Brands Area, and all other cards that are not financing, research, or brand cards, must be played on a brand card to endow the business with new capabilities. The social stats a product caters for are important, as

Promotion

Promotions are the primary means to divert the attention of people towards our products and services. Promotion cards can be played on brands to generate an advertisement token. These tokens can be dropped on zones to select where these advertisements should be focused on. If the player has Market Segmentation research then they can segment the population there and use targeted advertisement to focus on a specific social segment.

Distribution channels

Distribution cards represent opportunities and investments in local venues to setup stores and services in. These cards can be dropped on brands which in turn generates a store token. This token can be dropped on zones to establish a local venue. District residents will visit these stores based on their preferences and use the services or buy the products. The number of stores present in a district limits the availability of the brand therefore more stores can be established to expand the reach.

7. User manual

When the game starts the students are presented with the game board (Figure 15). Top and bottom left shows a tooltip and card view of the currently hovered card (or element). The current round and player state is indicated on the top right. The player area is in front of the player, separated into 4 areas and a deck of cards. Your hand is shown on the bottom.

Each player has their own player area where they can activate cards. Each round you draw 2 cards and can also draw a few cards from the carousel at the start of the turn. The number of cards drawn from the carousel is the active Euro icons in the Financing area.



Figure 15: The game board

The goal of players is to select and then build up your **brand** by building **stores** and **marketing** your products or services to the citizens. Districts are separate and students can build stores in multiple districts to reach a wider audience.

Students can **activate cards by dragging and dropping** them over their respective areas (or cards). Some cards generate tokens this way. Tokens can be dragged and dropped over the districts to activate them (building stores or marketing).

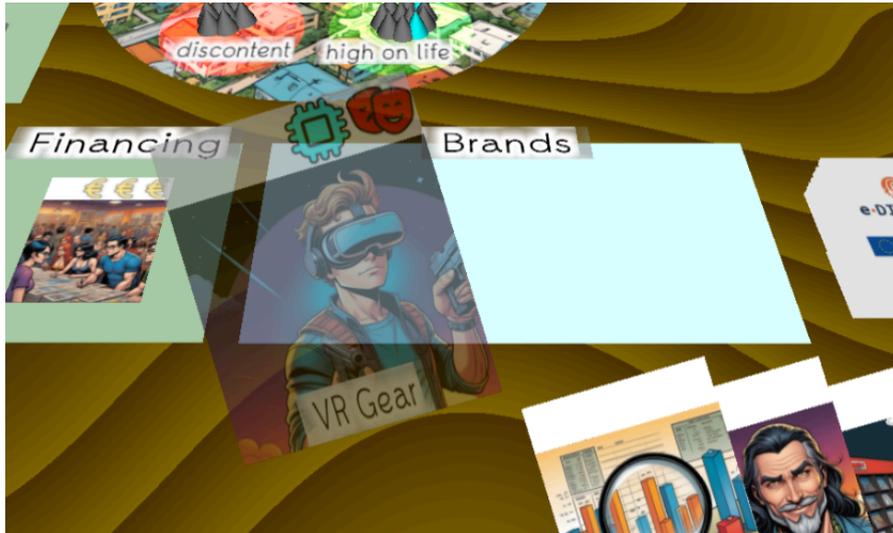


Figure 16: Dropping a card onto the Brand Area

Each round students first draw some cards from the carousel then play their cards and finally see the result and scoring.

During the first round you will draw **Financing cards** from the carousel. You should activate it to draw more cards during subsequent rounds.



Figure 16: An activated financing card

In your starting hand you will also find **Market Segmentation** and **Survey cards**. These can be activated by dropping them on an icon in the **Research area**. The survey will reveal which citizens are demanding the selected statistic. Market Segmentation will create a clickable triangle token on the icon that can be used to group the citizens according to that stat. You should use these before the second round starts.

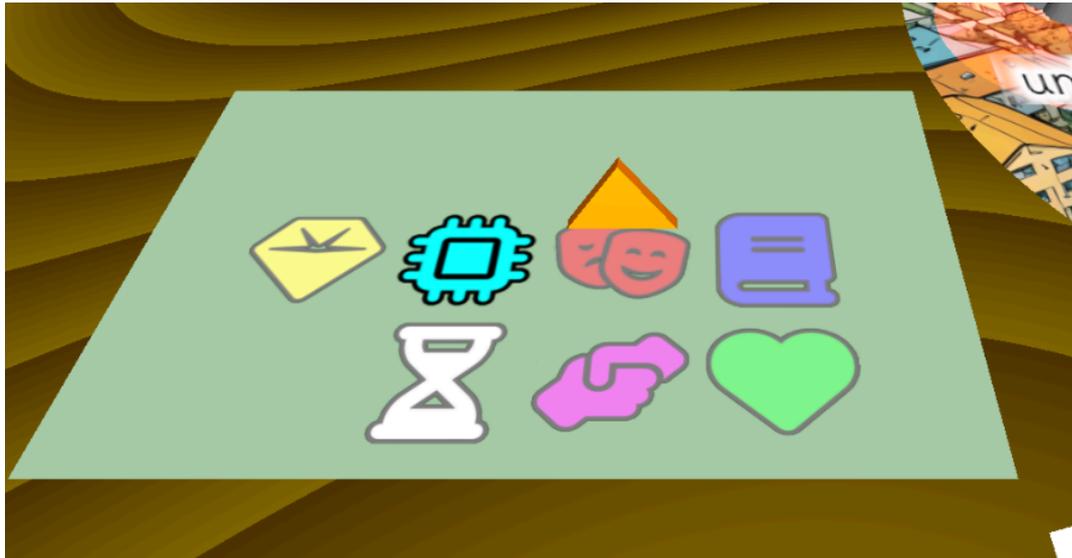


Figure 17: Research Area



Figure 18: Activated market segmentation

During the second round **Brand cards** can be drawn from the carousel. Each brand has two statistics that they provide to the citizens. You should choose a brand based on your market research in the previous round. It will define your strategy for the game.

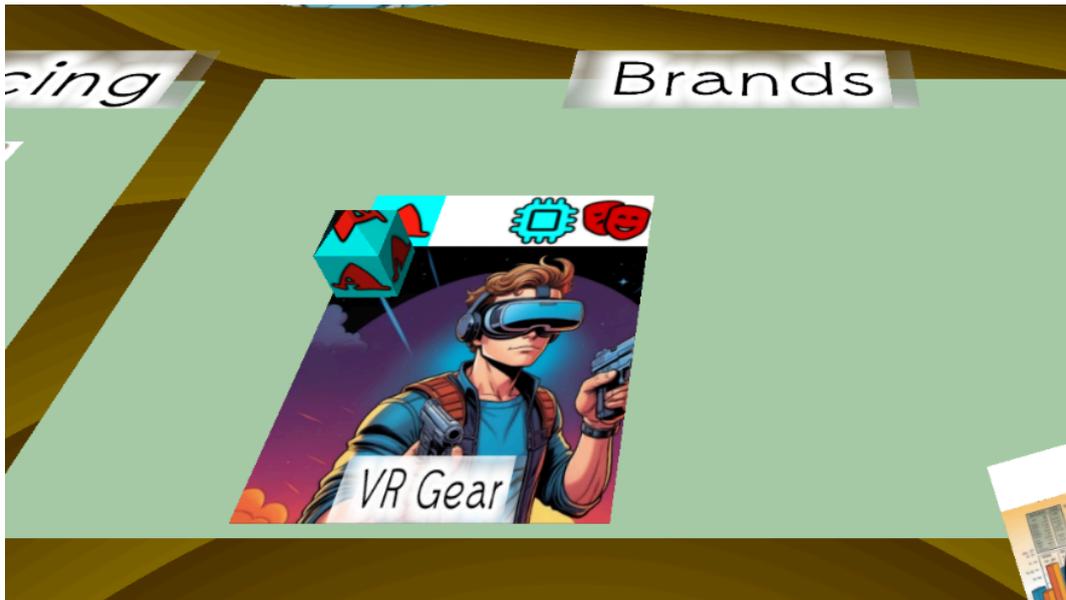


Figure 19: An activated brand card with a store token

During the planning phase you should activate the brand card that you got by dropping it onto your brand area. You can also build a store by dropping a store card onto the activated brand card. The store can be built in any district by dropping the token on it. You should use market research to find which district is the best choice. Marketing cards can be used to advertise your brand to a group of people. First drop the marketing card onto the brand to create a marketing token. Then activate your market segmentation for a relevant stat, to group the citizens. Find a group that should receive the marketing and drop the token onto this group (the slice of the district under the group).

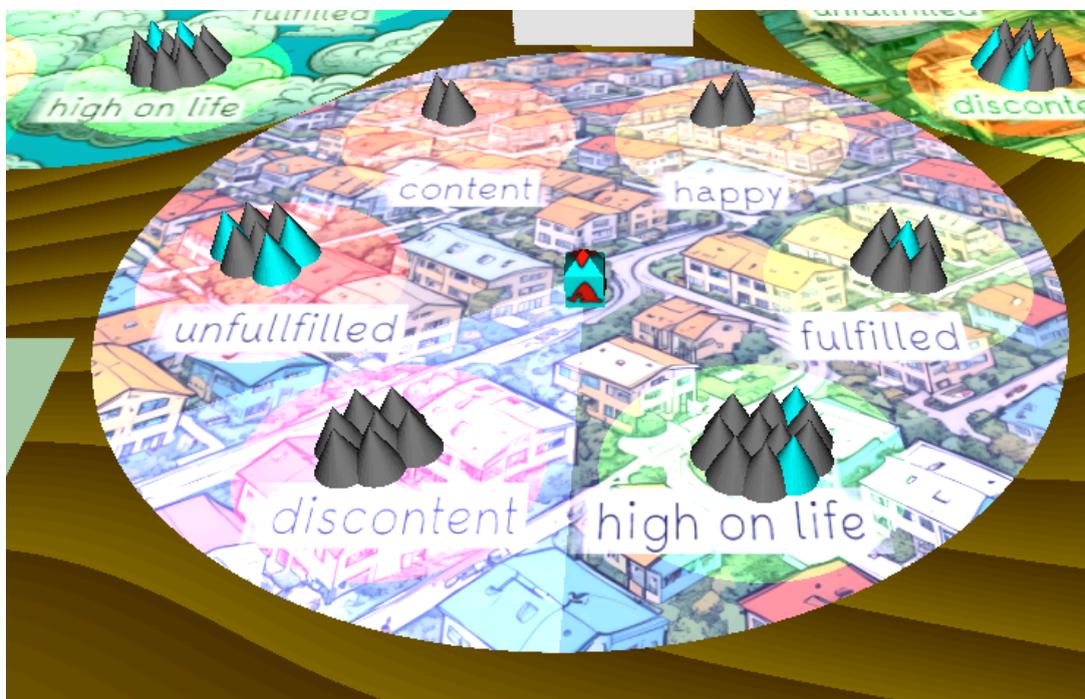


Figure 20: Building a store

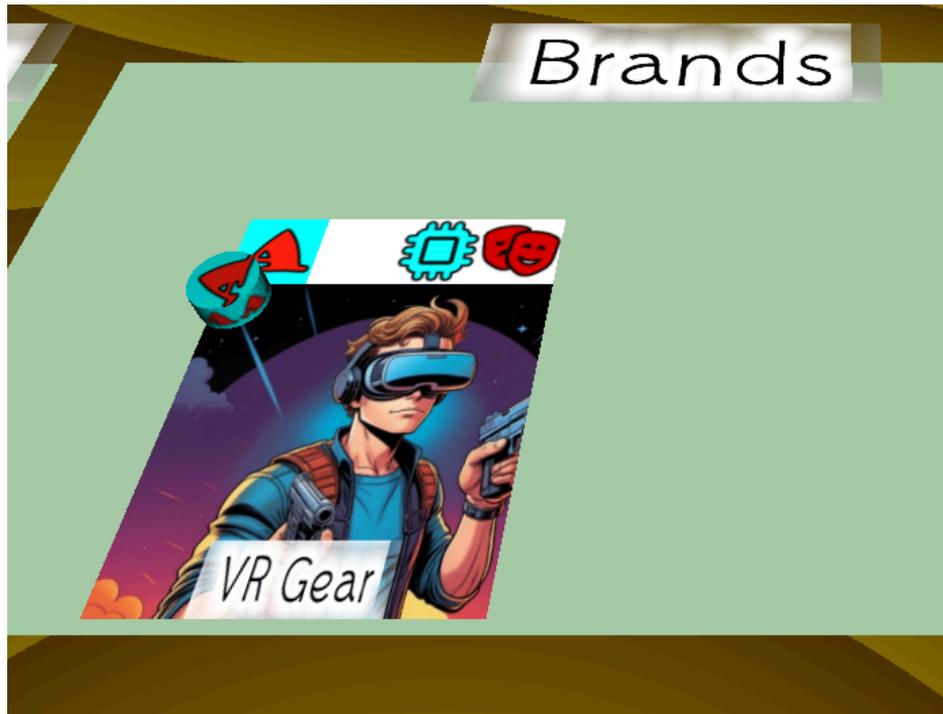


Figure 21: A brand with a marketing token

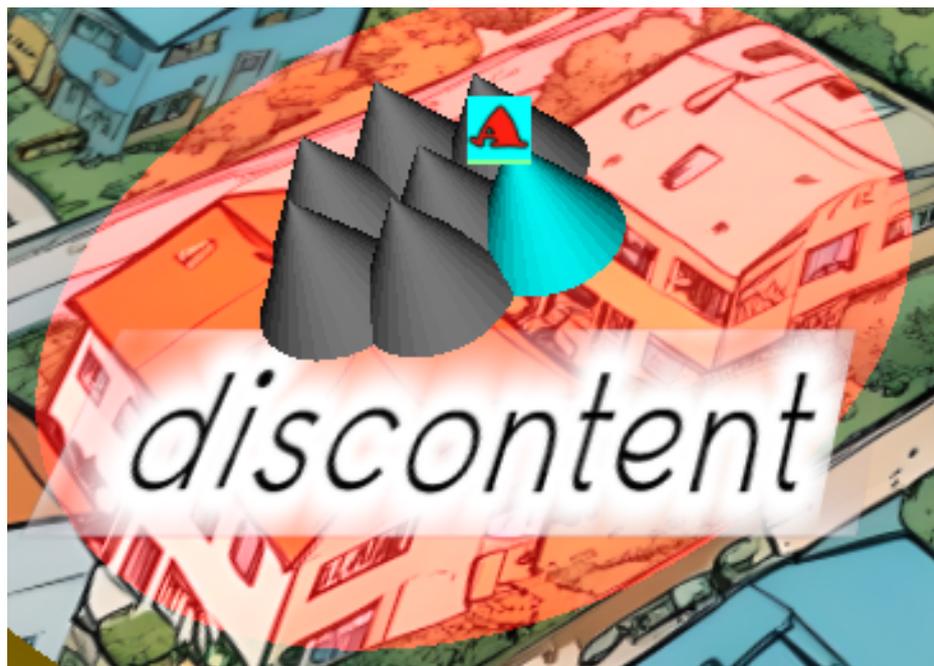


Figure 22: Advertising to a group of customers

After the planning phase the game will calculate the impact and result of your actions. If you make sales, it will impact the citizens in the district and you will also gain a score.



Figure 23: Sales Area

In the fourth round a second financing option can be drawn from the carousel. It is a **Government Grant** that provides additional victory points if you do sales in a certain statistic.



Figure 24: A government grant card

Sometimes additional brand cards can be drawn in later rounds, but you should focus on at most 3 brands. Building only one brand in the game is also perfectly viable. Do not forget to expand in multiple districts.

The game is over when all the rounds have been played. As all phases in all rounds have a maximum time duration, this happens in limited time. For best learning effect, it is recommended that the students play multiple games, which allows them to explore more strategies, and get familiar with more concepts through the game.

If grading is required, grades can be assigned based on the overall score, or using the knowledge test quiz.



e-DIPLOMA



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