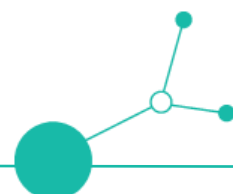


Re/Upskilling Programs PP6

D 2.1.1





General introduction

The *Re/Up-skilling Programme* developed by PP6 - **FabLab Zagreb** represents a key contribution to the broader **DiSTT Digital Skills Transformation Toolkit (DiSTT Toolkit)**, a comprehensive set of innovative learning formats and tools co-designed by the project partners to address digital fabrication and innovation skill gaps across Central Europe. The overall objective of the DiSTT Toolkit is to strengthen the capacity of educators, innovation spaces, FabLabs, and Makerspaces to deliver inclusive and high-quality training formats that respond to emerging industrial and societal needs, while remaining accessible to a wide range of adult learners.

Within this framework, FabLab Zagreb designed and implemented the *Designing the Future* Re/Up-skilling Programme - a modular, flexible, and inclusive learning framework focused on **digital manufacturing, design thinking, and hands-on prototyping**. The programme specifically targets **less-privileged individuals** such as persons with disabilities, residents of rural and remote areas, older adults, and low-income learners who traditionally face barriers to accessing advanced technological education.

Building upon FabLab Zagreb's long-standing expertise in **digital fabrication education** and its participation in international initiatives such as **Fab Academy** and **Fabricademy**, the programme introduces participants to practical and creative applications of digital tools including 3D printing, laser cutting, CNC machining, IoT wearables, and biomaterial development. Through a combination of guided workshops and self-directed reflection, participants are encouraged to design and prototype their own solutions to real-world challenges.

The programme promotes empowerment on three complementary levels:

1. **Personal empowerment**, by fostering confidence, creativity, and problem-solving abilities through design thinking;
2. **Economic empowerment**, by providing practical skills that can lead to self-employment, entrepreneurship, or new job opportunities; and
3. **Community empowerment**, by encouraging participants to contribute to local innovation and sustainable development.

In line with **Deliverable D.2.1.1** of the DiSTT project, the *Designing the Future* programme is structured around **five thematic modules** that integrate design thinking with digital and circular fabrication skills. Each module includes guided instruction and self-directed learning, and is evaluated using pre- and post-assessment tools to measure progress and inform continuous improvement. The curriculum has been co-created through stakeholder consultations, survey data, expert interviews, and analysis of regional skill gaps, ensuring its relevance, inclusiveness, and practical value.

Reflecting the project's **transnational ambition**, the *Designing the Future* programme is designed to be **transferable and adaptable** to diverse local contexts and challenges. It offers a scalable model for other innovation-oriented learning hubs and FabLabs across Europe to engage and empower less-privileged individuals and communities—particularly in rural and remote areas—through creative, hands-on, and inclusive digital learning.



PP6 RE/UPskilling program

Title of the program:

DESIGNING THE FUTURE

Re/Up-skilling Programme to Empower Less Privileged to Design the Future

Overview and Objectives

The *Designing the Future* Re/Up-skilling Programme aims to empower less-privileged individuals by providing access to future-oriented skills and digital fabrication technologies. The programme introduces participants to the design thinking process as a tool for solving real-life challenges and encourages creativity, collaboration, and personal empowerment through hands-on learning.

Participants explore 3D design, digital fabrication (3D printing, laser cutting, CNC, vinyl cutting), wearable technology with basic programming and AI integration, and bio-based “recipes of the future materials.” Working collaboratively, they identify problems, design innovative solutions, prototype with both analog and digital tools, and present their final concepts to peers and community stakeholders.

The programme strengthens **creative problem-solving, teamwork, and digital literacy**, while reducing barriers to technology and preparing participants for the increasingly digitalised world of work. It empowers less-privileged individuals on three levels:

1. **Personal empowerment** - building confidence and self-efficacy in solving challenges;
2. **Economic empowerment** - supporting self-employment and financial independence;
3. **Employability** - improving access to jobs and professional inclusion, including for persons with disabilities through possible tax benefits for employers.

The first pilot was held in **June 2025**, with further runs planned for **Autumn 2025** and **Spring 2026**.

Pedagogical Approach

PP6 applies three complementary learning methodologies within the programme:

- **Design Thinking:** shifting from passive learning to active, human-centred problem-solving. Learners apply iterative thinking to analyse challenges, generate ideas, and test prototypes, developing innovation and empathy-driven design skills.



- **Project-Based Learning (PBL):** participants work in teams on community or real-world challenges, proposing tangible solutions and presenting them to peers and experts.
- **Experiential Learning:** learning by doing and reflecting, focusing on hands-on experimentation with digital and physical tools and the improvement of prototypes through feedback.

This approach ensures that participants gain both **technical competencies** and **transversal skills**, strengthening creativity, communication, and collaboration.

Structure and Duration

Each module includes two complementary learning components:

- **Guided learning (4 hours)** - instructor-led, interactive workshops combining demonstrations, group discussions, and prototyping sessions;
- **Self-directed learning (2-4+ hours)** - individual or group reflection and application, where participants explore how to implement newly gained knowledge in their own contexts.

This ensures approximately **6-8 hours per module**, combining structured guidance and personal reflection. The full programme consists of **five independent modules**, with a total of **30-40 hours of guided instruction** and **10-20 hours of self-directed learning**. Modules can be taken separately or as a complete course.

Programme Modules

1. **Patterns - Understanding and Creating with Technology**
Introduction to geometric and natural patterns through digital design. Participants use simple 2D and parametric tools to explore how structure and repetition create function and form in design.
2. **Biomaterials - Making from Nature**
Focus on circular and sustainable materials. Participants learn to create bio-based materials (gelatin, starch, mycelium), exploring ecological impact and local sourcing for innovation.
3. **IoT Wearables - Connecting the Physical and Digital Worlds**
Introduction to sensors, microcontrollers, and interactive design. Learners build simple prototypes using Arduino or micro:bit to connect physical and digital functions.
4. **3D Bodies - Designing and Fabricating in Three Dimensions**
Participants learn 3D modelling and digital fabrication using accessible tools (Tinkercad, Rhino, laser cutter, 3D printer). They prototype physical structures to understand digital-to-physical workflows.
5. **Design Thinking & Prototyping from Waste**
Learners apply design thinking to local challenges, ideate collaboratively, and prototype low-cost



solutions using recycled materials. This module fosters creativity, sustainability, and teamwork.

Each module concludes with a **reflection activity** and **mini-presentation**. At the end of the programme, participants engage in a **Final Challenge**, combining skills from all modules to address a community-relevant problem with a prototyped solution.

Module / workshop example

Workshop title	Designing the Future - Dynamic patterns
Target audience	less privileged (physical disabilities, low income, remote and rural areas)
Prerequisites	None
Purpose & Learning Outcomes	Base of the program is design thinking process and with module is to engage and provide insight to patterns around us. Those can be inspired from nature or human design. What can be the purpose of auxetic patterns and forms? What patterns can help us to bend wood? What challenges can be solved with patterns and how to made them using digital fabrication including laser cutter and vinyl cutter.
Program Format	Structure: Theoretical introduction to the topic, hands on with appropriate digital fabrication equipment to produce patterns, discussion about challenges can be solved, preparation for prototyping Duration: 4 hours direct learning and 4+ hours project based self learning with prototype. Delivery mode: in person, powerpoint output, physical prototype
Skill Gaps	Ability to detect and solve problems, to prototype solutions using digital fabrication
Learning Activities	lectures, discussion, self-study, hands on, and consultations
Assessment	Pre-workshop self-assessment (confidence, familiarity, expectations) Post-workshop self-assessment (learning gains, perceived growth, confidence, suggestions) Program surveys (content quality, experience, suggestions) Practical outputs (prototype fabrication, documentation)
Roles & Support	Facilitator: Fablab staff Evaluator: university staff
Feedback	Suggestions as part of post assesment



Showcase or Closure	Presentation of fabricated prototype
Documents, support materials	Presentation (incl. goals, timeline, knowledge base) Instructions for digital fabrication equipment
Language:	Croatian or English

Instructional Design and Learning Materials

All materials are developed following **Universal Design for Learning (UDL)** principles to ensure accessibility for participants with diverse physical, cognitive, or digital access limitations.

Learning resources include:

- Visual presentations and illustrated tutorials;
- Short instructional videos and quizzes;
- Facilitator guides for instructors;
- Printable worksheets and activity cards for hands-on sessions;
- Reflection journals for self-assessment and lifelong learning.

The programme can be implemented in face-to-face, blended, or online formats, ensuring flexibility for rural and remote learners. However, hand on activity with the tools in (pop-up) fablabs, makerspace, is necessary to gain benefit. /9

Assessment Framework

To ensure personalised learning and measurable outcomes, a two-step assessment system is applied:

- **Pre-assessment:** identifies participants' prior skills, digital familiarity, and learning goals before starting the programme.
- **Post-assessment:** evaluates progress and competence development after completion through questionnaires, facilitator observations, and peer feedback.

Participants compare their own progress and reflect on improvement in creativity, digital skills, and teamwork. The assessment tools also measure the overall **effectiveness and inclusiveness** of the programme.



Target Groups and Stakeholders

The programme targets less-privileged individuals across various vocational fields, including:

- Persons with disabilities;
- Residents of rural or remote areas with limited access to technology;
- Individuals with low income;
- Older adults disconnected from digital environments.

Implementation is carried out in cooperation with key organisations:

- **Technical Subject Teachers Association** - supporting pedagogical and technical content;
- **Competence Centres** - ensuring alignment with local industry and remote access;
- **Associations for People with Disabilities** - ensuring inclusive participation and accessibility.

These partnerships guarantee that the programme remains **practice-oriented, market-relevant, and socially inclusive**.

Learning Outcomes and Competencies

Technical competencies:

- 3D design and optimisation for digital fabrication;
- Operation of 3D printers, laser cutters, CNC, vinyl cutters, and embroidery tools;
- Basic programming, debugging, and AI integration with microcontrollers;
- Prototyping and assembly of functional digital-physical systems.

Transversal (soft) skills:

- Creative problem-solving and iterative design;
- Teamwork and collaborative innovation;



- Creative confidence and self-efficacy;
- Presentation, communication, and reflection.

Expected Impact

The *Designing the Future* programme bridges the gap between vocational education and modern manufacturing technologies. It promotes inclusion, accessibility, and lifelong learning for underrepresented groups. By equipping participants with practical digital skills and creative methodologies, the programme contributes to personal empowerment, employability, and the wider digital and green transition of local communities.