

schools eu

Towards Digital Smart, Entrepreneurial and Innovative Pupils

Policy Recommendations



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WHY DO WE NEED RECOMMENDATIONS?

THE ACCOMPANYING PUBLICATION (A MANUAL ON TEACHING DIGITAL FABRICATION) TO THESE RECOMMENDATIONS PRESENTS THE “FABLAB SCHOOLS EU: TOWARDS DIGITAL SMART, ENTREPRENEURIAL & INNOVATIVE PUPILS” PROJECT’S THEORETICAL FRAMEWORK, A SET OF METHODOLOGICAL PRINCIPLES THAT HAVE BEEN LISTED AND 15 CASES ON TEACHING AND LEARNING WITH DIGITAL FABRICATION. TEACHERS CAN THUS IMPLEMENT THE THEORETICAL BACKGROUND AND EFFECTIVE PRACTICES IN EACH THEIR OWN CONTEXT.

PLEASE SEE THE PROJECT WEBSITE FOR AN ELABORATION OF THE PROJECT **BACKGROUND, PARTNERS, OBJECTIVES** AND **ACTIVITIES** FABLABPROJECT.EU

THE PARTNERSHIP PUTS FORWARD THE FOLLOWING RECOMMENDATIONS ON HOW TO ADAPT THIS APPROACH IN SCHOOLS IN EUROPE.

RECOMMENDATIONS ARE AN IMPORTANT TOOL IN ORDER TO GIVE A BRIEF INSIGHT OF THE PROJECT PRACTICE TO POLICY-MAKERS AND STAKEHOLDERS, THUS ALLOWING SHARING THE PROJECT EXPERIENCE SUGGESTING POLICY FORMULATION AT ALL LEVEL TO SPREAD THE BENEFITS OF DIGITAL FABRICATION.

THESE RECOMMENDATIONS WERE DEVELOPED BASED ON EXPERIENCES AND DISCUSSIONS AMONG PARTNER ORGANIZATIONS AND PARTICIPATING TEACHERS DURING THE LAST TWO YEARS ON THE FOLLOWING AREAS, TAKING INTO CONSIDERATION ALL THE PARTNERS’ CONTEXT:

-  HOW DOES DIGITAL FABRICATION LINK TO 21ST CENTURY SKILLS?
-  HOW SHOULD TEACHERS AND SCHOOLS WORK WITH EDUCATIONAL DIGITAL FABRICATION?
-  WHAT ARE THE CHALLENGES OF INTEGRATING DIGITAL FABRICATION IN SCHOOLS?
-  IN WHAT WAYS SHOULD SCHOOL DEPARTMENTS AND NATIONAL AUTHORITIES SUPPORT THE SPREADING OF EDUCATIONAL DIGITAL FABRICATIONS?



How does digital fabrication link to 21st century skills?

The aim of the project was to demonstrate how the present approach can be used across different European countries and schools systems, and thus lead schools towards digital smart, entrepreneurial and innovative pupils. Teachers therefore need to be clear on linking the approach to 21st century skills, i.e. critical thinking, communication and cooperation, creativity, complex problem solving, technological mastering and digital citizenship.

Digital fabrication requires an educational framework to enable students to acquire 21st century skills, ensuring an effective learning path. The project used the “design thinking” framework that, with its 6 phases, supports the students’ acquisition of such skills. The themes in the teacher workshops have been inspired by the United Nation’s 17 sustainable development goals. This also applies to the teachers’ own experiments with students while focusing on specific subject areas (e.g., science, arts, etc.).



How should teachers and schools work with educational digital fabrication?

During the two-year implementation, the partnership has identified three main focus as the basis of how teachers and schools need to introduce and work with digital fabrication in the students' learning path:

1. Focus on the learning environment

- Not all schools may initially have learning environments with all Fablab technologies, which is not crucial in the initial phase where adapting a design-based approach to teaching and learning is paramount.
- The acquisition of the necessary technologies is necessary to create a learning environment that stimulates the development of 21st century skills based on educational digital fabrication.
- It is important to investigate and develop a locally-styled interior design of the school's Fablab, which supports design-based teaching and learning. Likewise, local "ownership" must be ensured.
- It is necessary to look into different synergies between the Fablab method and the more traditional teaching facilities at the school. Not all phases / processes in design based teaching and learning require facilities with Fablab technologies.
- Teaching should include the surrounding community where real-life field studies can take place.

2. Focus on pedagogy

- The design circle is a good tool to help pupils know what the teacher expects from them in relation to the 21st century skills in the learning process. This way, learning becomes more transparent and clear to everyone. Clarity and a "common language" seem to support learning 21st century skills and learning in innovative and complex learning environments.
- Implementation of the approach happens in close collaboration between school management and teachers willing to experiment and master the approach.
- Design thinking is, of course, not only the possible approach to teaching 21st century skills, and it is important for school management and teachers to make relevant links between the design approach and e.g. "engineering" in science teaching.

3. Technology

- There are a number of technologies recommended when offering contemporary design-based education. For a list of possible technologies, please see pages 78-84 of the Manual. In the end, the design task which the student uses.



What are the challenges of integrating digital fabrication in schools?

1. A new pedagogical approach

There is a low awareness in Europe that a “Fablab approach” can be used for different subjects. In Italy for example, there is still a strong belief that Fablab technologies are applicable only for the more technical subjects. However, as demonstrated by the project, Fablab technologies and design thinking goes beyond the classical technical subjects and can be integrated in a wide range of course subjects and/or combination of course subjects.

Design thinking must be implemented as an approach that can be adapted to any class and any subject. As teacher’s workload is already quite high, the methodology must be introduced not as additional load to learn, but as something complementary to previously known pedagogical approaches.

2. Fablab technologies

In some cases, the use of the Fablab approach to teaching and learning is constrained by lack of space or funding in schools. This can be circumvented through sharing of laboratories: Instead of building a Fablab for one school, there are shared Fablabs among schools. However, one must be wary of the organization of scheduling of the use of the Fablab, as this can be quite challenging.



In what ways should school departments and national authorities support the spreading of educational digital fabrications?

1. Formulate local or national strategies

Focus on educational digital fabrication in context of an educational approach that supports the development of 21st century skills; and

Relate to other relevant digital initiatives that schools may already be engaged.

2. Establish teacher training programmes

With **Workshops** that alternate between presentations, dialogues and concrete preparation of courses for experiments at home and in classrooms. Focus on giving meaning in relation to teachers' everyday teaching, providing tools and suggestions to facilitate the introduction of digital fabrication in the daily teaching activity.

I. The structure of common workshops with practice-based and theoretical input is highly inspirational for teachers and facilitates and inspired teachers to work in new ways with their teaching practices.

II. The projects' collaborative and cross-cultural approach stimulates the exchange between diverse groups of participants throughout the project.

Thorough testing / experimentation between workshops where participants test and further qualify course planned in workshops. Training programmes may include:

I. School visits that show concrete teaching and offer discussion on what you see. School visits must be thoroughly organized with relevant observations and reflections; and

II. Online exchanges (Twinning) and sharing between students on the activities and courses they engage. These exchanges provide valuable learning for teachers allowing them to reflect on activities and results of their own teaching.



Engage in sharing and transnational teacher training

1. A new pedagogical approach

Potentials in transnational teacher training activities. Sharing knowledge and experiences between colleagues across countries increases the teacher's own learning and competencies. Twinning and online exchange can be positive elements for cross-cultural understanding and engagement, but they take time to plan and execute. Working formats for teachers and student twinning should be developed further based on experiences from the project.

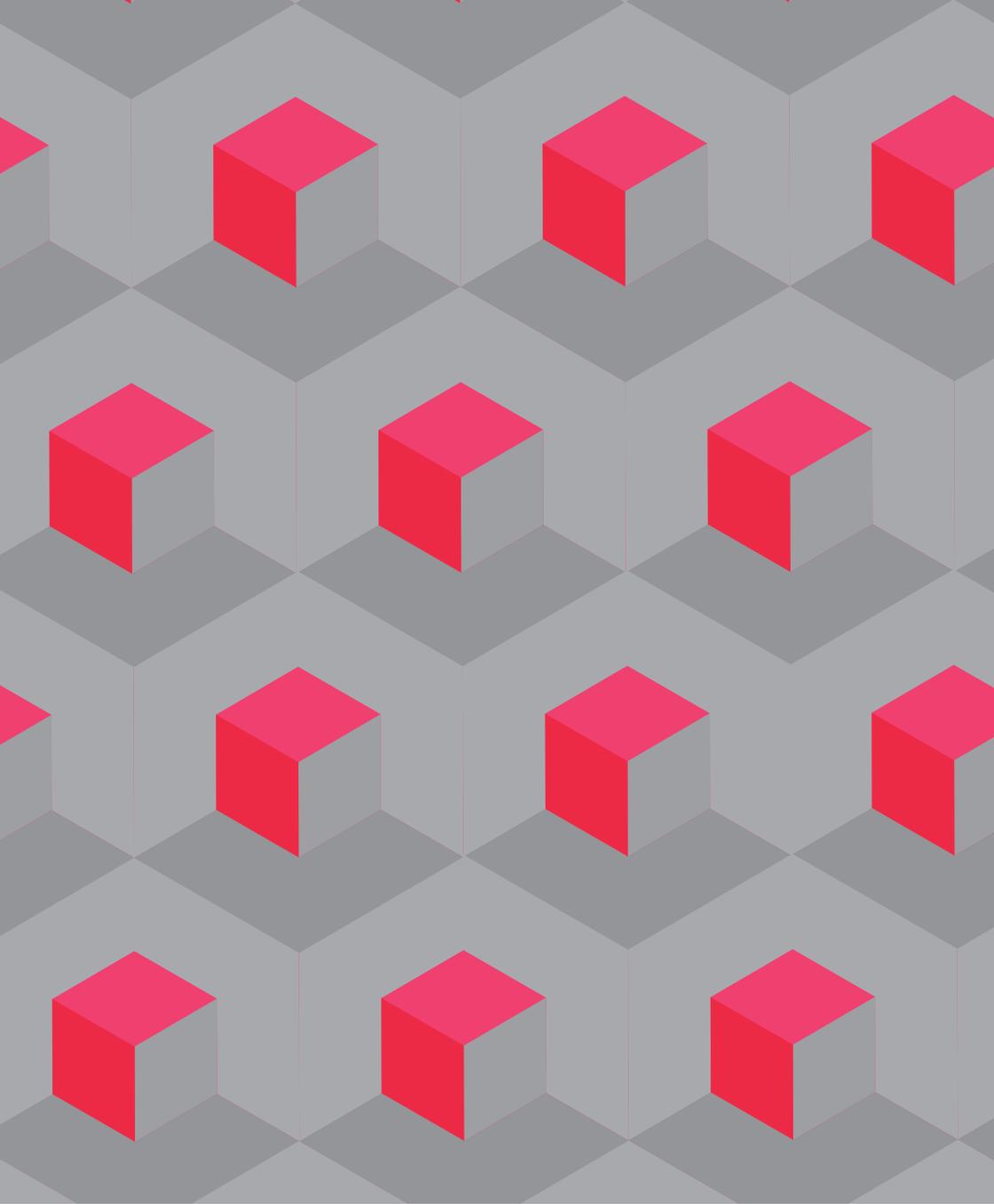
Language barriers can be a challenge, but experience shows that help is possible not only from the same language group but also across countries. It is important to seek a common language, knowledge of technologies and the design circle as an educational framework for teacher training.

“Teaching skills” as a common starting point.

I. Teachers training should be the clear focus of the common workshops, with time for hands-on and practice-based teaching and training.

II. Emphasis should be placed on cross-cultural exchange leaving enough time and space for dialogue and questions in the common workshops.

III. Process documentation and reflection tasks support participants work in positive ways, and is a positive tool for structuring the process, communicating experiences and learning.



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