FAB LEARNING ACADEMY

FLA CARDS

Building Blocks of the Fab Learning Academy Curriculum

A modular, remixable toolkit that captures the core concepts, practices, and pedagogical strategies of the Fab Learning Academy.

These cards function as building blocks to help educators understand, adapt, and redesign the FLA curriculum across global contexts.

Designed to support reflection, innovation, and collaboration, this open resource translates the collective knowledge of FLA hubs into an accessible visual format — ready to be explored, reshaped, and shared.

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Welcome and introductions

Presenting program, goals, sturcture and introduce labs, hubs and people

Sharring | 20 min

Maker Movement

The Maker Movement represents a cultural shift where people move from being consumers to active problem-solvers. It encourages local design and production of solutions to local challenges. This movement includes events like Maker Faire and uses digital fabrication tools such as 3D printers and vinyl cutters.

Learning Theory | 10 min

Maker mindset

The Maker Mindset is characterized by curiosity, embracing failure as learning, open collaboration, reflection, and a growth-oriented approach. It also involves seeking multiple options, thriving on creative challenges, doing things differently ("zagging"), and maintaining optimism.

Learning Theory | 10 min

Teaching with Digital Fabrication

TPACK theory of teacher knowledge.
What are the implications of adding DF makerspaces into formal education?
What are the challenges?
What are some potentials for using digital fabrication and making in schools?

Learning Theory | 5 min

Mesauring our envirmoment

Designing and creating experiential solutions using data, digital fabrication and coding, with the idea that later they can undertake initiatives within their centre that help to unite the community

Innovation | 5 min

FLA Model

3 knowledge domains: Innovative Practices, Pedagogy, and Technology

Learning Theory | 5 min

Documentation tools

Introduction to documetation tools and proces. What is git, how to use the tool fabcloud editor.

Technology | 10 min

Groups Discussion

What do you think your students can learn using digital fabrication that is different to what you are already doing in the classroom?

Reflection | 20 min

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Task
Short video

Create a **short video introduction** of yourself (no longer than two minutes) and post it to your webpage.

Tell us your name, your context (about your students), your experience with digital fabrication technologies, and what your students are learning in your class. And post it to your website.

Practice 30 min

Task
Website

Design a webpage which will serve as your learning portfolio. Put a photo of yourself, your classroom (or space), and a brief introduction paragraph. Use any webpage tool you would like. Share the link

Sharing 60 min

Task
Visit your local node

Explore different digital fabrication processes available in your lab (laser cutter, vinyl cutting, 3D printer). No need to go into specifics just observe the different machines working and reflect on possibilities. Discuss with your instructor on policies and safety rules in your lab.

Practice 60 min

Additional
Content
(asynchronous)

Making in education: examples of digital fabrication activities FOR kids
Portfolio of curated examples of digital fabrication for KIDS.
Making in education: examples of digital fabrication activities FOR kids
Presentation of different DF processes (laser cutter, vinyl cutting, 3D printer).
Making in Education
FLA documentation tool tutorial

Support 60 min

Homework
Review

Designing and creating experiential solutions using data, digital fabrication and coding, with the idea that later they can undertake initiatives within their centre that help to unite the community

Sharing 15 min

DF FOR/WITH
kids continuum

Roles in digital fabrication education:
DF for kids: Teacher designs and fabricates learning tools without direct student input. These tools support specific learning goals or classroom management.
DF with/by kids involve increasing student participation and autonomy.

Learning Theory 10 min

Design process
model

Describes structured models to guide educational fabrication activities: Task Definition, Field Research,Ideation, Fabrication, Justification, Reflection.

A STEAM process also integrates stages like Planning, Execution, and Sharing centered on clear objectives.

Learning Theory 10 min

Design FOR kids

physicalising hard to grasp concepts
Manipulating a learning object is a good way for students to connect with the learning objectives. Teachers create physical artifacts to help children understand complex or intangible ideas. These tools are customized to learning needs and used during instruction or classroom organization.

Innovation 10 min

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Vinyl Cutting

Designing on a computer.
Using a vinyl cutter (e.g., Roland CAMM-1 GX-24, Silhouette Cameo 3) to cut designs on materials like vinyl, flexible copper, or paper.
-Producing educational stickers, labels, flexible circuits, or stencils.
Key factors: machine size, noise level, usability, cost, and safety for children.

Technology 10 min

Groups Discussion

How do you define your learning outcomes in your activities (not DF)?

What learning outcomes can you expect from different DF activities?

What kind of skills do you expect your students get with different DF activities?

Reflection 20 min

Tasks Sticker

Design and cut a sticker (or heat transfer) for your classroom/context that reflects your understanding of the maker mindset

Practice 120 min

Tasks Questions

How does this process relate to what you are teaching in the classroom?

How does this project inspire you?

In which part of the digital fabrication continuum would you feel more comfortable? Why?

Reflection 30 min

Tasks Documentation

Create a page on your documentation title Week2, and include 2 or more pictures of the final project, Short description of the process
Copy and paste Student Agreement text in your Student Agrermment page inside about section of your website.

Sharing 30 min

Additional Content (asynchronous)

Learning outcomes: content based and horizontal competences (21st century skills, socioemotional learning)
Rapid prototypying steps: brainstorm, iterate, design, testing. Low fidelity prototypes
tutorial videos for vinyl cutting
2D design. Introduction to vector graphics
Using the vinyl cutter and heat transfer

Support 120 min

Homework Review

Designing and creating experiential solutions using data, digital fabrication and coding, with the idea that later they can undertake initiatives within their centre that help to unite the community

Sharing 15 min

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Constructionism Principles behind

Introduction to constructionism, a learning theory that emphasizes building knowledge through hands-on interaction with physical objects. Students will learn how creating things can help them understand complex ideas, and how social interaction plays a key role in learning, as described by Vygotsky's Zone of Proximal Development.

Learning Theory | 10 min

Socio Emotional Learning

Students will learn the five core areas of Social-Emotional Learning—self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. This module shows how SEL can be naturally embedded in maker-centered projects that are collaborative, authentic, and student-driven.

Learning Theory | 10 min

Teachers reflective practice

Introduces the concept of reflective practice as a key tool for professional growth. Students will learn how regular self-evaluation—through journaling, dialogue, or feedback—can improve teaching strategies, help identify what works, and support better learning outcomes.

Innovation | 5 min

2D fabrication with laser cutter

Students will learn the basics of laser cutting as a digital fabrication process. This module covers how to prepare 2D designs using vector software, the difference between cutting, engraving, and rastering, and important safety considerations when working with laser cutters in educational settings.

Technology | 10 min

Groups Discussion

When you DESIGN activities/projects using Digital Fabrications:

- Is Social-Emotional Learning (SEL) considered when designing the activites ?
- What DF processes can be used?
- How those activities can be integrated into formal lessons?

Reflection | 20 min

Task Laser cut

Design and cut with the laser cutter an object that can be used in your classroom (e.g. to support any of your lessons, or as part of your infrastucture)

Practice | 120 min

Task Questions

- How could you use laser cutting in one or two of your lessons?
- What do you consider when planning a lesson?
- How do you include soft skills or SEL in your teaching? Has your perspective changed after this session?

Reflection | 30 min

Task Documentation

Document briefly the process in your portfolio. Indicate which were the main challenges.
Include two pictures of the final object (hero shot) and explain how are you planning to use it

Sharing | 30 min

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Additional Content (asynchronous)

- Tips to create a lesson plan
- Examples of 2D laser cut projects for classroom
- Gamification: How DF can help in when gamifying pedagogical activities?)
- tutorial videos for laser cutting
- Additional concepts: union, difference, text to path...
- preparing for laser cutting.

Suport 120 min

Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Steven Greenstein

Associate Professor Steven Greenstein (Mathematics, Montclair State University) presents the Educational CAD Model Library, a peer-reviewed repository of 3D-printable objects for K-12 STEM education.

Real world talk 50 min

Groups Discussion

- What is your subject/content?
- What manipulative/ teaching aid can be used to teach this concept?
- Are there examples online?

Reflection 20 min

Field Activity

Digital Fabrication FOR kids

Design and build a physical teaching aid and create a lesson plan for a subject that you teach. Your lesson plan must include a physical teaching aid: object, model, or manipulative that you design and fabricate for use in the classroom, and the subject and learning outcomes of the lesson should be non-technical.

Practice 4 h

Lesson Plan Builder

Lesson Plan Builder (ScopesDF): Lesson Plan Title, Banner Image, Featured Image, Lesson Summary , Additional Contributor, Subject Areas, Age Ranges, Fab Tools, Topic Tags, Curriculum Standards, What You'll Need, Learning Outcomes

Sharing 60 min

Module 2

Sharing 30 min

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Homework Review

Share some of the better Field Activity Projects with the larger group

Sharing 20 min

Problem/Project /Design Based Learning

This section helps educators understand the differences between PBL approaches and traditional teaching. It explores how to design meaningful, multidisciplinary learning experiences, plan activities with real-world relevance, and clarify the evolving role of the teacher as a guide and facilitator.

Learning Theory 10 min

DF with kids continuum

Digital Fabrication (DF) can involve students at different levels—from idea generation to using machines. This section explores how to meaningfully integrate DF into education, even when students are involved in only part of the process, and helps teachers identify when and how to foster student agency.

Learning Theory 10 min

Introduction to CAD Tools

Introduces digital design environments like TinkerCAD and Fusion 360, helping participants explore how to model 3D parts and collaborate using cloud-based CAD tools in education.

Technology 10 min

Laser cut tips

Covers best practices: use vector paths for cuts, avoid unsafe materials (e.g. PVC), nest shapes to save material, and understand kerf. Also includes how to prepare raster images for engraving.

Technology 5 min

Laser cutting 3D projects

This section introduces building 3D forms with flat materials using techniques like slot-and-tab, stacking, slicing, and living hinges. Tools like Fusion Slicer and Boxes.py support the design process

Innovation 5 min

Groups Discussion

GROUPS: Science & Math, Technology, Humanities & languages, Arts & Elementary
How does the role of the teacher change when working on digital fabrication WITH kids?
How can this work in your subject area and your classroom?documetation tools and proces. What is git, how to use the tool fabcloud editor.

Reflection 20 min

Task Laser cut 3d objects

Create a press-fit build kit using the laser cutter or a 3D object with the laser cutter. As material we strongly recommend using cardboard

Practice 120 min

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Task Questions

How your press-fit can be utilized in education? How other teachers could use it?
What has been your experience using Project Based Learning / Problem based learning in the past?
When organizing DF activities with kids, What are the aspects that you think should be prepared beforehand? What aspects can be improvised?

Reflection 30 min

Task Documentation

Create a page on your documentation and include 2 or more pictures of the tasks and a short description of the process

Sharing 30 min

Additional Content (asynchronous)

Intro to materials. Cardboard
CAD resources. Where to find 2D and 3D models to modify.
Tutorials on 3D design
Creating 3D objects with laser cutter
Creating molds with laser cutter

Support 60 min

Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Sustainability

This section connects digital fabrication to the UN Sustainable Development Goals (SDGs). It introduces circular economy principles using the Ellen MacArthur "Butterfly Diagram" and promotes using Fablabs to teach sustainability through projects, materials, and community impact.

Learning Theory 10 min

Sustainables Practices

Learners explore practical strategies for sustainability using the 7 R's: Rethink, Refuse, Reduce, Rot, Reuse, Repurpose, and Recycle Right. These actions are discussed as guiding principles for sustainable education and maker-centered learning.

Learning Theory 10 min

Biofabrication (biomaterials)

This section introduces materials made from natural sources like gelatin, agar, or fruit waste. Students learn to mix biopolymers, plasticisers, and additives to cook, cast, and dry sustainable materials for use in classroom projects.

Innovation 10 min

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Moulding and casting

Students learn to design and use 2D or 3D molds for casting biomaterials. TinkerCAD is recommended for designing molds, which can be printed or cut. The section explains types of molds and drying techniques for educational use.

Technology 10 min

Change in school culture

This section focuses on fostering a growth-oriented attitude: being curious, embracing failure, collaborating, and reflecting. It highlights the importance of creating a culture where making is about ideas, not just products.

Learning Theory 10 min

Groups Discussion

GROUPS: Science & Math - Technology - Humanities, languages, Arts & Elementary

How can you integrate sustainable practices in your makerspace?
How can you promote among different stakeholders (kids, colleagues, directors) the adoption of sustainable practices

Reflection 20 min

Task Moulds

[Recommended for all]: Create a mold in wood / acrylic using the laser cutter
[For Advanced participants]: Create a mold using the 3D printer

GROUP: Together with your local instructor and colleagues cook your own material and pour it into your cut molds.

Practice 120 min

Task Questions

Have you considered sustainable practices in your teaching in the pasts? How?
How Digital Fabrication might support sustainable practices?
Do you think your school is ready to a change in mindset? Why? How can you get support from other stakeholders? How would you structure a training for teachers?

Reflection 30 min

Tasks Documentation

Create a page on your documentation and include 2 or more pictures of the tasks and a short description of the process

Sharing 30 min

Additional Content (asynchronous)

- Metacognition and self-regulated learning
- Molds using 3D printers
- UN Development goals.
- Recipes for biomaterials
- Recommendations for creating molds

Support 2 h

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Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 20 min

Standard/CV alignment

This section explores how to connect digital fabrication (DF) activities with official curriculum standards across countries. Teachers are encouraged to link DF to subject-specific and cross-curricular frameworks like NGSS, ISTE, and SEL. It highlights strategies to identify where DF enhances learning and promotes creativity, hands-on skills, and the use of diverse educational standards beyond local guidelines.

Learning Theory 10 min

Education portfolio

This section presents the educational portfolio as a way to reflect, grow, and share teaching practices. It includes learning goals, tools, photos, and the project story. Teachers are guided on how to document DF activities to benefit others, highlighting what makes them unique compared to traditional lessons.

Learning Theory 10 min

Additive manufacturing principles

This section covers how 3D printing works by adding material layer by layer. It explains key concepts like slicing, infill, shell thickness, overhangs, and supports. It also compares additive and subtractive manufacturing, emphasizing advantages like low waste and high customizability for education.

Technology 15 min

AI for 3D modeling

Briefly acknowledges how AI tools (like Generative AI) are emerging in 3D design. These tools can assist educators and students in generating or enhancing models for digital fabrication projects. (Meshy, Zoo, Openscad + LLM)

Innovation 10 min

Groups Discussion

GROUPS: Science & Math - Technology - Humanities, languages, Arts & Elementary

How do you align your digital fabrication lesson with curriculum or standards?
What challenges do you face when integrating DF in formal education?
How do you make sure your lesson meets the required standards?

Reflection 20 min

Task 3D Printing

[Recommended]: Create a 3D object with a 3D printer. The 3D object should provide some support for your class or some of your teaching lessons. Design it from scratch or modify an existing 3D object.
[For Advanced participants]: Build an object assembling different 3D printing parts, or Create an articulated object printed in one piece

Practice 2 h

Task Questions

- Will you use the fabricated object in your classroom?
- Describe a 3D printing activity. How does it align with your curriculum? What challenges do you foresee?
- Have you started an educational portfolio? Why or why not?
- What are the benefits of keeping one?

Reflection 30 min

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Task Documentation

Create a page on your documentation and include 2 or more pictures of the tasks and a short description of the process

Sharing 30 min

Additional Content (asynchronous)

- AI supporting 2D and 3D
- Learning portfolio: Examples & tools
- 3D printing: - Design for 3D printing (limitations) - Basic concepts: support/bed adhesion, infill, wall thickness, layer thickness - Slicing
- 3D design: - Tinkercad - OnShape - Fusion360 Tutorials

Support 2 h

Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Bartholomew Ting

This talk shows how students and educators can use **cardboard and digital tools to build large**, interactive structures. Projects blend creativity, engineering, and storytelling, often including electronics. They promote collaboration, sustainable prototyping, and are ideal for STEAM learning and public exhibitions.

Real world talk 50 min

Field Activity

Digital Fabrication WITH kids
Design, test, and reflect on a lesson plan for a subject that you teach. Your lesson plan must include students engaging in the digital fabrication process themselves. You must include, at least, one of the digital fabrication processes learnt so far: vinyl cutting, laser cutting and 3D printing.

Practice 6 h

Lesson Plan Builder

- **Engagement:** Did DF tech boost student interest or motivation? Why?
- **Learning**: Did it help meet learning goals? Any surprising outcomes?
- **Challenges:** What difficulties arose? How did you handle them?
- **Growth:** How has this shaped your teaching? What new skills or strategies did you gain?

Sharing 60 min

MODULE 3

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Homework Review

Share some of the better Field Activity Projects with the larger group

Sharing 20 min

Culturally Reflective teaching & learning

This approach encourages educators to recognize students' cultural backgrounds, reflect on their own biases, and adapt pedagogy accordingly. The aim is to support student identity, amplify diverse voices, and design lessons that are inclusive and meaningful.

Learning Theory 10 min

Distributed TPACK for Collaboration

Distributed TPACK allows teams of educators to share knowledge across Technology, Pedagogy, and Content domains. Teachers collaborate on lesson design, instruction, and student support—leveraging strengths and co-creating interdisciplinary learning experiences.

Learning Theory 10 min

Introduction to Electronics for education

Basic electronics concepts include current, voltage, resistance, circuits, and components like resistors, LEDs, and motors. Tools like multimeters and Tinkercad Circuits help teach electronics in accessible, engaging ways aligned with standards like NGSS or Common Core.

Technology 10 min

Electronics un CV

- Eco House: LEDs + light sensors in a sustainable home model
- Art Spinners or Constellations with LEDs
- Playdough Keyboards for younger learners
- Interactive Posters and String Machines for waves and circuits

Innovation 5 min

Groups Discussion

GROUPS: Early childhood education - Primary - Middle school - High school and adult education.

- How do you see the distributed TPACK model working in your environment?
- Which are the main opportunities and challenges, considering digital fabrication and collaboration?
- How can you promote collaboration within your organization?

Reflection 20 min

Task Electronics

Design some educational activity using simple electronics components that is suitable for the age group that you are teaching. Build and test it yourself.

Practice 2 h

Task Questions

- What are the main challenges of using electronics in your space?
- Describe a successful co-teaching experience. What are the benefits and drawbacks of collaboration? What's essential for co-planning?
- How can digital fabrication support culturally reflective learning? Suggest a project that celebrates student diversity.

Reflection 30 min

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Task Documentation

Describe briefly your project, enumerate the electronic components you are using, describe how are they used and provide several pictures of your project. If possible you can also include a video.

Sharing 30 min

Additional Content (asynchronous)

- Flexible electronics: material, tutorials and guidelines
- Electronics simulator list
- Human Centered Design
- Example of inclusive projects
- Introduction to Electronics for education
- List of boards for electronics and other kits(not to program)
- Tutorial: simulation electronics in

Support 2 h

Practice 2 h

Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Universal Design Learning

This session introduces Universal Design for Learning (UDL), a framework for inclusive and flexible teaching. UDL recognizes learner diversity and promotes three key principles: multiple means of engagement, representation, and expression, helping remove barriers and support all students.

Learning Theory 10 min

Assessment DF activities

This section explores how to assess learning in digital fabrication. It covers diagnostic, formative, and summative methods, stressing the value of formative assessment in hands-on projects. Teachers learn to align outcomes with rubrics, and use portfolios and reflection to track progress and creativity.

Learning Theory 10 min

Intro to programming

This module introduces programming in education through block-based (Scratch, MakeCode) and text-based (Arduino, Python) tools. It highlights coding as a way to build problem-solving, creativity, and computational thinking, while covering core concepts like loops, conditionals, and functions for classroom use.

Technology 10 min

Groups Discussion

GROUPS: Early childhood education - Primary - Middle school - High school and adult education.

- How do you assess student work? What metrics / methodologies do you use?
- What are the challenges?
- How do you include diversity in assessment?
- How to integrate DF in assessment?

Reflection 20 min

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Task Programming

[Recommended for all]: Design and implement a simple game or quiz using a block programming language. Ideally the game / quiz can be used in your classroom but it is not a mandatory requirements.

[**Absolute beginners**]: Build a simple story using Scratch. You can use some of the tutorial examples.

Practice 2 h

Task Questions

- How do you consider diversity when designing activities?
- What do you consider for students with learning, physical, or emotional disabilities in DF activities?
- How do you assess digital fabrication activities? What's your preferred method? What would you improve?

Support 30 min

Tasks Documentation

Describe briefly your game/quiz and the programming platform you have used. Discuss about your main challenges.

In addition, you should provide the source code (as a file or a link that can be opened by anyone) and several screenshots of your application. If possible, a video is a great way of documenting your project.

Sharing 30 min

Additional Content (asynchronous)

- Example of assessments
- List of Programming environments for education
- Tutorial: Scratch, Snap!
- Tutorial programming concepts using Block programming (sequential programming / control structures / variables)

Support 2 h

Learning Theory 10 min

Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Megumi Iwata

In this session, Megumi Iwata explores practical uses of Generative AI in education to improve lesson planning, support diverse learners, and boost creativity. She highlights the need for ethical reflection on AI's biases and urges thoughtful integration in teaching.

Real world talk 20 min

Donn Koh

In this talk, Donn Koh shows how AI is transforming design by boosting creativity, efficiency, and collaboration. He shares practical examples and inspires new ways to tackle real-world design challenges using AI.

Real world talk 20 min

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Field Activity

Electronics & Programming: Collaboration and Assessment

Design (or adapt) an electronics or programming-based lesson plan, (possibly) collaborate with another teacher, design the assessment, and test the lesson to receive feedback. Your lesson plan must include electronics components and/or basic programming elements.

Practice 6 h

Lesson Plan Builder

Depending on the chosen option you can take different type of feedback.

- Test your lesson plan with learners either in your classroom or in another setting.
- Test your lesson plan with a colleague or another FLA participant.
- Test your lesson plan with an AI.

Sharing 60 min

MODULE 4

Homework Overview

Share some of the better Field Activity Projects with the larger group

Sharing 20 min

Content integration: multidisciplinarity

Bringing multiple subjects / field of knowledge in different activities. General experts vs field experts. Collabaration between disciplines. Organizing multidisciplinar activities within a curriculum. How DF supports multidisciplinarity

Learning Theory 10 min

Computational and systems thinking

What is Computational thinking. What is worth to be taught about computational thinking. How computational thinking supports learning.Introduces problem-solving strategies like decomposition, pattern recognition, abstraction, and algorithms, as well as systems thinking —understanding how parts interact. Useful for both coding and real-world teaching.

Learning Theory 10 min

Physical computing. Introduction to microcontrollers

Define physical computing. How use computational thinking to teach physical computing (or viceversa). What benefit could physical computing provide in education. Includes beginner-friendly tools like Scratch, Makecode, and Tinkercad Circuits.

Technology 10 min

Makerspaces in schools

Showcase of makerspaces integrate in schools. How each space provides an identity for that school? What are the strenghts and weakness of each space? Example on how to integrate makerspace in school (e.g. full fab lab vs mobile fab lab)

Innovation 10 min

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Groups Discussion

Discuss about experiences, positive / negative trying to collaborate with teachers from other disciplines / bring different disciplines in the same project.

How DF can support multidisciplinar projects?

Reflection 20 min

Task Physical computing

Use one development board (arduino, microbit ...) and use it to sense something in your class (noise / light / movement) and produce some kind of response (audio, light, movement)

Practice 2 h

Task Questions

- Do you integrate multiple disciplines or collaborate with other teachers? What are the benefits and challenges?
- How do you envision or use a makerspace at your school? What would you change?
- How do you define computational thinking? Do you use it in teaching? How could you leverage it more?

Reflection 30 min

Tasks Documentation

Describe briefly your project; name the board you are using, as well as the sensor and actuator; Explain what you are measuring and how you are using the actuators; if you are using external components, draw a simple diagram on how they are connected and finally provide your code (or link to your code). Include several pictures of your project. If possible you can include a video.

Sharing 30 min

Additional Content (asynchronous)

- Computational thinking
- AI tools for education. Compilation of tools.
- Tutorials on microcontrollers programming
- List of platforms and environments
- Simulation in tinkercad and wokwi

Support 2 h

Learning Theory 10 min

Homework Overview

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Makerspace in learning environments

Explains how to design and manage makerspaces in schools, considering space, tools, safety, and organisation. Different models include dedicated rooms, distributed setups across classrooms, or mobile labs. Successful makerspaces need staff support to integrate with teaching and co-develop lessons.

Learning Theory 10 min

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How to succeed in group projects

Highlights the importance of collaboration in group projects through brainstorming, sharing resources, peer feedback, and coaching. Collaborative work helps students apply knowledge and skills in meaningful ways.

Learning Theory | 5 min

Makerspaces and local communities

Describes how makerspaces connect with local communities to create partnerships that support learning and local production. Examples include urban models like Fab City Barcelona that focus on community-driven innovation, circular economies, and hyperlocal manufacturing.

Innovation | 10 min

IoT and connectivity

Introduces the Internet of Things (IoT) as everyday devices connected to the internet, enabling remote monitoring and control. Discusses connectivity technologies (WiFi, Bluetooth, Zigbee, NB-IoT), examples of physical computing projects integrating sensors and actuators, and digital platforms like IFTTT, Node-Red, and Make.com.

Technology | 15 min

Task IOT

Connect your microcontroller board with other device: it can be another microcontroller, application in cloud, a mobile phone... They should be able to communicate data generated/sensed using the board to the other end (E.g. of use case: monitoring system for school). You can also use your board to receive instructions from the other device (use case: robotics).

Practice | 2 h

Task Questions

- What opportunities exist to collaborate with your local community? Who and how would you work together? What's needed for success?
- What are the next steps for developing your school makerspace? How do you envision it?
- How can physical computing and IoT enhance your teaching? Any plans to integrate them?

Reflection | 30 min

Task Documentation

Name the devices you're using, along with the platform or technology used for communication between them. Clearly explain what you're measuring and describe how data is communicated between the two endpoints. Include a simple diagram illustrating how they're connected. Provide your code for both ends. Add several pictures showcasing your project. If possible, include a video demonstration.

Sharing | 30 min

Additional Content (asynchronous)

- Learning communities around the world
- Creative design.
- Equipment cards
- List connectivity tools with descriptions
- Examples of projects using IFTT, NodeRed, Blynk

Support | 2 h

Learning Theory | 10 min

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Homework Review

Participants share their websites from the previous week. This space allows for peer feedback, visibility of different approaches, and reflection on learning through documentation.

Sharing 15 min

Field Activity

Interdisciplinary work in Physical computing. Create a lesson plan involving robotics, physical computing or programming and test it in real educational environment. The lesson plan should include certain aspect of interdisciplinarity, multidisciplinarity or transdisciplinarity. Hence, this time, you need to collaborate with a teacher from another subject at some point (either during design or implementation phase or both).

Practice 8 h

Lesson Plan Builder

"Lesson Plan Builder (ScopesDF): Lesson Plan Title, Banner Image, Featured Image
Lesson Summary , Additional Contributor, Subject Areas, Age Ranges, Fab Tools, Topic Tags, Curriculum Standards, What You'll Need, Learning Outcomes"

Sharing 60 min

Questions

- Collaboration: When and how did others support your Field Activity?
- Challenges: What difficulties did you face while teaching?
- Integration: How interdisciplinary was your lesson? How could you improve it?
- AI Use: Did you use AI? When and how?
- Course: Key takeaways from the course?

Reflection 30 min

Erin E. Riley

Erin E. Riley explores how combining art, technology, and community can enrich education. She shares ways to use creative practices and digital tools to boost critical thinking, expression, and inclusion, offering strategies to engage and empower students through collaborative learning.

Real world talk 20 min

Kirk Lin

Kirk Lin presents Culture Box, an interactive installation blending digital fabrication, NFC technology, and storytelling to explore indigenous Tao culture and environmental awareness. The project uses handmade objects, audio, and AR to engage users in multisensory experiences, showing how fabrication can amplify cultural narratives and foster reflection.

Real world talk 20 min

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