Maker education: towards a new paradigm in education

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The Maker Movement…

- a return to the **do-it-yourself (DIY) ethos**
- individuals engage in **passion projects**
- Learners become **creators or makers** of things in a makerspace
- open exploration, personal interest, and tinkering founded on a belief in innovation
- Placing students at the center of learning!

Introducing the maker movement in education

- The Maker Movement is now assimilating into school-based settings, creating a dedicated space that promotes the freedom to explore, take risks, and create.
- It brings about a natural interest in learning that combines constructivist traditions with new technology.

- Maker spaces or sites of innovation
- Maker spaces are community-oriented workshops that engage learners in problem-solving through hands-on design and construction, oftentimes combining analog material with digital tools
- Makerspace provides kids with a variety of tools and materials and the freedom to create

Makerspace: One lab, multiple spaces

- Space for ideation and planning
- Create and Develop area
- Space for crafting
- Space for programming
- Space for robotics
- Presentation area (Wall of fame!)
- Sharing

Plan of a Makerspace

(by “Maker Days for Kids”, Designing a Makerspace for Children – Let’s Do It Sandra Schön . Martin Ebner and Maria Grandl)

Designing a Makerspace for Children – Let's Do It

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Sandra Schön , Martin Ebner and Maria Grandl)

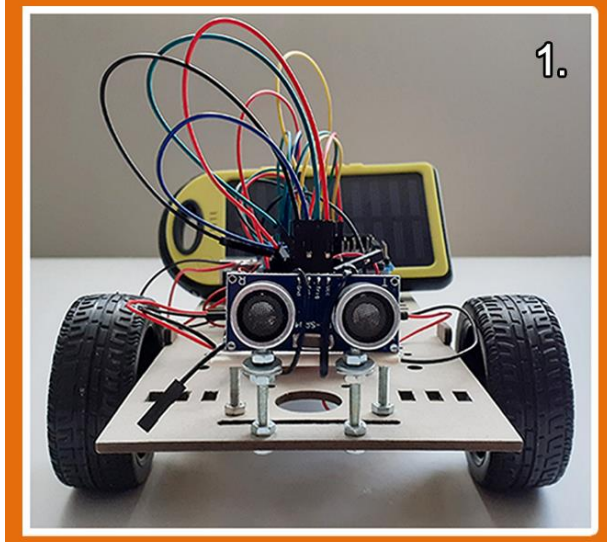
What do we mean by maker activities/ projects?

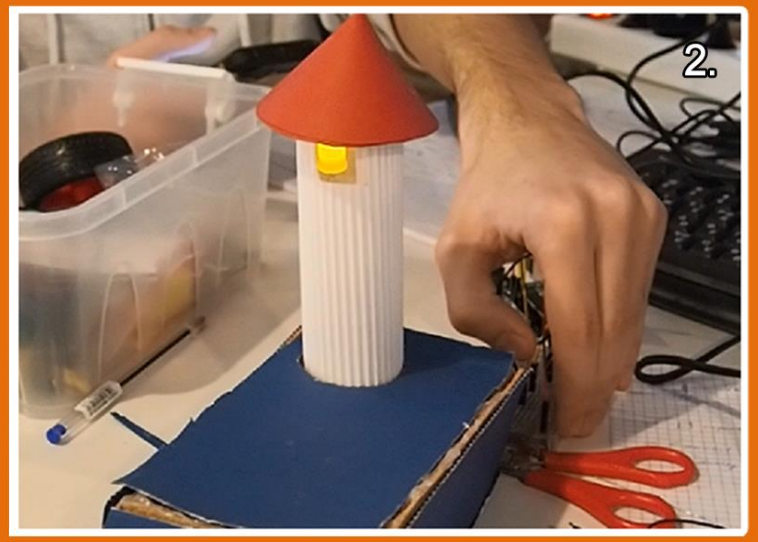
Every makerspace is unique, may offer diverse projects!

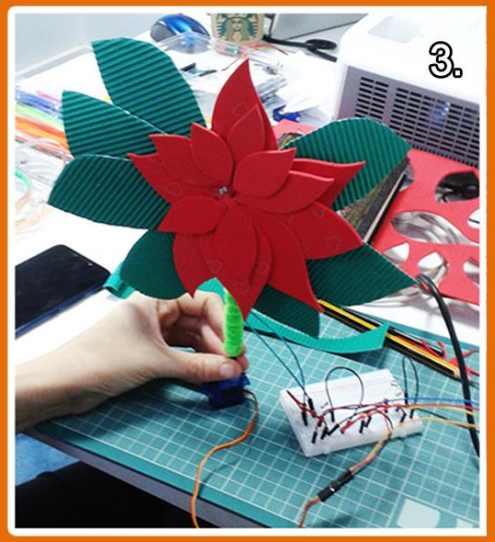
Some of the things you can do in a makerspace:

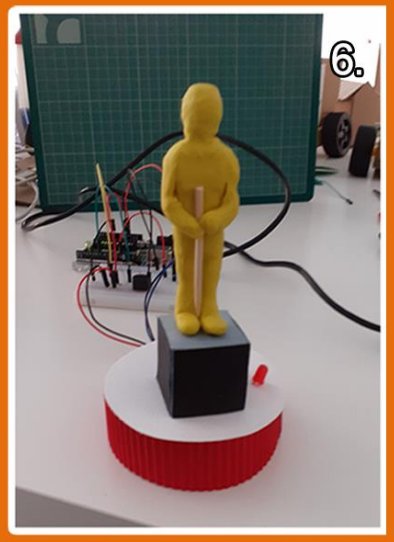
- Coding
- 3d printing
- Laser cutting
- Soldering
- Electronics / Arduino
- Robot building / Robotics
- Learn Circuits and Electricity with paper circuits
- Sewing
- Wood working

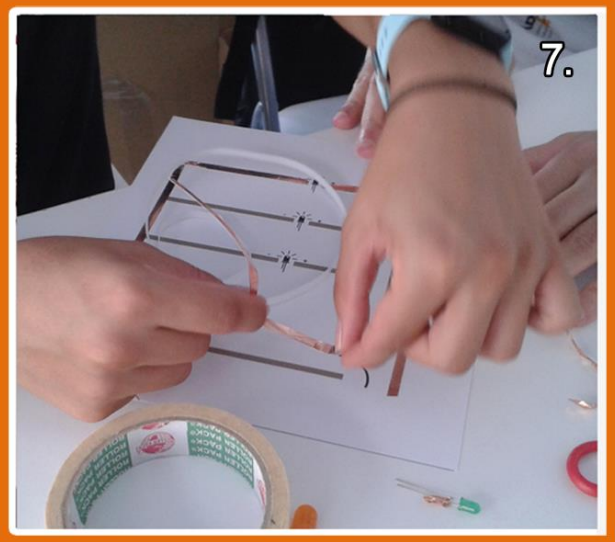
What do we mean by maker activities/ projects?











1. THE DIY AUTOMOBILE 2. THE LIGHTHOUSE 3. THE SUNFLOWER 4. THE 3D PRINTED PEN HOLDER
5. THE SMART LIGHT 6. THE ALARM SYSTEM 7. INTERACTIVE PAPER MODELS

Tinkering is important!

No rush to make a predefined product/project

Ask “what happens if…”

Engage learners in iterative explorations/experimentations with the tools and materials (“a deep conversation”)

“Arts and crafts”

- the eCraft2Learn action we have seen young students aged 13–17 in several projects working enthusiastically with creative “arts and crafts” artefacts e.g. children created DIY robotic automobiles from scratch using low-cost and recycled materials
- inline with the maker movement mindset
- technologies as “creative material” that can offer a design which provides hands-on materials for children to manipulate, think with and act upon as creators
- The “arts and crafts” model allows children to un-box, un-craft, deconstruct and reconstruct, triggering their curiosity and facilitating collaboration

Technologies designed for professionals and hobbyists or for learners?

- technologies designed for professionals or enthusiasts presuppose a domain knowledge (e.g.electronics) and skills (e,g. soldering, circuiting, C coding etc.) that young students or novices are unlikely to possess
- when introduced in classrooms or educational makerspaces for novices, can cause difficulties and eventually frustration and discouragement
- “overdesigned” technologies essentially hide how the product actually works
- We argue for technologies designed in line with sound learning theories and constructionist/constructivist pedagogy
- However, putting emphasis on making technologies educationally meaningful and engaging should not compromise their reliability or scientific accuracy

Scenarios from everyday life or “missions to Mars”?

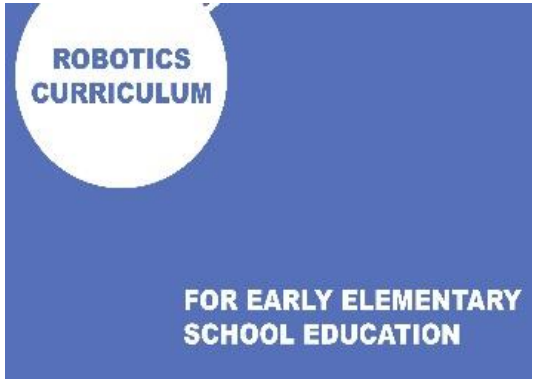
- “exotic” scenarios and models of robots inspired by fiction movies or popular TV shows?
- have nothing to do with children’s everyday lives.
- may result in the mystification of technology and promote misconceptions about how technologies work
- We argue for scenarios from everyday life!

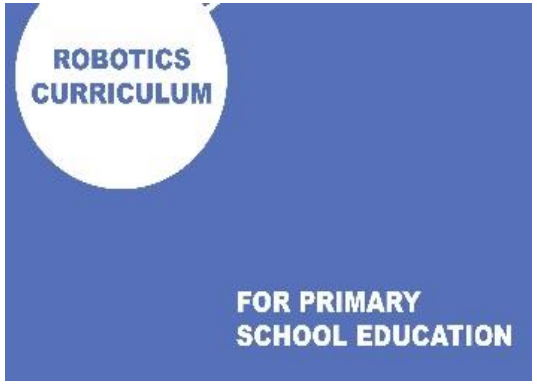
Cost matters!

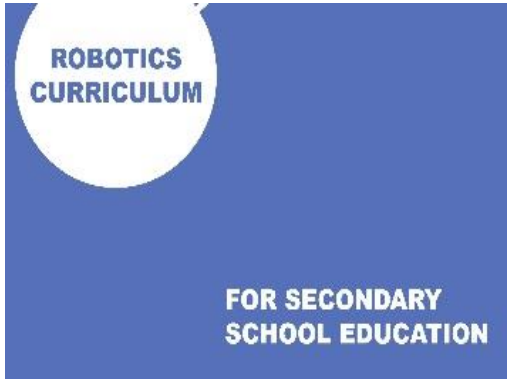
- high cost of technologies may be an inhibiting factor for schools, educators and families
- low-cost kits combined with materials from everyday life and recycled components of toys can offer creative solutions and higher educational value than expensive, ready-made models or kits that allow children to make only a limited number of predefined models.

Further readings & resources

- MAKEOLOGY, Eds. K. Peppler, E. Rosenfel Halverson, Y. KAFAI, 2016, by Taylor and Francis
- Alimisis, D. (2020) Emerging Pedagogies in Robotics Education: Towards a Paradigm Shift. In: Pons J. (eds) Inclusive Robotics for a Better Society. INBOTS 2018. Biosystems & Biorobotics, vol 25. Springer, Cham
- Alimisis, D. (2021) Technologies for an inclusive robotics education. Open Research Europe 2021, 1:40
- The INBOTS curricula and open educational resources freely available for teachers and educators https://edumotiva.eu







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Thanks!

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