
DOING MORE
TOGETHER
STEAM
IN OULU

1. The ABCs of STEAM in Oulu

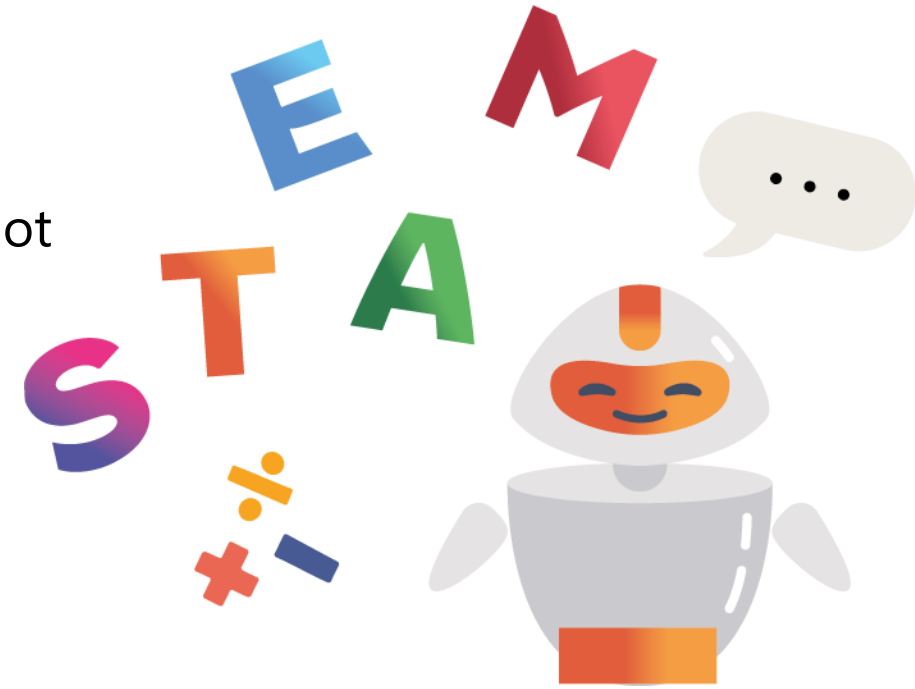
STEAM

Letter by letter

Science
Technology
Engineering
Arts
Mathematics

In the language of Oulu

Tiede
Teknologia
Insinööritaidot
Taide
Matikka



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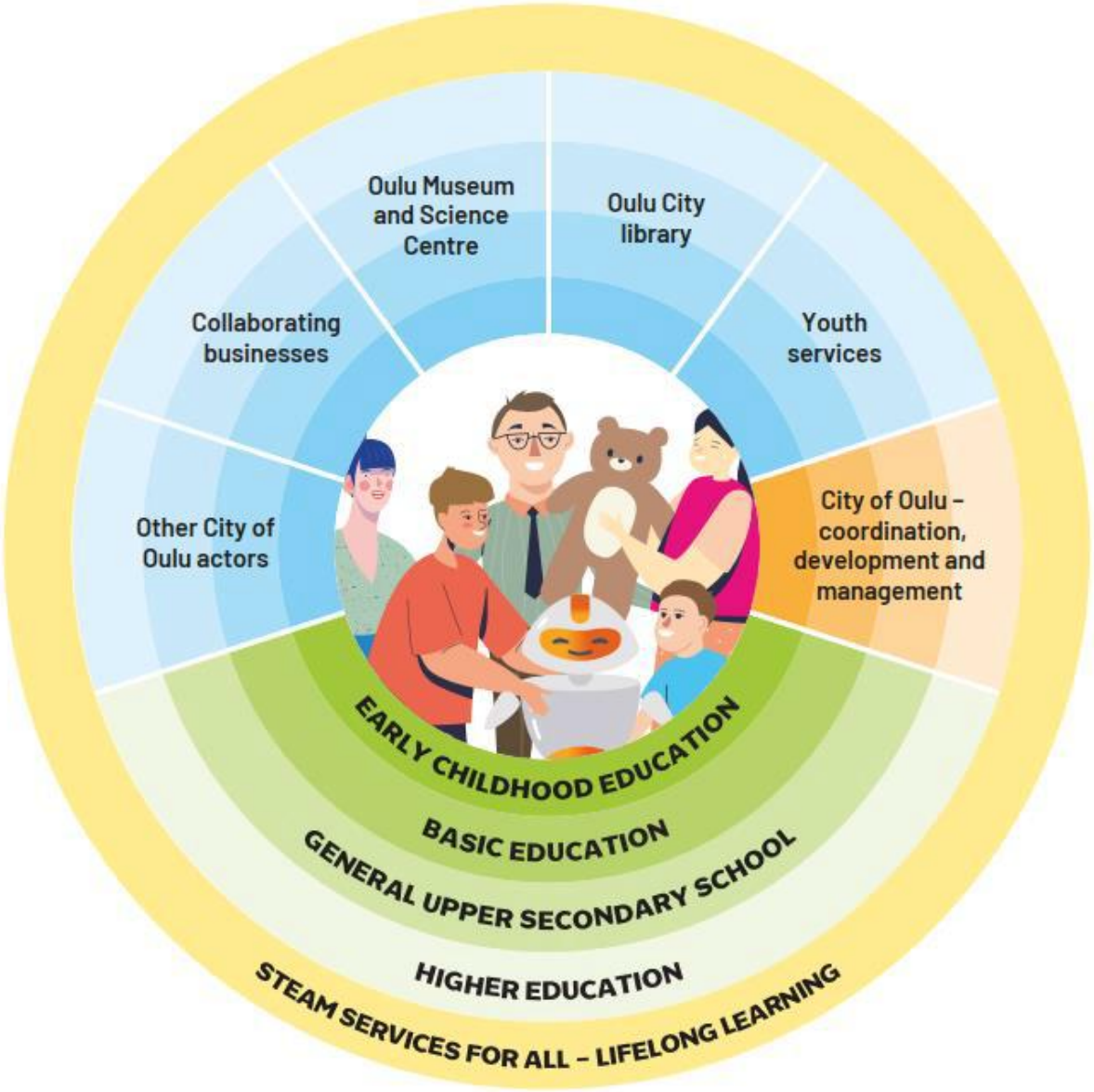
How did it all start in Oulu?

- Project began in 2018 with funding from the Finnish National Board of Education and the support of six basic education schools.
- After eight years, the network includes all basic education units, about 30 of early childhood education units, a few upper secondary schools, university, and other city actors.
- Activities vary by units; some are quite experts, some are just starting
- Each unit implements STEAM pedagogy based on its own strengths
- Implementation in lower and upper secondary schools is challenging because of the subject teacher system

Enabled by


Oulu Museum and Science Centre
Oulu City library
Collaborating businesses
Youth services
Other City of Oulu actors
City of Oulu – coordination, development and management
EARLY CHILDHOOD EDUCATION
BASIC EDUCATION
GENERAL UPPER SECONDARY SCHOOL
HIGHER EDUCATION
STEAM SERVICES FOR ALL – LIFELONG LEARNING

STEAM in Oulu

Which Innovative community in Oulu

What Promoting creativity and curiosity

Why Looking for solutions to the challenges of the future

Where At the intersection of arts, media, science, and technology

How Joining fields of learning and subjects into larger wholes

Who Teachers and other professionals in collaboration with children and youth

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Main idea: Doing more together

Doing together

A collaborational, experimental way of learning

"STEAM means both the teacher and the pupil draw strength and courage from doing things themselves. Those are inspiring experiences."

Jaakko Määttä, Oulujoki elementary school

Focus areas

- Meaningful collaborative development
- Trying and failing is allowed
- Focusing on art and the design process
- Centring the learner
- A culture of sharing and doing together
- A strong link between pedagogy and everyday learning
- Active mentoring
- The role and commitment of management

“STEAM has been a turning point for the entire culture of our school.”

Pekka Pöyhtäri, Hintta elementary school

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Vision 2026

Bravely on the edge – STEAM in Oulu.

Towards a creative method through doing together.

- Bravely on the edge – innovative, daring to try and to fail
- A creative culture – experimental and constantly developing

Values

- **Doing more together**
- **Be inspired and inspire others**
- **Centring the learners**
- **Open to everybody**
- **Not afraid to try**

Growing towards a regional development Network

- Backed by the City of Oulu educational services programme: Education builds Oulu
- Fully supported by city management
- A key element of the Oulu city strategy
- A significant factor in the Oulu2026 European Capital of Culture project
- A way to ensure an adequate and capable workforce for the future

“In Oulu, inhabitants grow up together to well-being, caring, and active citizenship through strong networks of education and know-how.”

City Strategy

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Collaboration with the University of Oulu

Educational sciences

- Minor in STEAM teaching
- Supplementary training
- Research and development
- Teacher internships in STEAM units
- Students participating in projects in STEAM units
- Developing STEAM activities in lower secondary schools

Natural sciences

- LUMA Centre
- Science Education Working Group

Information technology and electronics

FabLab

International cooperation

- information exchange
- expert exchange
- joint seminars
- university and educational cooperation
- Erasmus projects
- STEAM Residency

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Elements


LEARNING ENVIRONMENTS
OBJECTIVES
CONTENT
SKILLS AND STRENGTHS
EVALUATION
Art and literature
Coding and programming
Crafting skills and building
Research and innovation
Digital design and fabrication
S
M
T
A
E
SUPER ADEPT
ADEPT
NOVICE

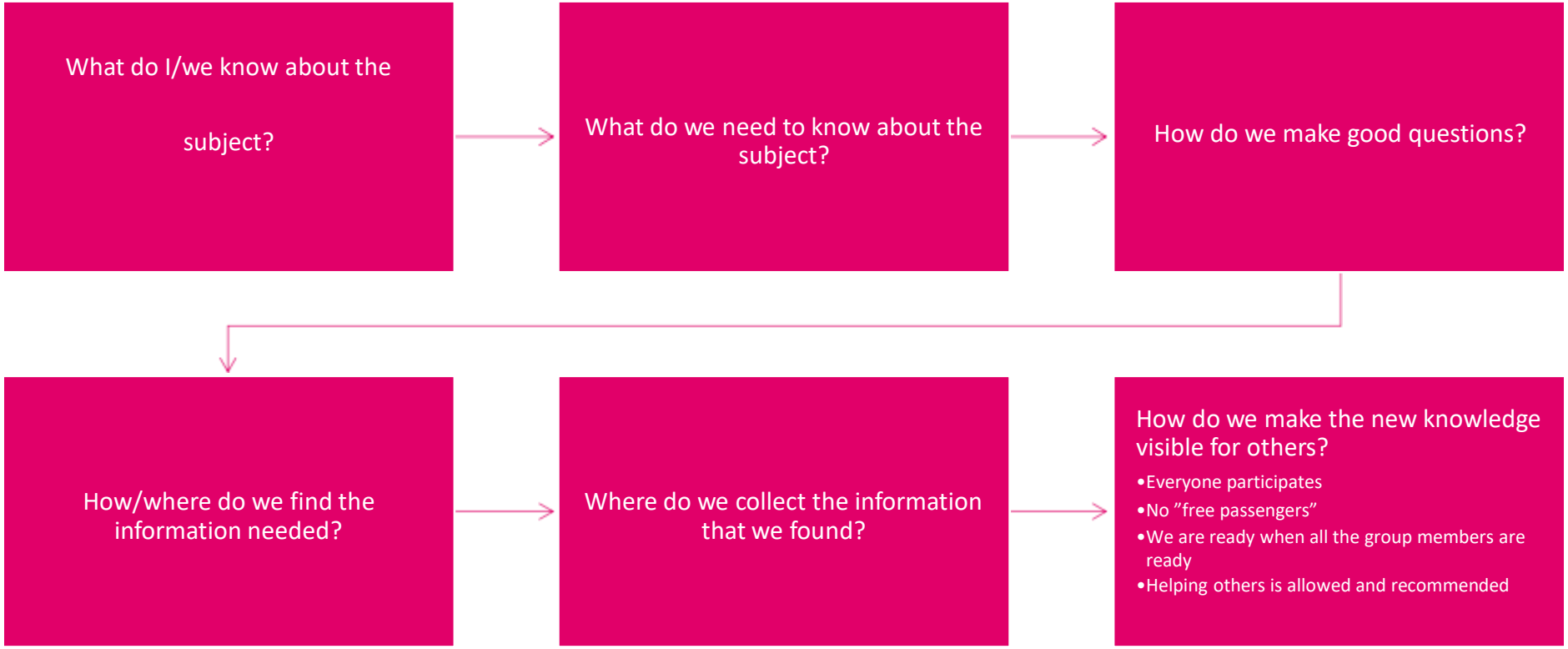
Transversal competences in curriculum

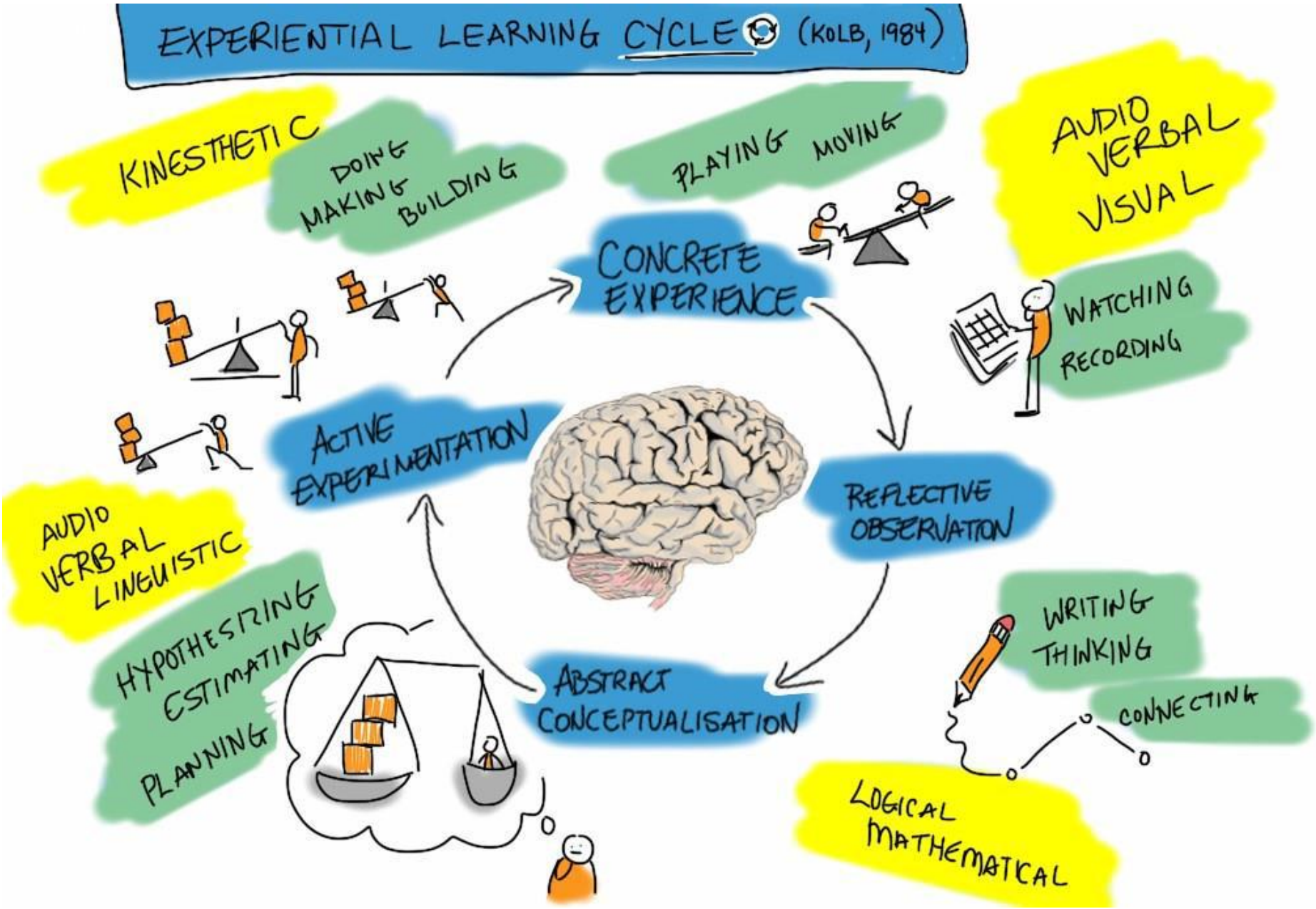
-Subjects have their own content in curriculum

-Transversal competences should be taught in all subjects

-STEAM pedagogy is a good solution for that

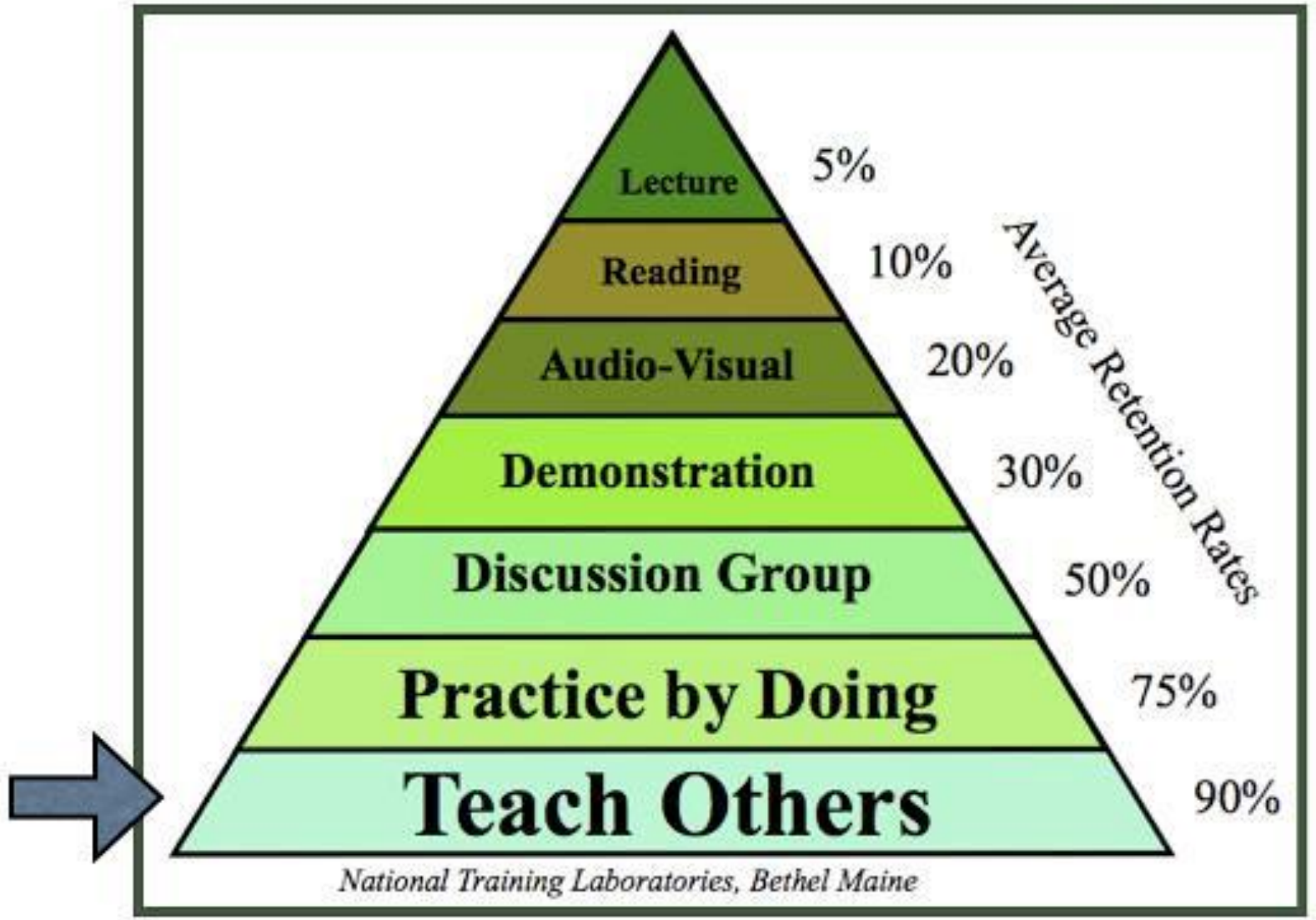
Collaborational knowledge building





How do you learn?

The Learning Pyramid



THE CHANGING ROLES

TEACHER IS:

- A GUIDE
- AN ACTIVATOR
- A FACILITATOR

STUDENT IS:

- ACTIVE
- COLLABORATIVE
- KNOWLEDGE BUILDER
- TAKING RESPONSIBILITY OF THE LEARNING PROCESS
- SELF-DIRECTED

The STEAM process

- Repeated in every STEAM implementation
- Applicable for various theme from product design all the way to knowledge-based teaching

ToolCamp 2026 participation instructions

Competition categories

Day one 6.5.2026	Day two 7.5.2026
5-8 -year olds	Grades 7-9
Grades 3-4	K-16 category:
Grades 5-6	Upper secondary, vocational
	Youth centers
	University and university of applied science students

- Max 4 groups per kindergarten, elementary, or secondary school; 8 per basic education school (4 elementary + 4 secondary).
- Groups are selected through internal selection.
- No group limit in the K16 category on the second day.
- Mixed-age groups allowed.
- Groups must be present at the event (no online participants).

STEAM process

- ToolCamp projects are implemented using this process.
- The entire process must be documented and presented with the solution at the event.
- More tips in the STEAM handbook

Competition rules

- Work must be done in small groups.
- The solution must be tested.
- Participants present the solution to the target group, which tests it.
- The group modifies the solution based on feedback.
- The solution must address at least one Agenda2030 goal.
- Technology must be used in the solution or its production.
- Digital design and manufacturing are recommended.
- The entire process and solution are presented at the event.
- The form can be anything (poster, video, presentation, etc.).
- The solution can also be presented functionally (e.g., game or play).

STEAM - information search checklist

Information retrieval is important in planning and solving ToolCamp challenges, especially in the background phase. Remember sources in the sharing phase.

1. Choose appropriate sources (books, magazines, internet, images, videos, 3D models, experts).
2. Evaluate the timeliness and reliability of sources.
3. Always record sources used at any stage.
4. Gather sources at the end of the presentation material as a reference list.

SIVISTYS- JA KULTTUURIPALVELUT

Evaluation criteria and competition categories

- Collaboration
- Application of technology
- Problem-solving and innovation
- Communication and visuality
- Responsibility
- Perseverance

Each category’s best group is awarded.

The overall winner is also chosen.

ToolCamp

Evaluation criteria

Evaluation

The ToolCamp jury evaluates groups in each category using the following scale:

The issues mentioned in the criteria were raised during the groups' presentations:				
Not at all	Just a little	Some	Quite a lot	A lot
0 points	1 point	2 pistettä	3 pistettä	4 pistettä

COLLABORATION

Shared responsibility

•Shared responsibility for the design challenge.

•Decisions made together about content, process, and solution.

Roles

•Each member has a special role.

Documentation of the collaboration

•Groups describe and document their collaboration (photos, videos, models).

•Groups describe successes, challenges, choices, and roles.

•Each member can answer questions about the group's work, content, process, and solution.

RESPONSIBILITY

Life cycle

- The product/service is as durable as possible

Ecology

- Minimal waste of resources, environmentally friendly, use of recycled materials

Ethics

- Considers different users and special groups.

USE OF TECHNOLOGY

Use of technology in information search and documentation

- Participants use technology at different stages of the process.

Collaboration with the use of technology

- Participants work together digitally.
- Participants also present their knowledge and solutions using technology.

Digital design and manufacturing

- Participants will use digital design and manufacturing to implement the solution.

PROBLEM-SOLVING AND INNOVATION

Description of the solution and its justification

- The participants' solution is innovative.
- The participants' solution is feasible in real life.
- The participants can justify and explain how they arrived at their solution.

Use of the target group

- The participants choose a suitable target group for their solution.
- The participants test the solution with the target group.
- The participants can justify the solution and its significance for the target group.
- The participants improve their solution based on the feedback provided by the target group.

COMMUNICATION AND VISUALITY

Process description

- Participants describe all stages of the STEAM process.
- Participants describe what they have learned during the process and what they can use from what they have learned in the future.

Documentation clarity

- Participants' communication is clear.
- Participants' documentation and solution are visually appealing.
- Participants' presentations show that their work has progressed according to the stages of the STEAM process.

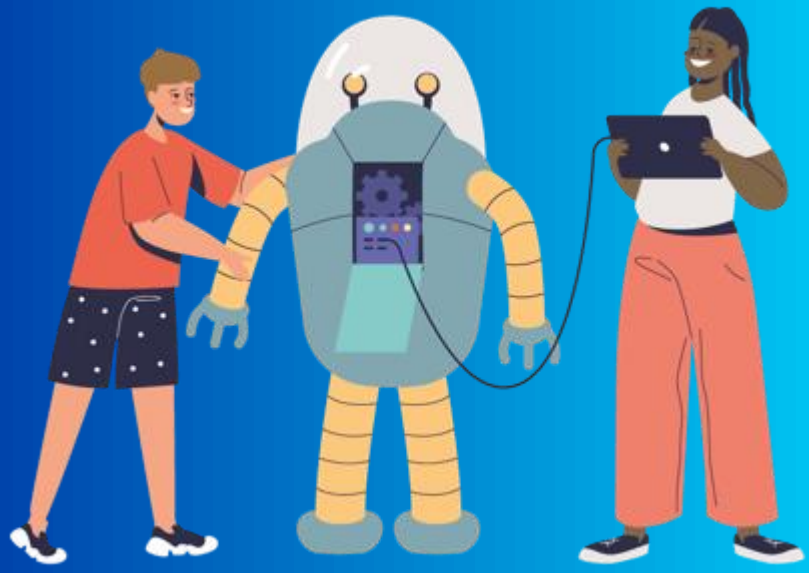
PERSEVERANCE

Commitment, attitude and creativity

- Participants demonstrate commitment and motivation throughout the process.
- Participants continue to work even when faced with adversity.
- Participants find original and different solutions to challenging situations.

ToolCamp 2026 challenges

City of Oulu
Educational and Cultural Services



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CHALLENGES FOR THE YEAR 2025-2026

City Council Challenge:

Future Jobs; Design a solution that prepares young people for the future job market and promotes lifelong learning.
Experts: Tiina Haapaniemi, tiina.haapaniemi@businessoulu.com and Reeta Räisänen, reeta.raisanen@businessoulu.com

Chairperson of the Education Committee Challenge:

Imagine that you would like to learn Japanese or French, but your school or educational institution does not offer them. Or maybe you would like to choose an interesting optional subject, but it is not offered at your school or educational institution. How could we solve this problem through online learning? Your task is to come up with a way to offer online learning in less common languages or other interesting elective subjects. How could we make learning fun and exciting, even if the teacher and students are not in the same classroom? What makes concentration harder and what are the ways to keep students on track? Come up with creative ideas and solutions and tell us how we could implement them in practice.
Expert: Maikki Manninen, maikki.manninen@ouka.fi

Circular Economy Challenge:

Electronic waste is a growing waste type. We are consuming more and more electronics. How can we make the life cycle of electronics more sustainable and longer? Design a product that is manufactured in accordance with the principles of the circular economy.
Expert: Katja Viinikka, katja.viinikka@kiertokaari.fi

Wellbeing, Culture and Sports Committee Challenge:

Everyday movement back to normal. What should be done to increase the (everyday) movement of children, young people and families? Think of different solutions to increase movement.
Expert: Piia Moilanen, piia.moilanen@ouka.fi

CHALLENGES FOR THE YEAR 2025-2026

Innovation Manager Challenge:

Design an AI assistant that helps all different types of students learn better. What is it like and what does it do?
Expert: Olli Rantala, olli.rantala@ouka.fi

FabLab Challenge:

Repurpose used and recycled textiles, also using digital manufacturing methods. Think as innovatively as possible. The goal is to give a single fiber material as long life as possible, either by making it durable or easily recyclable. Many textiles can be laser-cut and 3D-printed in addition to more traditional processes. Composites can also be made. Is there anything else that younger minds could come up with?
Expert(s): Jani Ylioja, jani.ylioja@oulu.fi, Ivan Sanchez Milara, ivan.sanchez@oulu.fi

Child-friendly municipality challenge:

Hey innovative children/youth!
Could you come up with a new way or method:
How could we increase awareness of your rights among children/youth,
few people can grasp or manage to memorize this UNICEF Convention on the Rights of the Child:
The Convention on the Rights of the Child in a nutshell | UNICEF
The full text of the Convention on the Rights of the Child | UNICEF
Expert: Janika Harju, janika.harju@ouka.fi

CHALLENGES OF THE YEAR 2025-2026

Library Services Challenge:

Lukevin kaupunni –bookbot; Oulu Central Library Saari has a bookbot working that inspires Oulu residents to read and guides library customers. What does the bookbot look like, what does it do and what is it like? What kind of literature does it recommend and how does it inspire reading? Does it learn anything from its users? Build a prototype of the bookbot either as a physical or digital output. Plan the bookbot's functionalities, user interface and personality. Take photos of the bookbot, write a short introductory story or make a video. With them, the bookbots can also go on adventures on the Lukevin kaupunni website.
Experts: Elina Kauppila, elina.kauppila@ouka.fi and Ritva Nikola, ritva.nikola@ouka.fi

Peace Machine2026 Challenge:

You have certainly noticed that there are many different types of children and young people in a daycare group or school. It is important that we understand each other and value diversity. Diversity does not justify bullying, and everyone should be given their own space, peace and value, regardless of their appearance or personality. How can we bring understanding between children and young people, even though we are all very different and yet in many ways the same?
Expert: Karoliina Lisko, karoliina.lisko@eduouka.fi

STEAM coordinators' challenge:

Research the animals of Northern Finland and design a solution that promotes their protection and the preservation of their habitats.
Experts: Outi Mustonen, outi.mustonen@eduouka.fi and Anne Ylitalo, anne.t.ylitalo@ouka.fi

LUMA Finland challenge:

Create an innovative solution to the challenges of the use of electricity. Identify the social and technological challenges associated with the use of electricity and make a prototype to solve it/them.
Expert: Tapio Koivu, tapio.koivu@stek.fi

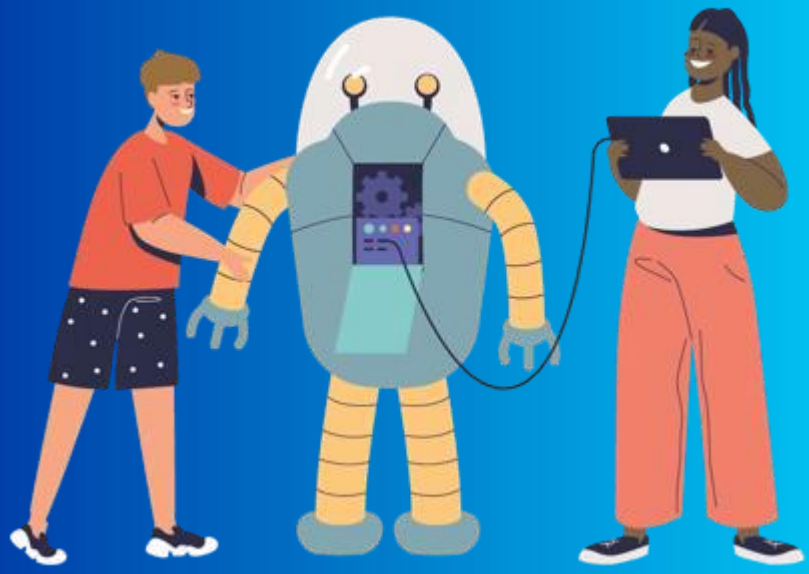
Group discussion

- What did you hear?
- What can you take with you?
- Questions?
- Comments?

Have a 15 minute talk with your group.
We'll go through the questions then!

Thank you!

maikki.manninen@ouka.fi



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