

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.



Finland: STEAM Turku

Secondary education

15.6.2021

NORTHERN EUROPE

TURKU, FINLAND

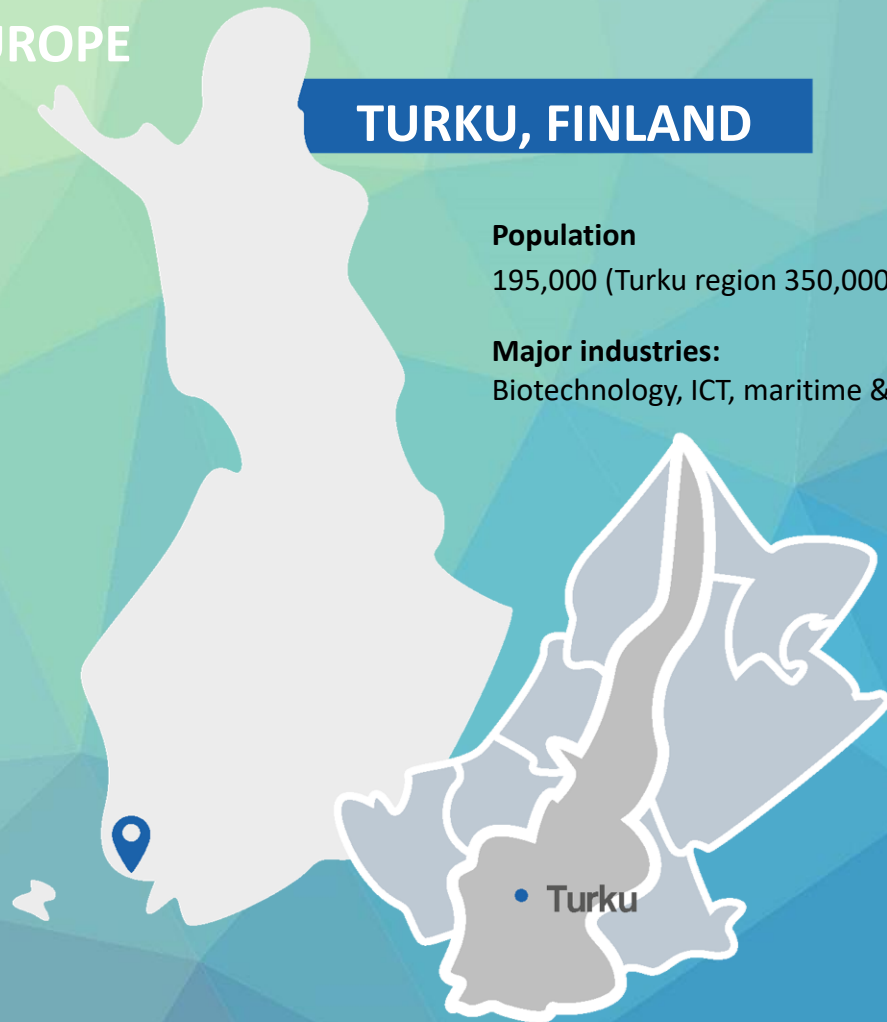
Population

195,000 (Turku region 350,000, SW Finland 700,000)

Major industries:

Biotechnology, ICT, maritime & creative industries

For more information,
see www.turku.fi



City of Turku Education Division

81 daycare centers/preschools

41 comprehensive schools

10 upper secondary schools

7 vocational schools at the Turku Vocational Institute

adult education services

over **40,000** students (including daycare), number of staff **3,700**

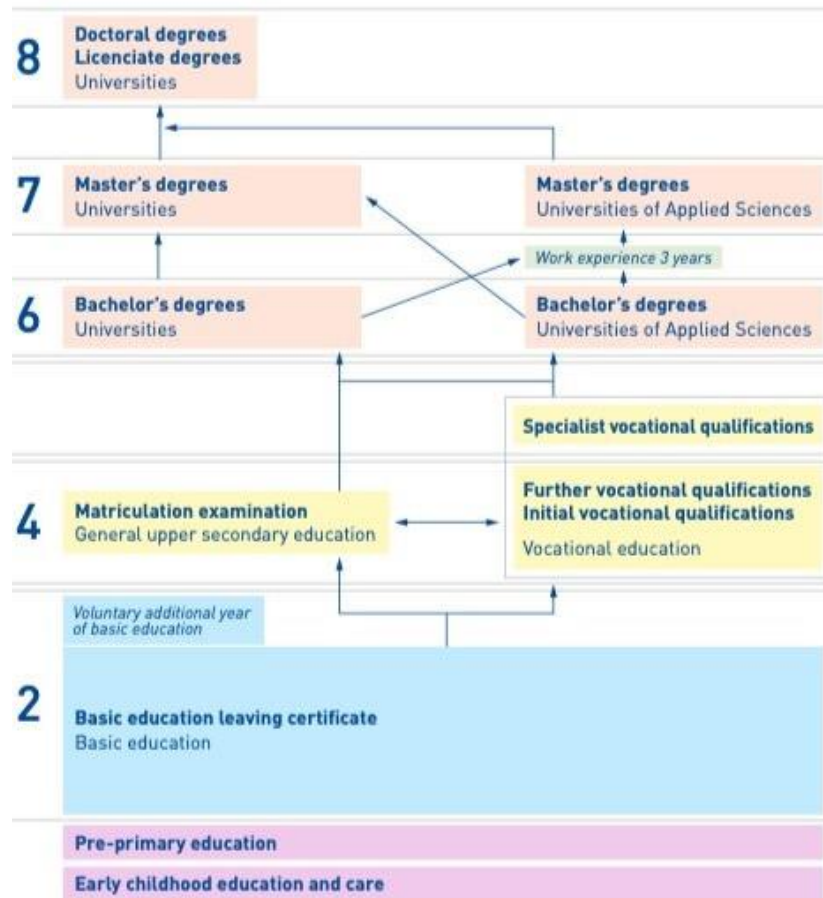
For more information,
see www.turku.fi/education

Finnish education system

- Compulsory schooling consists of one-year pre-primary education for 6-year-olds, nine-year basic education for children aged 7-16 and a three-year general or vocational upper secondary education and training.
- General upper secondary lead to matriculation examination and vocational to vocational qualification.



EDUCATION SYSTEM IN FINLAND



STEAM Turku is part of the City of Turku's Technology Campus cooperation.

STEAM Turku is also linked to the business policy of the entire city.

Long-term work is made possible through the city's permanent financing, which is supported by various externally financed projects.



Science and technology path in early childhood education (0-6y), comprehensive (7-15y) and secondary level (16-19y) education in Turku and Southwest Finland

A direct route to further studies and the Turku technology campus





TURKU

International cooperation

Cooperation with University of Strathclyde

Other international networks and projects

National cooperation

FiTech, Technology industries of Finland, other stakeholders

National development projects



- Increasing the appeal of science and technology
- A science and technology path combining early childhood, basic, and secondary education
- New digital solutions, contents of instruction, learning materials and learning environments
- New paths to higher education
- Creating new forms of cooperation between all levels of education, universities and companies
- Development projects (a total of 20 in the Spring 2021)

STEAM South-West Finland

Cooperation with the Education Forum for Maritime Industry and Technology

Dissemination and productization of results

Common development projects

New forms of cooperation

Participation

There is a personal path for every pupil, student and teacher into the world of science and technology

Openness

All information and practices are shared, everyone can participate in the cooperation, we are ready to learn from others

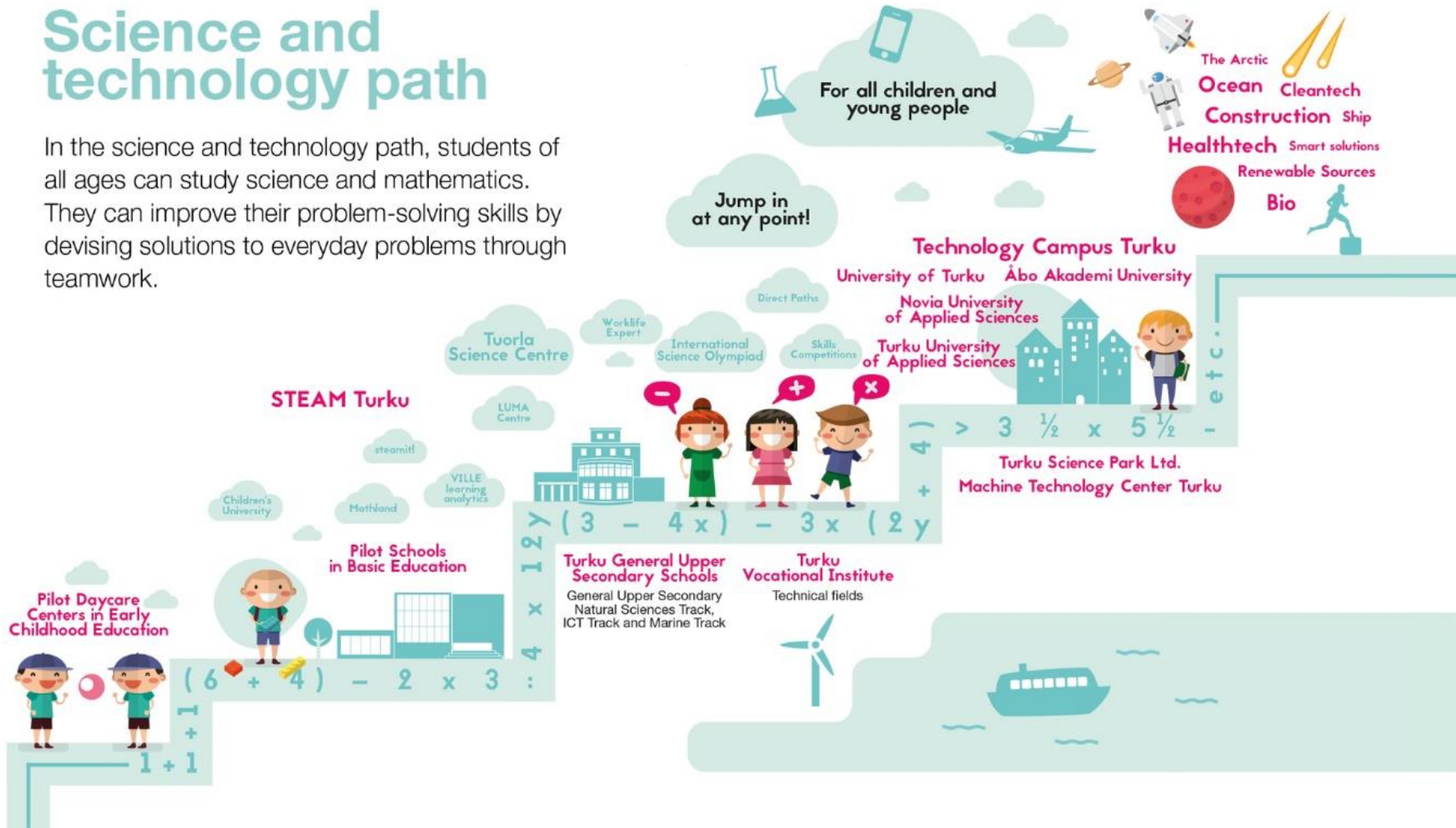
Innovativeness

We want to seek and find new solutions and opportunities we also believe that failures are learning experiences



Science and technology path

In the science and technology path, students of all ages can study science and mathematics. They can improve their problem-solving skills by devising solutions to everyday problems through teamwork.



STEAM Turku in secondary level vocational education and training

VET is seamless and future oriented

Vocational education and training is not limited to the technical sector but covers all sectors of working life. Qualified and competent teachers, flexible qualifications, strong employment prospects and eligibility for further studies are some of the reasons making VET an attractive choice

VET *is* often STEAM by nature



STEAM Turku in secondary level VET

- Strong connections to local and regional companies and higher education institutes
- New LMS
- AR/VR learning environments
- Basics of Robotics and automation offered also for non-technical qualifications
- Circular economy
- Industry 4.0



Photo: Lea Froloff



STEAM Turku in upper secondary schools

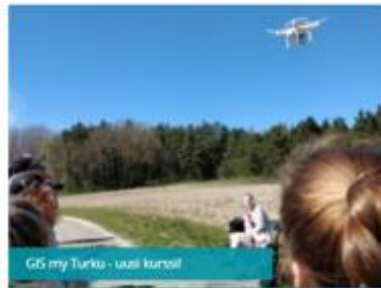
- Three of six high schools in Turku are specialized on STEAM:
- The TSYK High School's **NATURAL SCIENCE** and **MARINE tracks** and the Kerttuli High School's **ICT track**
- Co-operation with universities or/and companies → STEAM courses
- Direct routes to university and university of applied sciences studies
- New digital solutions and learning environments, for example AR application made by high school and university students & CTRL reality ltd - > [appi](#)



Elective STEAM courses available for all upper secondary school students



STEAM
Turku



Crossing the boundaries of individual subjects – building a sustainable future

How curriculum and lessons plans are developed?

National upper secondary curriculum

→ Local (City of Turku) upper secondary curriculum

→ School specific upper secondary curriculum

For example Turku STEAM coordinator has been involved in curriculum work in all these three levels:

- 1. National Agency for education -> National curriculum work of Upper Secondary Geography group and also
- 2. Turku general Upper secondary development group, as well as
- 3. Upper secondary schools biology/geography group.



How pedagogy is determined?

Base: Every teacher holds a university level degree on their subject and pedagogical teacher studies. Teacher chooses and determines the pedagogy used.

STEAM Turku encourages to use: problem solving, experimental and experiential learning, learning by doing, workshops, exercises and laboratory work organized by students at institutes of higher education.



Identification of teaching/learning materials and equipment

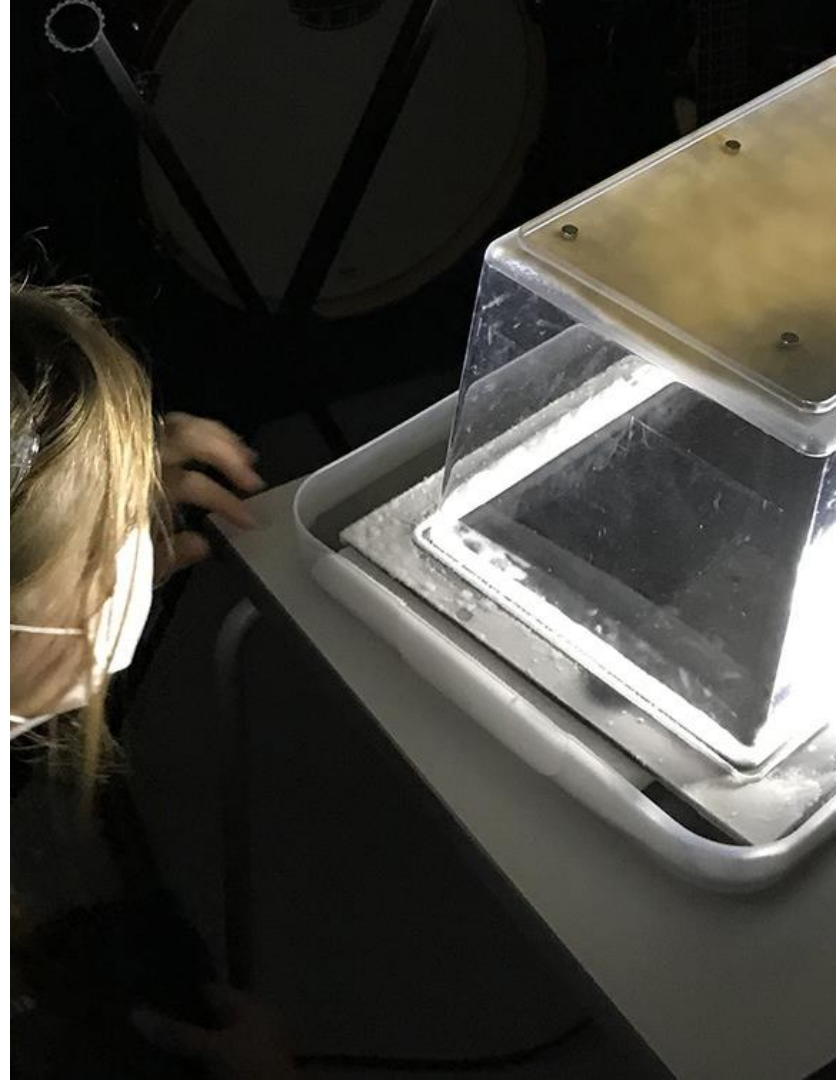
Base: Through teacher studies, every STEAM teacher is capable of choosing appropriate STEAM exercises, tasks and equipment to their specific subject.

Equipment can be *borrowed* from cooperation organisations, universities and companies



Case: Cloud chamber– radiation physics

- Multidisciplinary course: radiation physics (history, physics, Finnish, social studies, health education, geography etc.)
- Cooperation with local companies and the university
- Students built a cloud chamber and familiarised themselves with basics of radiation physics in every day life and through the effects of Chernobyl accident.



Case: Preschool robotics & binary bracelets

- STEAM Turku encourages teachers to plan STEAM activities that reach to other levels of education.
- Cooperation with university level is seen as important, but increasingly we see activities organised for and with younger students too



How teachers are trained to teach this new initiatives (pre-service and in-service teacher training)?

Base: University level teacher training and studies in didactics.

Supporting life-long learning /continuous learning is seen as important. Teachers participate actively in trainings every year. In Turku we have a special unit for supporting the use of ICT in teaching.



Assessment tools developed to assess the students' learning outcome

A multitude of assessment methods in use:

- pass/fail
- grading
- peer assessment
- pair/group exams



What are the success factors?

- Connection to national and local curricula
- Connections to the higher education institutes and companies (biotechnology, technology, medtech, maritime technology)
- High regional interest for STEAM education
- **Voluntarity** – teachers with interest for development projects and STEAM education are supported through STEAM
- School specific courses and STEAM courses for all
- STEAM values



What are the greatest challenges?

- Reaching every student
- **Voluntarity**
- Not seeing the connections, STEAM is everywhere!
- New pedagogy takes too much effort
- Resistance to change, fear of change
- Time restrictions



Case: 21st century skills – Beyond 2030 Challenge

- The competition was created in 2020 by the pharmaceutical company Bayer Nordic and the City of Turku for students in upper secondary and vocational schools in the Southwest region of Finland
 - The aim is to increase the appeal of the technology sector, encourage students to study STEM subjects and strengthen cooperation between educational levels and various stakeholders
 - It was the first competition to be organised jointly by the public administration, private companies and universities
- The ambitious goal of the competition is to develop creative solutions, products and applications that will save either the planet or humanity, or even both



Case: 21st century skills – Beyond 2030 Challenge

- A total of 41 teams submitted their entry for the science competition. Themes of the entries that made it to top ten included, for instance, different kinds of apps, games, devices developed for reducing plastic on land and at sea and a device designed for health care that measures pathogens in exhaled air.
- Inspired by the amazing results we had the first year, the competition is now expanding to a national level. Its target group now includes about 425,000 students and 505 schools at the upper secondary level





Questions?





Thank you!