Interactive Classroom
Working Group

Future
Classroom
Lab

Makerspaces in schools

Practical guidelines for school leaders and teachers

Case Study

Technisch instituut Sint-Lucas, Belgium

European Schoolnet

Makerspaces in schools

Practical guidelines for school leaders and teachers

Case Study:

Technisch instituut Sint-Lucas, Belgium

Authors:

Ben Bastiaensen, International Coordinator, Belgium (Flanders)

Jill Attewell

Editor:

Anja Balanskat, European Schoolnet

Jim Ayre, European Schoolnet

Acknowledgements:

Frederik Wylin, Teacher

Bert Galle, Teacher

Picture credits:

Technisch instituut Sint-Lucas, Belgium (cover, pp. 3, 4, 5, 6, 7, and 8)

Introduction

Makerspaces, which are designed for hands-on, collaborative, creative work, are a fairly recent addition to some schools in Europe and worldwide. Students in school makerspaces can work with materials such as paper, cardboard, wood, metal, plastics, clay, fabrics, electronic components, microcontrollers, construction kits or programmable robots to create many different objects, and complete many different projects, using a variety of tools and machinery.

This case study is one of 15 developed from interviews with school leaders, teachers and other staff who have set up makerspaces in their schools. The schools are located in nine countries i.e. Austria, Belgium, The Czech Republic, Ireland, Italy, Luxembourg, Portugal, Switzerland, and Turkey.

The interviews were part of research carried out by European Schoolnet's Interactive Classroom Working Group and the schools' experiences, the lessons they have learned and the good practice they have developed, have informed the development of a publication "Guidelines on Makerspaces in Schools".

Find the full report and other case studies here: *fcl.eun.org/guidelines*

The School

VTI Sint-Lucas Menen was founded in 1923 as a vocational school and, therefore, has a long-standing tradition of technical and vocational secondary education for boys and girls between 12 and 18 years old.

The school has over 700 students and 110 teachers, all from the Menen region. Menen is a city in South West Flanders with 32,000 inhabitants. The school also recruits students from neighbouring municipalities including Geluwe, Wervik, Wevelgem, Moorsele, Dadizele, Beselare and from Halluin and Bousbecque in France.

Menen has a large number of families who have migrated to Belgium and a relatively high number of students with disadvantaged backgrounds. The school Principal has observed that "*it can be a challenge for the school, and by extension the school community to which we belong, to keep young people from migrant or disadvantaged backgrounds in school and to overcome language difficulties and other problems*".

There are two makerspaces in the school. The one in the main school building houses the larger making machines and a CO2 laser cutter for cutting metal. In a smaller building, the second makerspace contains smaller equipment such as robots and drones.

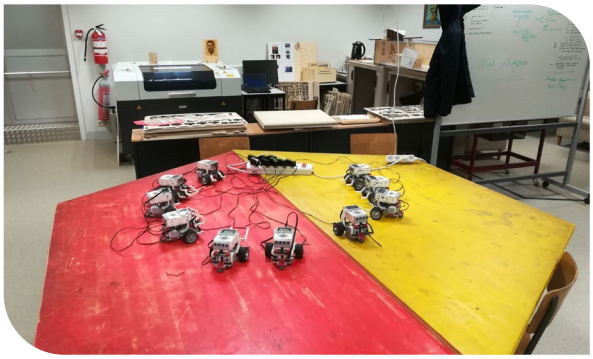
Motivation and aims

The Principal decided it was necessary to build a new, innovative classroom dedicated to improving teaching of STEM subjects. In particular, he wanted the school to be a pioneer in the field of engineering, which suggested that the best solution would be to create a makerspace.

This vision expanded over time and two makerspaces were set up. A key aim of the makerspaces was to provide teachers with opportunities to introduce new teaching methods, including group work. Another aim was to increase the amount of differentiation in lessons.

The implementation timeline

The original idea for building an innovative classroom occurred in 2015 and the development has been driven by the Principal and a team of STEM teachers. A year later three classrooms in the smaller of the school's buildings were merged to set up the first makerspace. Only a few months after the start of the first makerspace, the principal and the teachers decided to create another makerspace in the main school building.



Building and equipping the maker space

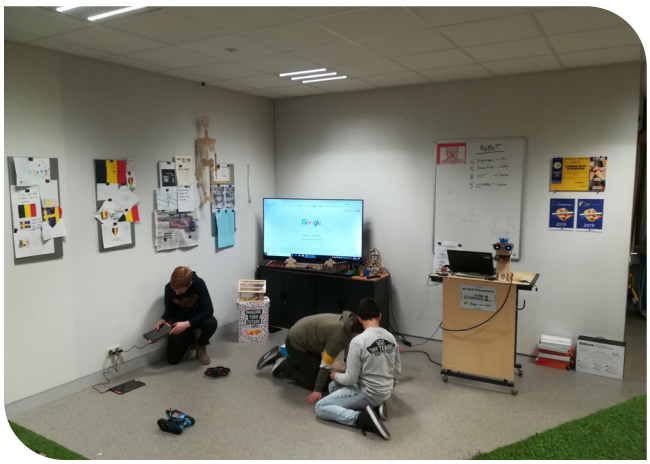
The school bought the equipment for the makerspace and the teachers and 2 technical workers of the school helped building it.

The makerspace in the main building has been divided into different areas. The first area is the instruction area with a large screen. Lessons start here with students receiving instructions.

In another area there are several small islands where students can work alone or in groups. There are three other areas dedicated to the use of specific machinery or equipment, including:

- An area where students can work with materials, drilling, soldering, etc.
- An area with the laser cutter
- An area with a 3D-printer

There are also stockrooms inside and outside of the classroom.



Equipment and technology

The makerspace in the school's smaller building contains this equipment:

- Laser cutter, for wood and plexiglass
- 3D-printer
- 10 x laptops
- 8 x desktop computers
- Green screen
- Large screen
- 12 x Airblock drones
- 12 x mBot Ranger robots[1]
- 20 x micro:bits
- 15 x Lego EV3 robots – WIFI

The makerspace in the main building contains:

- CO2 laser cutter, for metal,
- Laser cutter, for wood and plexiglass
- 2 x 3D printers
- 10 x laptops
- 20 x desktop computers
- Green screen
- large screen
- Brainboxes – WiFi

1 https://www.makeblock.com/steam-kits/mbot-ranger

Health and Safety

When potentially dangerous machines are used there is an experienced teacher present.

Cost and funding

The makerspaces have been entirely funded from the school's budget.

Organisation and management

The makerspace is used every day during school hours.

There are three responsible teachers for the space to ensure its management and functioning. If it is used by third persons, or third parties (organisations or companies) guidance is given on appointment. The use has to be approved by the principal.

Networking beyond the school

The makerspaces are open to interested groups or individual makers but no specific links or networks have been established.

Training and support of teachers

When the makerspaces were new, teachers were not used to the type of teaching required, which was more like coaching. Therefore, at first, they practiced co-teaching with five STEM teachers all having a different expertise required such as woodworking, informatics/technology, electricity.

By co-teaching we can bring the knowledge together which is a huge advantage in teaching STEM-projects.[2]

This enabled teachers to work on differentiation and to learn from and support each other. Teacher Frederik Wylin commented that this is a "*a big advantage in a 'digital' world that changes very fast*".

Teaching and Learning

The makerspaces are used for STEM lessons. First year students (30 in total) have five hours of STEM lessons and second year students (20 in total) have nine hours. During these lessons students work on different individual and collaborative projects[3], which are an integral part of the curriculum and include coding, designing in 3D, 3D printing and laser cutting.

The makerspaces are also used by some external groups, e.g. one local business works in the makerspace decorating their

2 For examples consult: facebook.com/vtisintlucas or www.vtimenen.be

3 An example lesson can be 'making a machine that helps your mom' https://www.youtube.com/watch?v=NKQJw-jHmJ4

cardboard boxes. There is a monthly session in the makerspace run by CoderDojo, which is an organisation that teaches young people to programme using robots and computers. During the Easter holiday there is also a Robotcamp for 6th grade students.

Teacher Frederik Wylin explained that the key challenge was that the teachers had to change their methods of teaching. He says "*when we started the makerspace, we faced a completely new space that no longer had the old structure of a classroom*".

Co-teaching, means that there is no frontal teaching anymore, but teachers coach students in solving 'the problems'. All courses are digital and work is carried out paperless, which is big effort for teachers, who were not used to this method in the beginning.

Added value and benefits

An added value is the co-teaching method where the knowledge of several teachers can be combined. There is more space and tools for the students to let them think, design and test some things they have made in order to solve some problems.

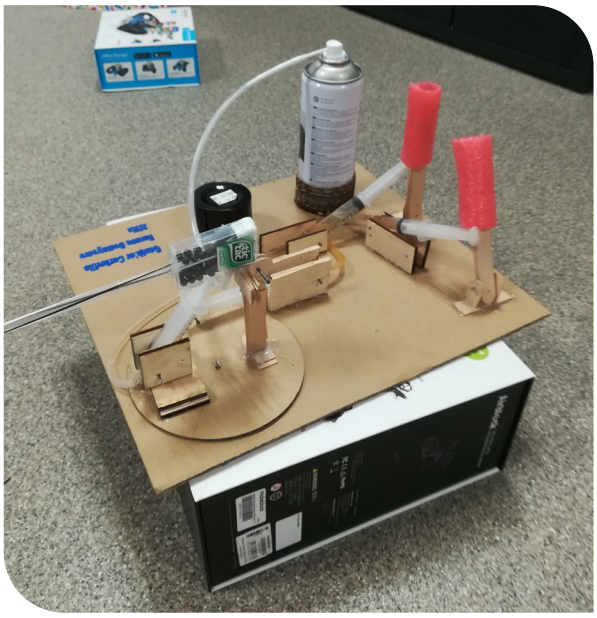
Challenges

The biggest challenge is to be original in the projects. Always make new course and try to be different than other schools.

Money is also a challenge, because technology is changing very fast and the school aims to innovate all the time.

Future plans

The future plans of the school is to try to involve non-STEM-teachers in this 'way of teaching' in the makerspace. Let them now how it is to teach with 2 or 3 teachers at the same time, how it is to work in groups and not frontal anymore. In the main building big renovation works are planned ... and maybe a brand new makerspace will be built in the future.



Makerspaces in schools

The guidelines have been created by European Schoolnet and supported by members of its Interactive Classroom Working Group (ICWG). Eight Ministries of Education are involved (Belgium (Flanders), Czech Republic, Ireland, Italy, Luxembourg, Portugal, Switzerland, Turkey).

Read more at **fcl.eun.org/icwg**

futureclassroomlab europeanschoolnet #FCL_eu

fcl.eun.org/icwg