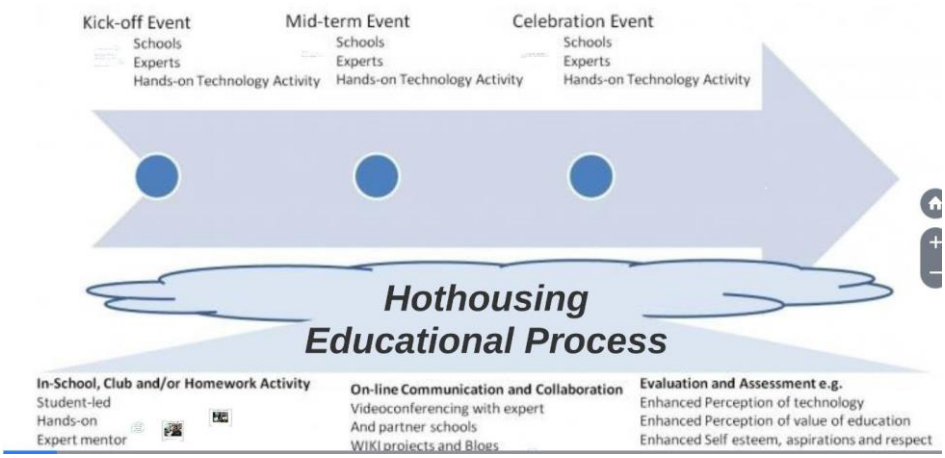
1 Hothousing

Hothousing is an intensive workshop technique which can be used in KIKS to foster creative problem solving, communication and collaboration skills and build self-belief - on many projects. It's also...Fun! It usually has a kick-off, mid-term and celebratory activity. For KIKS, it starts with an intensive creative activity, hence the term HOTHOUSE, followed by Local Challenges then International Collaboration:



This version is a variant on a well-established business technique, originally developed by BT and adopted by many others. Information can be found at:

http://www.methodsandtools.com/archive/archive.php?id=43p2

The key is intensity:

- Student - led (teachers stand back :-)
- Working hard - under time pressure
- Active engagement – actually DOING something, undertaking a project and coming up with THEIR solutions
- Working with others – 'somebody who actually listens to them'
- 100% engagement within team
- Having Fun...

To attract and prepare schools, a ‘How to’ guide was created for both UK partner schools and institutions and also for the benefit of all KIKS partners: The document can be found at:

H1: KIKS Project, Hothousing & On-line Description

An accompanying presentation “Hothousing for KIKS” can be found at:

H2: https://prezi.com/e78q3uha7-zn/hothousing-for-kiks/

1.1 UK Schools and Activities

There were four different events with different themes and activities. At all events the students worked with STEM Ambassadors - these Ambassadors were volunteer Scientist, Technologists and Engineers from university or local industry. They encouraged students to challenge their thinking and aim for more sophisticated designs. Importantly they tested the students understanding of STEM and helped them learn new concepts as well as inspiring them to careers in STEM. An excellent video recorded by Cambridge TV for the national UK television network BBC summarises the whole event and highlights the experiences of the students and their learning outcomes can be seen at the link below. Although this video was made at one of the four events, it does deliver the message for all events:

http://www.cambridge-tv.co.uk//?s=STEM+Fair+

1.1.1 Student Digital Ambassador with Bay House School and Park House School- London Area

Working with Bay House School in Gosport and Park House School in Newbury, the KIKS Student Digital Ambassadors Programme was developed to harness the energy and enthusiasm of students:

http://www.kiks.unican.es/en/inauguracion-inglaterra/

The KIKS Student Digital Ambassador Programme had two variant programmes BBC Micro:bits and iSTEM+: The strength of these two programmes was the foundation of using Technology to enhance learning. Technology Enhanced Learning

H3 KIKS UK SDA Programme.pdf

H4 KIKS UK SDA- BBC micro-bits One-pager (1) (1).pdf

They can be found on the KIKS site and also on the National STEM Learning Centre and Network for all UK secondary schools: https://www.stem.org.uk/:

1.1.2 Parkside School and Lindbergh Schools - Suffolk

We held Hothousing Kick-Off Activities with Parkside and Lindbergh Schools, and Sawston Village College at Duxford Aircraft Museum and the STEM Team East annual STEM Fair. This featured a set of workshops specially designed for the ERASMUS KIKS teams:

http://www.kiks.unican.es/en/inauguracion-inglaterra/

These were very challenging activities...undertaken by all.

H5 Design a Bridge

There were two Bridge Design workshops: both workshops took place at Imperial War Museum Duxford as part of the STEM Fair Erasmus entry : one workshop tasked the students to design a bridge with a mechanism to lift the bridge beam : Students could use a manual lifting mechanism or design a geared motorised mechanism . Alternatively, KIKS students worked together to design a bridge from lightweight expanded polystyrene with a fixed span and able to support a heavy load. The photograph shows their design under test.

H6 Cable Car

The Cable Car workshop was particularly challenging. Students worked as a team with Engineers. They considered the problem of designing a motorised cable car which could travel along a horizontal cable and deliver a load to the other side. Students produced schematic diagrams and had to demonstrate that they had understood the physics and engineering principles in their design before making and testing the cable car.

H 7 Science of Butterflies – Embracing STEAM

This activity had a strong Art element. Its purpose was to show how approaching a topic from the angle of Art could bring the students into an appreciation of STEM. The workshop started with a presentation and discussion on the colour of butterfly wings. The information related to the areas of physics, biology, technology and art: It explains why butterflies have beautiful colours - not due to pigments, but to the properties of white light that reflects in the scales of butterfly wings. Through an investigative approach students learnt about the life cycle of butterflies and the importance of butterflies for pollination and crops, and therefore environmental science. Research on the flight of insects as well as the future science of colour could provide technological advances. Students used mathematics to produced circles, isosceles triangles and squares on coloured paper which were then folded and assembled to produce very pretty butterflies. Using their understanding on moments then could then produce butterfly mobiles and displays.

http://www.kiks.unican.es/en/the-science-of-butterflies/

1.1.3 Linton Village College and Sawston Village College – Cambridge

We held individual in-school sessions with Linton Village College and Sawston Village College with the same workshops as above. Since STEM enrichment and STEM opportunities are readily available in Cambridgeshire these two schools built on the workshop experience with a direct view to incorporating the learning from these workshops into their own projects as part of the local challenges – see later

1.1.4 Rainham School and Westbridge School - London

These schools were keen to exploit the opportunity offered by the recent UK wide introduction of the BBC micro:bit. Students worked with STEM Ambassadors to learn how to use the Microbit – which is a credit card size computer. They used the open source software and learnt how to Code. These Microbit workshops were particularly important in the drive to teach more young people to code and to have an appreciation of Technology. They would have a significant part to play in the Local Challenges and International Collaboration as the project evolved. Since three of the core requirements of the Erasmus + proposal were to make use of Open Educational Resources OER online; to Collaborate and Share Good Practice and to engage with Virtual Mobility then these Microbit based workshop supported all three

Support material and a WIKI site were developed:

https://kiks-micro:bit.wikispaces.com/

Support material included:

H8 First steps in Computing with the BBC micro:bit

H9 First steps with micro:bits for data logging and modelling

H10 First steps with micro:bits for control and physical computing

These can be found at: **https://kiks-micro:bit.wikispaces.com/First+Steps+with+Micro:bit**

1.2 Finnish Schools and Activities

The hothousing process in Finland has benefited a lot from the UK KIKS-team's hothousing concept and knowledge and experiences. The Finnish KIKS-team has studied the UK approach and combined it with the methods of the Experience Workshop International Math-Art Movement (www.experienceworkshop.org), a STEAM community of teachers of mathematics and sciences, artists, researchers and parents.

1.2.1 KIKS Kick-Off Events in Finland

Huhtasuo, Mankola, Palokka, Sydän-Laukaa, and Viitaniemi schools from Central-Finland participated in KIKS project's kick-off in Finland. The kick-off programs were led by Pirjo Häkkinen, Kristóf Fenyvesi and Markus Hähkiöniemi (University of Jyväskylä). The participating students have been working on bridge designs, studied and built various constructions, like fullerenes, nanotubes, and many more… The largest construction was a 3 meters high and 5 diameters wide geodesic dome – a structurally similar construction, which served as a wireframe basis of the world largest ice dome realized in Finland in 2014 by Arno Pronk Dutch architect and his international team. Some of the constructions were also implemented in small artistic projects.

Photo material on the hothousing activities:
https://www.youtube.com/watch?v=9bsSZIWZFIY

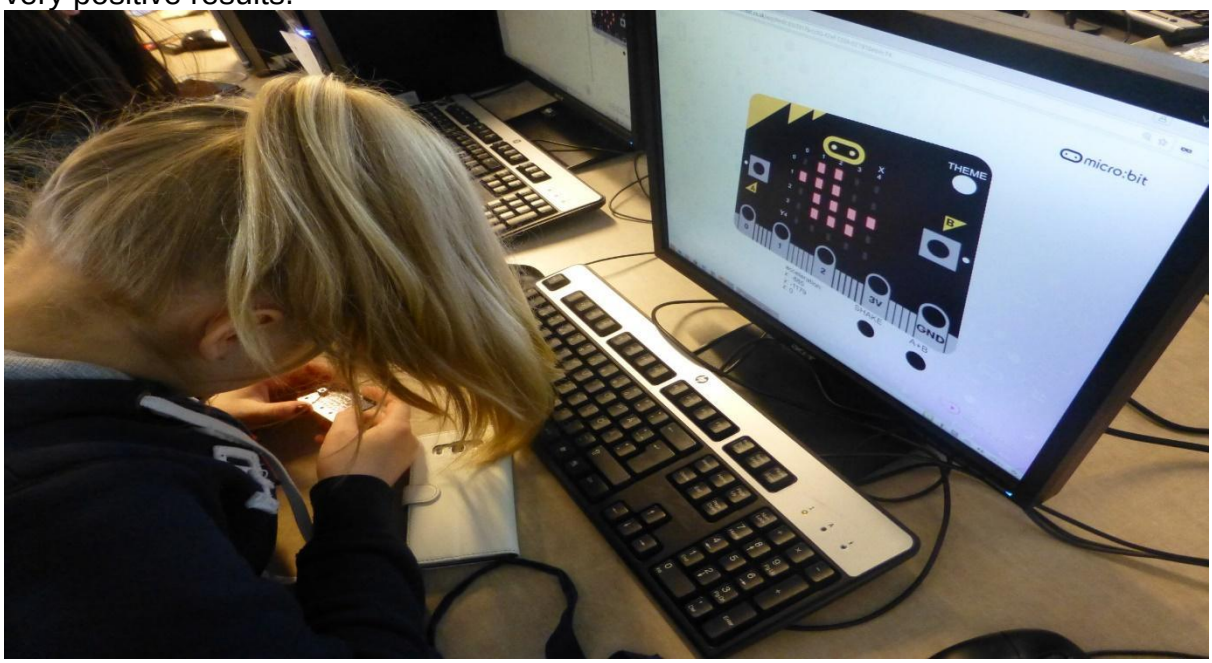
1.2.2 1st Finnish 4Dframe Challenge

Clever constructions from KIKS students: KIKS Teams participating in the 1st Finnish 4Dframe Challenge had 90 minutes to design and create an original construction, which was able to move on some interesting ways. The Viitaniemi KIKS Team of HASEEB SHAIKH, ANDREA CARUSO and MATIAS MAHLAMÄKI created a Special Windmill and a Clockwork's Prototype.

OLIVER PELTOLA & ARTTO SARALAINEN from Huhtaso KIKS school experimented with complex mobile structures.
From Viitaniemi KIKS school, the team of SIDRA SHAIKH & EMERALD KANANEN designed a funny mobile composition about the encounter between the Alien Man and a turbine.
KIKS-students were accompanying with their teachers at the Researchers' Night: Merja Sinnemäki & Leena Kuorikoski from Viitaniemi and Ulla Koskiahde from Huhtasuo. The valuable prizes of 4Dframe were given by the chairman of our jury, the researcher and teacher Pirjo Häkkinen. All KIKS results of the 1st Finnish 4Dframe Challenge were on exhibition in the University of Jyväskylä Museum's Soihtu Exhibition Center for a full month after the challenge.
More information on the challenge with photos:
http://www.elmenymuhely.hu/kiks-iskolak-a-szinpadon-a-bridges-vilagkonferencian-megrendezett-1-finnorszagi-4dframe-verseny-eredmenyei/?lang=en

1.2.3 micro:bit Activities in Viitaniemi School and in Laukaa

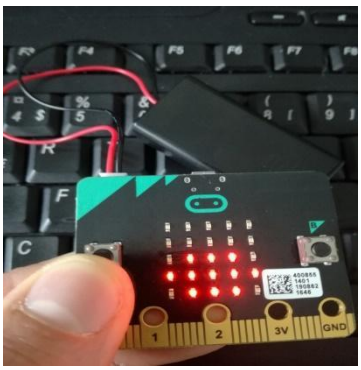
Based on the UK KIKS team's contacts with BBC micro:bit Foundation, KIKS Finland got several micro:bit coding toolkits for free. Two of our KIKS schools and several other of our partner schools have started to use the toolkits with very positive results.



A student of Viitaniemi School, Jyväskylä. Finland working on micro:bit

Viitaniemi School's KIKS students started working with micro:bit in March 2017. It was a real Kids-Inspiring-Kids experience as Jyväskylä Christian School have introduced the micro:bit to Viitaniemi students. That was a fun way to get started and soon the students of Viitaniemi School were able to create different images and texts with the led lights. Once the students got the idea, they were able to create more advanced things e.g. little games. In April 2017 Viitaniemi School had an open public day in which the parents and the

school neighbourhood were invited. The Viitaniemi School students had their own micro:bit workshop where they were introducing the micro:bit to visitors and the visitors also got an opportunity to try coding with micro:bit. In May 2017 Laukaa School students tried coding with micro:bit. Students started programming with examples, which were on the micro:bit website in English. Every group of students first built a program and then tried to translate that example into Finnish. Everything took place in Google Docs so they practised also using Google tools at the same time. These examples were quite easy for the pupils and it was nice to see how they managed to do those practices. After seven examples the pupils tried to come up with their own ideas or check some other ideas from the Internet. When they found something useful they tried to build it. Many groups found nice ideas but not so many managed to come up with an idea of their own, which they could build. Pupils were quite motivated to code with micro:bit and it was also fun. In their words: “This is cool” / “It is nice to see some real tool is responding to my code” / “Where can I buy these?”



1.2.4 UN’s World Water Day in Laukaa School

On United Nations World Water Day March 22 and on March 23, 2017 KIKS workshops took place in the Laukaa School to prepare the school’s upcoming thematic ‘Water Week’. **4Dframe Warka Water** and **4Dframe Wind & Water Power** workshops have been organized to the school’s students to develop water & environmental awareness in the STEAM context.

1.3 Spanish Schools and Activities

The Spanish opening event took place at the Faculty of Science, University of Cantabria, in April 2016.

1.3.1 Tracker

The following is an example of a possible development of an activity of mathematical modeling of a physical phenomenon. To obtain data that allow the generation of the mathematical model, the program Tracker is used.

Example of a possible development of the activity:

1.4 Hungarian Schools and Activities

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