
EduTechLab: Using 3D printing, simple sensors and automation systems to build interactive robots and exhibits.

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Abstract

This workshop is designed for classroom educators to experience the kind of products that can be achieved through work with the product oriented education inspired by EduTechLab.dk. The workshop is split into two halves, one dealing with physical construction and one dealing with machine automation. The target age groups are grades 5-12. Pupils from Antvorskov Skole will be on hand to help, instruct and answer questions.

Author Keywords

Edutechlab; product based learning; 3D printing; sensors and systems; automation

Introduction and Background

To achieve the target of high learning in a school environment with large diversity in the student population and within the economic constraints of the public school system, Antvorskov Skole has chosen to implement the thoughts of **Product based learning** incorporated in the Edutech Model of Mindset. The use of product based education have been around in various shapes and most seen implemented as the end results of project based learning. One of the challenges have often been the lack of vocational training;

The workshop in short:

Materials: HummingBird Robotics Kit, Makey Makey, 3D printer, Scratch.

Process: Two steps from design methods to interactive automations will be tested in the workshop.

Plenty of access to 3D printers, HummingBird Robotics kits, Makey Makeys and other technologies.

Participants: School teachers and educators in all topics, designers and practitioners. Max 20-24 participants.

Participants should bring their own computers.

meaning the products produced by the students have been of a sloppy and/or poor workmanship.

Today's use of easy accessible design tools, 3D printers and real world sensors coupled with intuitive programming environments and easy to use motors and servos makes it possible for students to invent and design projects that are ethical as well as esthetical founded. The workshop will include a basic entry into 3D design, the use of 3D printers as well as a quick guide to visual programming in scratch and the use of the HummingBird Robotics Kit to bring the 3D printed designs to life.

Experiences so Far

In Antvorskov Skole this spring more than 300 pupils have been working with 3D printers and Hummingbird kits, as well as Makey Makeys and other interactive building technological aids. April 2014 4 teams of pupils reached the semi finals in the Young Scientist fair, one group achieving a second place win amongst the 50 finalist teams. An early view at the results gathered by graduate student Niels Vandel, AAU, will also be available.

About the Workshop

Anyone with interest in educational technology can participate. The goal of the workshop is only to view and experience the ease of creation, it is not meant to be a didactic or pedagogic showcase – although time permitting we would like to end with an open debate session.

The workshop will start with a short introduction to the terms and tools of EdutechLab.dk. Participants will be divided into 5-6 teams, with each team having

access to a 3D printer and several robotic kits, as well as one knowledgeable young student from Antvorskov Skole.

The first part of the workshop will focus on 3D design and the ease of use that is achievable with today's soft- and hardware. Participants will be able to gradually move towards the second part of the workshop at their leisure.

Each group should be able to have something tangible working at the end of the workshop, a combination of 3D printed parts and the servos, motors, diodes and sensors of the various electronic kits available.



Figure 1. Omarn is waiting for a gear to finish printing



Figure 2: 3 girls from Antvorskov Skole showing Minister of Education C. Antorini and HRH Princess Marie how to assembled their 3D printed rocket

About the Workshop Facilitator

Peter Eduard is a teacher, instructor and consultant working within the area of educational technology. Winner of the 2007 “Best Danish Science Teacher” award and principal consultant at the Municipality of Slagelse. Peter has considerable experience with teaching, spanning Youth Schools, University Colleges, High Schools and various others. Original trained as a marine biologist, Peter have worked extensively (but not exclusively) within the area of STEM.

Niels Vandel Svendsen is a Thesis Graduate from Aalborg University. He has a background in Human Centred Informatics and has worked on several projects concerning teaching practice with interactive digital media. He has won a Best Paper award at the Educon 2014 conference for his contribution: Motivating Programming Students by Problem Based Learning and LEGO Robots. He recently had another paper accepted at the ACM Group 2014 conference in Florida, USA.

Niels is affiliated with e-Learning Lab at Aalborg University and EduTechLab at Antvorskov Skole.



Figure 3. Second place winner @Young Scientist fair – a system to test and protect against flooding

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References

www.edutechlab.dk; www.antvorskovskole.dk