

Project MYRE:

Electric Go-Karts and Kinematics at Svendborg HTX

A project in collaboration with a 5th-grade class from Haahrs School – a technology and physics course

Participants and overall plan

Teachers:

Jeppe Uddegaard (Svendborg HTX) and Christian Munk (teacher at Haahrs).

Students:

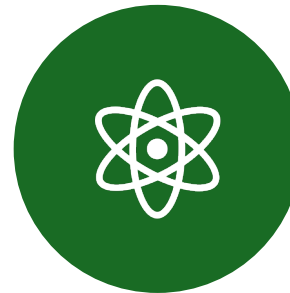
An entire 5th-grade class from Haahrs (10- to 11-year-old) and four of our own students from 2nd TekDes (HTX), who serve as instructors and teacher assistants.

May 2nd	Christian reviews essential methods with the class at Haahrs.
May 3rd	The 5th grade arrives at HTX at 8:00 AM, and the day's program runs from 8:00 AM to 2:30 PM
May 8th	The students finalize the last data at home on Haahrs.
May 13th	Jeppe Uddegaard visits Haahrs and evaluates with the students.

Purpose and learning objectives



The role of electric cars in the green transition.



Energy chains and energy conversion.



Basic kinematics: measurement of velocity, acceleration, braking distances, and force ratios.

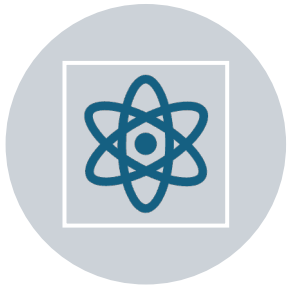


The level is adjusted to 5th grade, and by agreement, students take data home to work on the next day.

**Our own expert
in go-kart
racing: Villads
2. TekDes**

Villads is one of the 4 students participating in the program. He is one of Denmark's top go-kart racers. And soon, he will be participating in the European Championship.

What should the course contain?



Energy chains – how is energy converted (from one form to another)?



Green transportation - why do electric cars play a significant role in the green transition?



Basic kinematics - what is 'velocity,' 'acceleration,' and 'forces'?



Driving technique – how do we optimize lap time in a race?

Energy chains and green transport – how do we work with the case?

Sequence one: We are conducting a brainstorming session collectively with the aim of bringing keywords and concepts into play.

Sequence two: Based on the brainstorming, the students are now tasked with creating drawings illustrating how energy is converted all the way from the energy source to the end.

Sequence three: The students present their chosen energy chain and their ‘pros and cons of electric cars.’ 2-3 minutes per group.

During the process, our HTX students function as learning consultants, circulating among the groups.

Kinematics and Forces in Go-Karts – How Do We Work with the Material?

Sequence one: The students are instructed to drive go-karts, and everyone gets a single lap around the track.

Sequence two: We go through methods for velocity calculations between 2 points, and the students work on examples with assistance from the HTX students.

Sequence three: The students set up cones and measure distances. In turns, they drive while group members record the process.

Sequence four: We post-process data – how fast did we drive?

$$v_g = \frac{\Delta s}{\Delta t} = \frac{s_2 - s_1}{t_2 - t_1}$$

Braking distance and acceleration – how do we work with the material?

Sequence one: Based on input from the students, we go through a simple definition of acceleration (how long it takes to reach top speed)

Sequence two: The students collaborate again in their groups to measure braking distances from 3 different speeds. Braking distances are measured by group members. Our HTX students provide instructions along the way.

Sequence three: Results are discussed in plenary, and the students save important data for further processing at their school.

Relay race and driving technique – a fun event at the end of the day

During instruction, the students themselves build a track, and we assist in forming the teams.

Before the start, the teams should, based on their experience, discuss techniques and strategies.

Evaluation

Learning outcome: We reached our goals successfully, but the students were extremely focused on driving rather than pursuing the educational objectives.

Student-student interactions: Our HTX students were excellent at conveying information quickly. We noticed that the younger students from 5th grade listened to the older students. The HTX students received good training in conveying relevant material.

Evaluation

Haahr's assessment: Christian and the students seem to think that the course has been extremely good, and the students are begging to come back to school. Haahrs skole wishes for us to continue the course with 5th graders going forward.

My assessment: I am pleasantly surprised that we largely achieved the learning objectives. The very young students are better at maintaining focus than I expected.

Go-karts are a tremendous success, providing an exciting and fun entry point into aspects of green transition.

