

Introduction

The students in class nine, aged 15, lower secondary school in Sweden, have worked with a socio-scientific issue about nanotechnology. They have learned about both good argumentation and about the subject area nanotechnology. Theoretical information from a variety of perspectives was discussed.



The aim of this project is for the students to learn about good argumentation for or against a position regarding nanotechnology as well as obtaining subject knowledge.

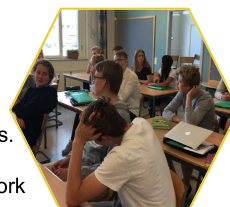
Planning

In order to argue well, students need to learn both about the subject and about argumentation. The table below shows how the work in this project was distributed over the lessons.

	Lesson A	Lesson B
Week 1	How to create argument that holds. (Figure 1)	What is nanotechnology?
Week 2	Own research about nanotechnology. (Figure 2)	Gather information, create mind map. (Figure 3)
Week 3	Film and discussion. (Figure 4)	Make a table with words they considered difficult. (Figure 5)
Week 4	Write a text with argumentation. (Figure 6)	Peer assessment of student texts. (Figure 7)

1. What is good argumentation?

The basis of this work is about argumentation and how to find scientific support for the arguments.

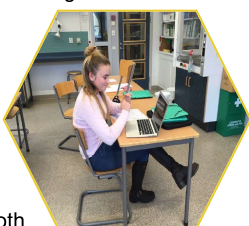


We began our work with a discussion on How an argument can be supported by scientific facts and how to build arguments both for and against a position. The pupils were then instructed to argue for or against different positions, which they found interesting but difficult.

2. Own research

The students received a lesson to search for information on their own. In order to delimit the area a bit, a folder was created for the students to begin with.

It contained information that were appropriate to begin with.



The material consisted of both films and texts and debates which showed nanotechnology from different angles.

3. Mind maps

In order to arrange all information, one lesson was devoted to discussions in groups. The students discussed collected information and made mind maps where they sorted different aspects of nanotechnology and how society could relate to new research.



The students expressed that this was the part of the work they considered have gained their understanding the most.

4. Film

Halfway through the project, the class together saw a film about nanotechnology and its potentials and risks. The content where then discussed and difficulties were cleared up.



5. Table

Many concepts within nanotechnology were new to the students. They were asked to create a table with concepts they needed to learn more about.

Concept	Meaning
Nano	One billionth of a metre
Nanotechnology	Research on nano size
interdisciplinary	Research involving multiple sciences
ENP	Manipulated particles
Toxicology	The doctrine of the poisons
Component	Factor or ingredient.
Spectrum	Wavelengths or frequencies
Absorption	Absorption, suction
Asbestos fibres	Nano particles that can cause lung cancer

6. The Socio Science Issue

One of the tasks in this project was to write a text based on the questions:

You will be hired as an expert of a research council. The council has been asked to recommend the ruling politicians how to relate to nanotechnology companies.



Should they invest more money on the development of nanotechnology, keep current investments or fully withdraw the funding?

7. Peer assessment

After the students wrote their texts, they had to exchange texts with each other and discuss together what qualities they achieved. They also helped each other to write complementary parts to enhance the quality of the texts.



This was a theme the students found interesting and they worked enthusiastically.

