Enhancing students’ interest and motivation in science learning through an industry site visit

Changing research landscapes to make the most of human potential
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Material Science (042942)
Self-Determination Theory (SDT; Deci & Ryan) and Interest (Krapp)

- Motivation describes the aspects within an individual which arouse, maintain and channel behavior towards goals (of the learning activity).

- The development of motivation is controlled by basic psychological needs for
  - competence,
  - autonomy and
  - social relatedness

- Interest is divided to individual (personal/topic) and situational interest
- Interest has value-related and feeling related components
Research in out-of-school learning environments

■ have a history of over 100 years
  (Hein & Alexander, 1998),

■ focus on learning of concepts and interest/motivation

■ A wide variety of approaches and methodologies.
Syntax of the site visit (industry, industry laboratory, university research laboratory, …)

1. Advance planning by teacher(s) (0.5 – 2 hours)
2. Teacher(s) preparatory site visit (2 – 3 hours)
3. The preparation of the visit and learning activities with students (1 – 2 hours)
4. Practical preparations for the visit (0.5 – 2 hours)
5. The site visit to the plant (2 – 4 hours)
6. Preparation of the output/reports/articles, (1 – 2 hours)
7. Evaluation and feedback (also to site representatives) (0.5 – 1 hours):
8. Collecting ideas for planning future site visits (15 – 30 minutes).
Materials around us:
Metals, plastics and paper

This learning material has been designed by the Local Working Group in Finland as a part of European Union 6th framework university school partnerships project (QAS6-CT-2006-02942 Material Sciences). The project aims to design and implement research-based ICT-enhanced modules for comprehensive schools in specific domains related to materials science. These modules aim to emphasise the inquiry-based science learning, the active student engagement, the motivation and the collaborative learning. Members of the Local Working Group are Tomi Alakoski, Annika Armpa, Kalle Jaani, Mikka Kallonen-Toppila, Timo Karvonen, Senni Laherto, Jarkko Lampela, Jari Lavonen, Anni Loukkonien, Veijo Manni, Marja Mantoven and Lasse Vanhaver.

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According to students’ interview

- In general the site visit had a positive influence on students’ interest and motivation to learn science.

- It was important to experience, how science is applied in real life: Interesting context

- All interviewed students were interested on the research tools and devices. Interesting context

- Most of the students mentioned situations which emphasized social relatedness and situations related to feeling of competence or feeling of autonomy.
How to increase interest in science and technology careers?

- Students should have possibilities to
  - meet *role models* and
  - participate *learning activities*
which support the development of *basic psychological needs* for
  - competence (*tasks, constructive evaluation*),
  - autonomy (*plan, take responsibility*) and
  - social relatedness (*get benefit from learning together*)

- Support to development of *values* through role models, experiences, …
Conclusions and implications

- Students’ opinion was that they had few possibilities to plan their own studying during the site visit module.
  - The students should be given more responsibility for the planning.

- Students emphasised the significance of working in a group together with friends,
  However, significance of working together in the context of science learning didn’t emerge of the students’ answers.
  - More support to the feeling of social relatedness in the direction of the aims of the teaching activity is to be amplified in the next cycles of designing the site visit.