Scince and Technology for All (the acronym in Swedish is NTA)

Our goal is to engage both pupils and teachers in their own learning!

For our future!

Ulrika Johansson, City of Linköping, Sweden
teachers... need to see this style of teaching as a journey, not a destination: 'becoming science teachers' is a life-long professional process.

(Carlone, Haun-Frank & Kimmel, pp. 956, 961)
(Skamp & Peers 2012, p 30)
The world and our challenges are changing and therefore we need to provide our children with the best conditions to meet the future.

Together we must find the best way supporting our children in their learning!

Ulrika Johansson, City of Linköping, Sweden
From January 2010 til Februari 2013 NTA participated in Fibonacci together with:

- 60 centers in Europe
- 3000 teachers
- 45 000 pupils
- University/Teacher training
- Research

*One of the booklets:*

Tools for enhancing inquiry in science education
From Sweden:
Gerd Bergman, Royal Swedish Academy of Science / NTA Development
Jan Schoultz, Professor, Linköpings University

NTA and collegially learning!

Aim:
• Helping to deepen the understanding of inquiry
• Supporting formative assessment of teaching practises
OUR THREE ISSUES

1. How do I collect the pupils' thoughts and experiences?
2. How do I work for the pupils to realize and see how they will observe?
3. How can the pupils show their learning and feel confidence in learning?
NTA and collegially learning

• from focusing on teachers to ensuring that pupils are at the centre of the process
• from participation in professional development to engagement in professional learning,
• from foregrounding delivery methods to foregrounding professional knowledge and skills
• from focusing on theory or practice to meeting the double demand of theory and practice
• from teachers being a recipient of someone else’s knowledge to becoming self-regulated learners.

(Timperley, 2011)
Formative assessment is always aiming to help the pupil (or the teacher in teacher training)

Teachers and students lifelong learning!

Ulrika Johansson, City of Linköping, Sweden
Example of questions from "Tools for enhancing inquiry in science education"

<table>
<thead>
<tr>
<th>Building on Ps’ ideas</th>
<th>T’s questions include open questions (requiring more than a one-word answer) which probe what Ps are thinking not only at the start but at other times in the activity; e.g. What do you think is the reason? rather than ‘what is the reason?’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a T asks questions requiring Ps to give their existing ideas</td>
<td>T asks Ps to explain their ideas so that others can understand, if necessary asking ‘Is this what you mean?’, giving them some time, perhaps in small groups, to discuss and clarify what they think.</td>
</tr>
<tr>
<td>1b T helps pupils to formulate their ideas clearly</td>
<td>T responds to Ps’ ideas such as by suggesting how they could be investigated in the current activity or later, or by referring to the Ps’ ideas at some stage during the investigation asking ‘do you still think that…?’</td>
</tr>
<tr>
<td>1c T provides Ps with positive feedback on how to review or take their ideas further</td>
<td>T asks, for example, ‘What would you like to know about …?’ or has a ‘question box’ or board where Ps can put questions which are read and taken into account in later discussion.</td>
</tr>
<tr>
<td>2a T encourages Ps to ask questions</td>
<td></td>
</tr>
</tbody>
</table>
Link to DiNo (National Agency of Education) support formative assessment in science

Ulrika Johansson, City of Linköping, Sweden
What educational outcomes are valued for our **students** and how are our students doing in relation to those outcomes?

What knowledge and skills do we as **teachers** need to enable our students to bridge the gap between current understandings and valued outcomes?

What has been the impact of our changed actions on our students?

How can we as **leaders** promote the learning of our teachers to bridge the gap for our students?

Engagement of teachers in further learning to deepen professional knowledge and refine skills

Engagement of students in new learning experiences

H. Timperley, A. Wilson, H. Barrar and I. Fung, 2007
Assessment in the role of helping learning!

5E learning cycle
5U teaching model

M. Areskoug, M. Ekborg, B. Lindahl and M. Rosberg puts Evaluation in the middle to show that this is not the last step in the progress, but formative assessment is made in every step to support learning!

(M. Areskoug, M. Ekborg, B. Lindahl and M. Rosberg (2013). Naturvetenskapens bärande idéer, Malmö: Gleerups.)
Utvärdering av vad som har hänt i klassrummet. Nya frågor och behov uppstår

Vilka kunskaper behöver lärarna för att kunna möta elevernas behov?

Lärarna fördjupar sina professionella kunskaper och får nya idéer för att möta elevernas behov

Lärarna prövar dessa idéer och tanker i klassrumspraktiken

Vilka kunskaper och färdigheter behöver eleverna utveckla?

Helen Timperley, 2013
Frågeställning 1

Träff 1

Erfarenhetsutbyte, frågeställning 1  Introduktion, frågeställning 2

Frågeställning 2

Träff 2

Erfarenhetsutbyte, frågeställning 2  Introduktion, frågeställning 3

Frågeställning 3

Träff 3

Erfarenhetsutbyte, frågeställning 3  Sammanfattning
Collegially learning

A structured and regular cooperation where feedback is a key element.

(The Swedish National Agency for Education, 2013, translated by U. Johansson.)
Frågeställning 1, NTA och kollegialt lärande

Hur samlar jag elevers tankar och erfarenheter?
Facts Knowledge dominates
In most of the schools visited dominated the teaching of factual knowledge contained within the curriculum area of nature and man. It is at the expense of teaching about the scientific activity and the use of knowledge, areas which is about how physics knowledge are put to use in society and their importance in everyday life. That teaching is limited in this way can influence students' perception of how meaningful physics teaching is.

Teachers does not know what the students want to learn
The audit shows that a major problem in schools is that teachers do not find out or account of what students are interested in learning of physics. Students can not affect work or work and they rarely evaluate physics teaching. The majority of teachers in the audited schools do not meet each student at the appropriate level, without conducting teaching based on a kind of medium-level teaching team. The importance of skilled and dedicated teachers for students' desire to learn physics is unequivocal, both according to previous research and the National Supervisory review.

Teaching materials gives distorted view of the role of women
The audit also includes an educational study of three, in the audited schools, ordinary physics teaching. The study shows that the contents of textbooks are limited to certain areas and do not cover the entire syllabus. They convey addition, as a special image analysis shows a distorted view of women's role and relationship to physics and science activities.
Swedish Schools Inspectorate

Investigation about science teaching in Years 1-3

The audit results
Summary, the results of this review by the no-instruction in grades 1-3 follows:

• Students think science is fun
• The audit revealed safe learning environments
• All areas of knowledge in curriculum core content is not covered, biology is given more time than other areas of knowledge.
• Teachers' subject knowledge is important
• All students is not working using scientific methods. (They do science but not learning science.) Hands on and minds on! Students need more time for reflection and discussion.
• More teachers need to take advantage of students' interests and experiences and give students opportunity to use a scientific language.
• Students need help to understand the meaning of the content and its relevance
• Student needs access to and use of ICT tools to improve learning
• Teaching is not equivalent, there are wide variations in the quality of education between schools, but also between different classes the same school.
NTA – part of teachers lifelong learning

- Training to become teacher trainer (NTA)
- Continual training for teacher trainer each term
- Unit-training
- Introduction for new NTA-teachers
- Continual training for NTA-teachers
- NTA and collegial learning
- Assessment training
Vilka kunskaper och färdigheter behöver eleverna utveckla?

Utvärdering av vad som har hänt i klassrummet. Nya frågor och behov uppstår

Vilka kunskaper behöver lärarna för att kunna möta elevernas behov?

Lärarna prövar dessa idéer och tanker i klassrumspraktiken

Lärarna fördjupar sina professionella kunskaper och får nya idéer för att möta elevernas behov
Min frågeställning

Analysera

Genomföra

Planera

Nuläge
Our goal is to engage both students and teachers in their own learning!

Ulrika Johansson, City of Linköping, Sweden