KeyCoNet (2012 – 2014) is a European policy network focused on identifying and analyzing initiatives on the implementation of key competences in primary and secondary school education.

On the basis of the evidence collected through literature reviews, case studies, peer learning visits, country overviews, videos and exchanges between network members, the project’s final objective is to produce recommendations for policy and practice regarding the enablers and obstacles to a holistic implementation of key competence development.

Among KeyCoNet’s current 18 partners in 10 countries (Austria, Belgium, Estonia, Finland, France, Ireland, Norway, Portugal, Spain and Sweden), are Ministries of Education/related agencies, universities/research institutes, European organizations, and practice related partners. KeyCoNet also has a growing number of associate members from other countries and stakeholder groups, steadily increasing our network’s scope and influence.
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ABOUT THIS CASE STUDY

Part of a series
This case study is part of a series of case studies being produced by KeyCoNet, to highlight various initiatives concerning key competence development, taking place across Europe. Each case study analyzes the initiative’s implementation strategies in depth, and will feed into the network’s recommendations for policy and practice on how to implement a key competence approach in schools most effectively.

How and why was this case selected?
Each year the KeyCoNet network identifies initiatives concerning key competence development across Europe, and a case note is produced providing basic information about each one. Following this, network partners participate in an online selection according to pre-established criteria, as well as an in-depth face-to-face discussion, in order to select the most interesting initiatives to develop into case studies.

The Swedish initiative, Science and Technology for All (STA), offers conceptual courses to school principals for the development of the school’s curriculum. The model for schools’ curriculum development was originally conceived for scientific and mathematical subjects and competences, but experience has demonstrated that in practice the model has also been used for the development of curricula around other subject areas and competences. The STA initiative was selected by the network as it is a large scale national initiative based on five basic principles of local curriculum development and pedagogy in the natural sciences and technology, all of which facilitate effective competence development: a question-based, investigative working method; using experiments as the starting point; access to suitably adapted experiment material, combined with suitable pupil/teacher guidance; continual skills and competence development for teachers; on-going assessment of pupil learning processes; and close liaison between schools, local authorities, the business community and universities.

Which methodology has been used?
Case studies are the main tool used by the network to probe beneath the surface of each selected initiative and provide a rich context for understanding the implementation issues involved. The initiatives selected by the network differ in many ways, according to the nature of the key competences addressed, the implementation process used, the number of students and teachers directly concerned, the type and number of actors involved, and the duration and stage of development etc. A multiple-case study design, whereby each initiative generates its own case study, but uses one single prism for a common analysis, was therefore chosen. This method makes it possible to explore diversity, as well as the enablers and obstacles to the initiative’s implementation, as perceived by the initiators and stakeholders interviewed. Moreover, through a multiple-case study design it is possible to identify choices, strategies, characteristics, situations or contexts leading to success or failure in a recurrent manner. This will particularly contribute to fuelling the set of recommendations for policy and practice at institutional, local, regional, national and European level, for the effective implementation of key competences in school education.

Each case study included interviews with the initiative’s coordinators and stakeholders, as well as desk research. In some cases, where considered feasible and fruitful, focus groups were also organized. In this particular case study, face-to-face interviews were conducted with three coordinators of the initiative: the STA coordinator for the Stockholm Region, who is also the Area Coordinator of Danderyd Municipality and a teacher; the Development Manager of STA; and the local coordinator in Sigtuna (who also works as a teacher). The case study report is structured as a series of questions under nine topics concerned with the initiative’s implementation. The answer to each question incorporates the views of the various coordinators and stakeholders interviewed, as well as the desk research undertaken.
### Basic Information

**Country:** Sweden

**Title of initiative:** [SE] Naturvetenskap och Teknik för Alla (NTA)  
[EN] Science and Technology for All (STA)

**Coordinator/Organization:** KVA - Kungl. Vetenskapsakademien (The Royal Swedish Academy of Science)  
IVA - Kungl. Ingenjörsvetenskapsakademien (The Royal Swedish Academy of Engineering Science)

**Key competences addressed:**  
[SE] Matematik och naturvetenskapliga ämnen  
[EN] Mathematical competence and basic competences in science and technology

**Type of initiative and channels used for implementation:** Professional development and support for teachers, teaching methodologies

**Partners:** The Royal Swedish Academy of Science and the Royal Swedish Academy of Engineering Science in cooperation with municipalities throughout Sweden

**Scope:** Students and teachers  
Local and national

**Learning context:** Formal

**School education levels:** From pre-school to the end of compulsory education

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**Target groups:** Teachers and students

**Time frame:** 1997 – on-going

**Relevant links:** www.nta.kva.se
INTRODUCTION

STA (Science and Technology for All) offers conceptual courses to school principals for the development of the school’s curriculum. The model for the school’s curriculum development is first and foremost directed towards biology, physics, chemistry, technology and mathematics, but experience has demonstrated a “spread effect” to other subjects and key skills and competences.

The STA concept encompasses a methodology for local development work and is based on five basic principles of curriculum development and pedagogy in the natural sciences and technology:

1. A question-based and investigative working method, using experiment as the starting point

2. Access to suitably adapted experiment material, combined with suitable pupil/teacher guidance

3. Continual skills and competence development for teachers

4. On-going assessment of pupil learning processes

5. Close liaison between schools, municipalities, the business community and high schools/university

The STA has been in existence since 1997 when it started as a single educational project. Via their contacts with academies in the USA, the Royal Swedish Academy of Sciences (RSAS) and the Academy of Engineering Sciences (AES) became aware of the school curriculum development concept known as “Science and Technology for Children” (STC), which had been developed and promoted by the National Science Resources Center (NSRC) over many years. The RSAS and AES

SUMMARY

The STA programme (Naturvetenskap och Teknik för Alla - Science and Technology for All), run by the Royal Swedish Academy of Science (KVA) and the Royal Swedish Academy of Engineering Science (IVA), was established in 1997 in order to counter declining results in national and international tests in mathematics and science. The programme focuses on providing professional development and support for teachers in order to develop and expand their attitudes and approaches to and knowledge of science and technology and to improve teaching and learning in STEM (science, technology, engineering and mathematics). The ultimate aims of the programme are to support teachers in their efforts to stimulate students’ curiosity, interests and knowledge in science and technology, to enhance scientific literacy and to encourage more young people to choose an education leading to a career in science or technology.
were offered free access to the school curriculum development concept STC; that is, access to all the material being used and the knowledge and expertise that had been built up. The RSAS and AES then made contact with a local authority in Sweden - Linköping - which was willing to operate a pilot scheme to assess the concept and establish if it might be of benefit to Swedish schools.

Those following the progress of the pilot scheme included politicians involved in educational fields, school management boards, trade union organisations and representatives from Linköping University. When the pilot scheme had finished, the reaction from all concerned was very positive and it was agreed that the STC (Science and Technology for Children) concept should be developed in Sweden as “STA” (Science and Technology for All). In other words, using the STC idea but adapted to the Swedish school system.

The experience gained in the years following that initial assessment has reinforced the view of the STA as a significant development concept for the teaching of the natural sciences and technology in schools.

The STA was run as a single project up to and including the year 2003. In 2004, the STA was developed from being a single project to a business partnership - the STA Production and Services Enterprise Partnership. During the spring of 2013, the partnership took a decision to institute new company statutes and found a new organisation. In this new organisation, the STA took on full management responsibility for all its programmes, but with the RSAS and AES continuing their engagement via representation on the board of the partnership, and also via the Swedish Research Council for which they provide support and members. The STA also changed its full title to the “STA – Enterprise Partnership for the Development of the School Curriculum”.

In 2003, the STA had 38 enterprise partners (34 municipalities and 4 independent schools). In 2013, the STA had 140 enterprise partners (113 municipalities and 27 independent schools).

The Rektorsakademien Principals has interviewed three people for this report:

Pia Norrthon, teacher and STA coordinator for Region Stockholm, as well as the local coordinator for Danderyds municipality area.

Gerd Bergman, development officer for Gerd Bergman, development officer for STA.

Tina Häggholm, teacher and local STA coordinator for Sigtuna municipality area.

Many years have passed since the STA initiative was first started and this fact has made it more difficult to obtain the full details regarding its beginnings and the way it was implemented. Despite this, via these interviews, we have managed to gain a very good insight into what happened at the beginning, and it is clear that STA has maintained exactly the same basic approach right throughout its long journey. This in turn has given us a better understanding of how the initiative started and its development since then.
1. CONTEXTUAL INFLUENCE

Which contextual factors have been perceived as enablers to the implementation of the initiative?

At the beginning, there were several important existing factors, which made it possible to start up and then implement the STA. Amongst other things, there were a range of existing problems in schools that required solutions. A new curriculum was also introduced and this coincided with the great interest shown in schools policy on the part of the RSAS and AES with regard to the natural sciences and technology.

Following the implementation of the STA programme, several other factors have played a positive role in its development and more widespread acceptance. A good example of this is the STA’s organisation and structure, its network of teachers, and also its working methods using fully available material and training courses.

Problem solving

One of the problems we faced was the low level of interest in the natural sciences and technology amongst children and teenagers. In a society where knowledge and proficiency in these subjects were becoming ever more important, this was a source of great concern.

Another problem that required urgent attention was the lack of suitably qualified teachers.

The lack of suitable educational material was also creating difficulties. Many teachers were bringing their own material with them to school so as to be able to carry out various experiments with the pupils.

New curriculum

Another opportunity presented itself in 1994 when the new schools curriculum (LPU94) was introduced. This was because from 1994 onwards, the curriculum would have a clear focus on the natural sciences and technology, something that had previously been lacking.

The RSAS and IVA’s keenness to promote the natural sciences and technology, and the importance of their networks

The third big boost to the STA initiative was the interest shown by the RSAS and AES in having the natural sciences and technology taught in schools. It was via their network of contacts with academies in the USA that RSAS and AES became aware of the school curriculum development concept known as “Science and Technology for Children” (STC), which had been developed and promoted by the National Science Resources Center (NSRC) over many years. This model presented a fantastic chance to initiate something that could be tested and was already in existence elsewhere, instead of having to start something from scratch. This saved both time and resources in trying to develop our own schools model.

Organisation

Another very useful factor in the promotion and development of the STA initiative has been the STA’s own organisation. The organisation consists of the STA Enterprise Partnership for the Development of the School Curriculum, which advises and supports schools on working methods and materials; the members’ local STA-organisations and a science committee staffed by the RSAS and AES.
**STA’s organisation**

<table>
<thead>
<tr>
<th>PARTNERSHIP AGM</th>
<th>THE STA ENTERPRISE PARTNERSHIP FOR THE DEVELOPMENT OF THE SCHOOL CURRICULUM</th>
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<tbody>
<tr>
<td>Provides Board Members</td>
<td>Board of Management</td>
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<tr>
<td>Each member has a vote</td>
<td>Responsible for national admin and regional work and the local STA-organisations.</td>
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<tr>
<th>OPERATIONAL SECTION</th>
<th>DEVELOPMENT AND ASSESSMENTS</th>
<th>SCIENCE COMMITTEE</th>
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<tbody>
<tr>
<td>Responsible for sending out Theme Containers (experiments) and extra material for members (schools).</td>
<td>Develops themes, training and other tools for members’ school curriculum.</td>
<td>The committee is staffed by the RSAS and AES. Supports and quality checks development work within the STA-programme.</td>
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<tr>
<th>THE STA AT REGIONAL LEVEL</th>
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<td>Coordination of regional competence development and organisation of regional conferences. Also tasked to provide info on the STA to interested school principals and to support the membership coordinator in building local involvement.</td>
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<tr>
<th>THE STA AT LOCAL LEVEL</th>
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<tr>
<td>In-service training for pedagogues/teachers and materials provision.</td>
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1. **Introductory course** – an introduction to the STA and its working methods.
2. **Theme Training** – A one day course on the theme that participants will be using that term. During the course, more or less all the tasks set in the term’s theme are examined and participants also discuss teaching issues and get a chance to exchange working experiences gained from theme work with child/pupil groups.
3. **Work with the chosen theme in child/pupil groups.** – forms part of in service training.
4. **Theme meetings** or other forms of follow up training. Is offered to all pedagogues/teachers every term. Focus on exchange of experiences and immersion within specific areas. Can be used to great advantage with more advanced higher training, or with the local business community.

A well grounded foundation is another aspect of the organisation’s structure that has made a highly positive contribution. A successful launch to STA work in any area requires a firmly grounded anchorage for all the parties involved – from politicians to teachers/pedagogues.

The actual process when first starting to work with the STA initiative follows the sequence below:

1. A political decision is taken within the municipality.
2. When the decision has been confirmed, a cooperation agreement is drawn up between the municipality, and the STA.
3. When the agreement has been signed, the municipality appoints a coordinator. The coordinator plays a central role within the STA. The coordinator acts as the mutual contact point for teachers/pedagogues within the organisation. He or she is also the link between the local development group and daily operational tasks. The coordinator also acts as the link between regional and national branches of the organisation.

All coordinators meet on a regular basis in order to assess current working methods from a science point of view, the school curriculum and how STA can be further developed.

4. All coordinators, principals and teachers/pedagogues receive STA training, including the various themes that they will be using in schools.
This process ensures that STA is firmly anchored at all levels and amongst all involved partners.

Sigtuna municipality is very much engaged in work around the natural sciences and technology and recognised from the start that the problems being encountered needed a solution. Thus the “Start an Experiment” initiative was launched. However, there was a still a huge requirement for materials and training courses. The municipality made contact with STA, which paid a visit to the area. Following on from this, Sigtuna sent a delegation to Linköping, which has been involved with STA from the start. Sigtuna municipality then decided to become a member of STA and actually decreed that all pupils in its area should be introduced to the STA initiative.

**Working methods and materials**

When a teacher in a participating school engages with STA, the teacher/pedagogue orders the current “theme container” from STA. The theme container contains all the material needed in order to carry out the experiment and also teacher/pupil guidance notes. The material carries a basic and continuous thread, which encourages confidence in the teaching process, engages the pupils and arouses their interest for natural science subjects.

Having both the material and guidelines delivered makes things much simpler and saves time for the teachers/pedagogues.

**Training**

All those working with STA are obliged to participate in its training course.

There is an introductory course, which is obligatory for coordinators, principals and teachers/pedagogues. Attendance is also obligatory at the theme training sessions for all teachers/pedagogues. Each theme has a training course in which teachers using the theme participate. These theme training courses give the teachers an excellent grounding in the subject being taught. They are also regularly updated with new skills and proficiencies. “As a teacher, you grow in knowledge and confidence” – quote from Tina Häggholm.

**The Network**

Quite apart from being a curriculum development programme, the STA initiative is also a network for teachers. The STA network has been one of the main contributing factors to the growth and continued development of STA in schools. Geographically, the STA initiative is mainly developed via the simple fact of teachers within the network talking to each other.

**The experience of teachers and pupils**

STA is firmly anchored within the teaching community. The majority of teachers/pedagogues working with STA believe that it plays a positive and entertaining role. Also, apart from the fact that it is fun to work with, teachers/pedagogues find that working with STA is a great time saver. They receive notes on working methods and material delivered to them and also continuous help in assessing what the pupils have learned.
But perhaps the biggest reason for STA's continued development and growth is what happens in the classroom, when the enthusiasm of the pupils becomes apparent – this creates a very positive atmosphere in class. The pupils are given very thoroughly researched material and encounter the natural sciences and technology at a professional level. Natural science is linked in a very clear way to the pupils' own reality, so that it feels real and recognisable. The key point is that experiments are linked to facts in a light handed way. Both teacher and pupil gain from this.

**Which contextual factors have been perceived as obstacles to the implementation of the initiative, and why?**

**Finance**

Finance is, and always was, the greatest hindrance to the growth of STA.

There is no doubt that with the advent of the STA initiative, natural science and technology teaching became more costly as there was now an induction fee to pay, then a fee per pupil, and also for the teaching theme being used by the school. These costs had not previously been an issue because teachers had very often brought their own material in from home.

The municipality pays the induction charge of SEK 15,000. Schools working with STA pay SEK 20 per child or pupil commencing a new theme during the term.

In return for these fees, the municipality and school obtains a training package for teachers/pedagogues, curriculum development, working method notes and materials (including guidelines for teachers and pupils).

**Time**

On top of financial obstacles, time can also be a problem. Due to lack of available time, it can be difficult for teachers to prioritise attendance at theme meetings and the theme training sessions that are required before one can begin working with STA. Nowadays, a teacher’s time is increasingly taken up with administration. Once lessons are over, teachers have to prioritise administration, in which case it can be difficult to begin focusing on training days and theme meetings.

**Other Issues**

When a school orders an experiment (a theme container) this contains all the material needed, including teacher and pupil guidelines. One criticism that has been levelled at the STA initiative, and which is something of a dilemma for STA, is that it is overly controlled. This is a conscious choice in order to maintain quality levels, but it is something that has been worked on, without of
course allowing a drop in standards. Thus, STA has now been set up so that teachers and pupils have the opportunity to work more freely, using their own insights vis-à-vis the concept being studied, choosing their own suitable methodology and carrying out their own investigations based on their own questions and issues. The STA model is designed so that pupils at all times can perceive the problem they are working with. These problems have to be contextually grounded in activities that can be easily grasped by the pupils. It is from this overall context that certain elementary scientific generalisations and concepts can be subsequently drawn.

Another challenge for STA is to obtain an increased understanding that the STA programme is not just a teaching tool but a broader schools curriculum development programme.

2. SUBSTANCE RELATED ISSUES

Which substance related issues have been the most difficult ones to fix when deciding on the content of the initiative, and why?

The natural science and technology content within the STA programme has been a given from the start. Since then, it was always the intention to continue this policy.

However, our experience has been that using STA in schools has helped to develop and strengthen pupil skills and proficiency in several other directions, such as: communication in Swedish, learning the learning process, creativity, entrepreneurial learning, initiative taking, digital skills, cooperativeness, taking responsibility, ability to concentrate, flexibility, curiosity, willingness to take risks, constructive questioning, reflection, handling and processing of information, perseverance and subject immersion and consequence analysis.

Another interesting aspect is that we have seen a lot of pupils, who do not have the Swedish language as their first language, strengthening their language proficiency and word vocabulary through the STA programme. Part of the STA working method requires that pupils write down their experiment notes, which has contributed greatly to language skills and development.

The report - “I like STA work. They don’t give us stuff just to bore us to death. It’s to help teach us.” Assessment of pupil/teacher learning and development levels within the STA-project” (Jan Schoultz ITUF Linköpings University, Glenn Hultman IUV Linköpings University) highlights the very point that language usage, both verbal and written, is central to STA.

3. PARTNERSHIP RELATED ISSUES

Which key aspects should be taken into consideration when defining the partnership?

The RSAS and AES are important cooperation partners. It was these two bodies that introduced the STA concept to Sweden and which developed the original Swedish model. The RSAS and AES are also responsible for the very important fact checking element in the development of the material used by STA. They are also part of STA’s science committee and have members on the board of the STA Enterprise Partnership for the Development of the School Curriculum.
STC (Science and Technology for Children) is also a central cooperation partner, given that it has contributed from the beginning with its own concept and experiences. Today, STA has a cooperation agreement with STC and it is from STC that STA buys its new themes.

Other STA cooperation partners are the National Centre for Mathematics (NCM), technology resource centres, schools and universities such as: Linköping University, The Swedish National Agency for Education, the business community and local cooperation partners. In Sigtuna for example, the local STA organisation works in close cooperation with the “Start an Experiment” programme, which is another initiative that aims to increase interest in the natural sciences and technology amongst children and teenagers. Via STA, schools and the business community obtain better conditions for collaboration - for example through things like a technology day, where both pupils and the business community display projects they have undertaken.

4. STRATEGY RELATED ISSUES

Which aspects of the strategy implemented for the initiative have proved to be particularly effective, and why?

The close cooperation with the RSAS and AES academies have acted, and still act, as a quality assurance system for the STA programme.

Being able to use to an existing concept (STC), which could be tested quickly and simply has saved both time and money.

Another key aspect in the success of STA has been the willingness amongst the participants to show patience and have a long-term view which puts quality before quantity. Beginning modestly, by starting and working with the STA programme in one school in a participating municipality, and then gradually increasing the number of schools has proved to be a successful approach.

And despite the fact that it smacks of overly strict regulation, the policy of requiring obligatory training for school principals and teachers/pedagogues has also been a success. For it has meant that quality standards have been maintained with regard to teacher development.

Another policy which has worked very well has been to avoid spreading awareness of STA through large scale marketing campaigns, but rather to promote the STA programme “mouth to mouth” via personal contact and, above all, through the STA's own network.

In other words, keeping the STA organisation in a minimalist format was the correct approach.

5. SYSTEMIC ASPECTS

To what extent has the initiative been designed as a systemic one from the start; i.e. introducing changes in several areas relating to the student curriculum [such as teacher training, assessment, school organisation, etc.]?

STA's objective is to provide a global view of the natural sciences and technology.

The STA programme has been adapted to suit Swedish preschool up to the last (9th) year of primary school (7 to 16 yrs).
STA’s objective is to have an overall assessment programme encompassing research, curriculum and national testing.

Another STA policy is to promote collaboration across subject boundaries. One example of this is when the class is working with the STA “movement” theme, for example a vehicle in motion; the Physics teacher might fruitfully work in tandem with the arts teacher.

STA has explained and demonstrated this cooperation model at some of its teacher training sessions.

Which enablers have been identified during implementation as a result of the systemic aspect of the initiative?

The common thread which the STA has firmly maintained, that is to say stressing high quality over quantity, training (theme training and meetings), theme containers and teacher/pupil guidelines are things that Pia Norrthon returns to several times during the interview as she stresses their importance.

The STA programme helps teachers and pupils to continually assess what each pupil has learned.

It can safely be said that many perspectives regarding methodology and objectives in today’s schools curriculum, LGR11, coincide with the approach taken by the STA.

What have been the obstacles and/or challenges encountered during implementation as a result of the systemic aspect of the initiative?

As is mentioned above, STA has previously been criticised for being overly controlled in its approach, because of its obligatory training courses and centrally defined working methods.

How have the obstacles and/or challenges encountered been overcome?

With regard to the issue of obligatory training, the principals and teachers/pedagogues involved have all gained an insight into the fact that a successful training programme forms an important part of our attempts to maintain standards and, moreover, that teachers/pedagogues receive valuable support and guidance.

With regard to the theme containers, STA has worked hard at developing the methodology, guidelines and also the theme containers themselves, so that they now offer more freedom when working with the concept and more choice is offered when considering suitable approaches. Individual investigations can also be carried out, based on one’s own questions These new versions are more creative and less controlled.

The coordinators and organisation’s network are working to spread and promote awareness and understanding of STA as a schools curriculum development programme.

Have some parts of the original design of the initiative (from the systemic point of view) been abandoned and why?

No, The STA has maintained a clear line, a common thread, right from the start and that has never changed.

6. EVALUATION RELATED ISSUES

STA has been the subject of a number of reports and assessments during its existence. The aim was to evaluate how the STA programme helps schools to achieve course targets in the natural
sciences field. Assessments of STA’s contribution in this regard have also been made on the basis of a teacher/pupil perspective. The reports can be viewed at the STA’s home page, here:

http://www.ntaskolutveckling.se/Om-NTA1/Rapporter-och-utvärderingar/

Apart from these reports and assessments, STA receives thoughts and opinions on an on-going basis from teachers/pedagogues, school principals and coordinators as to how the STA programme might be improved. These viewpoints are then used as input when revising programme themes.

It is also important that the STA follows the latest trends and developments and that relevant themes are adapted accordingly. Above all, it is important that a connection is made between the natural sciences/technology and the pupils’ own world. That these subjects are experienced as genuine and recognisable. One example of this is that many families today have gone from using fine grained salt to salt flakes. This has meant that those themes involving salt have had to be updated to adapt to the new situation that salt flakes have created. This may be seen as trivial, but things like this make a big difference and affect both the pupil’s experience and also the experiment itself.

STA also liaises with several international players in these fields and exchanges experiences with them.

7. ACHIEVEMENT OF INITIATIVE’S AIMS

Have the original aims of the initiative been achieved?

The original goal was to contribute to an increased interest in the natural sciences and technology amongst children and teenagers, and also to give teachers material to work with.

STA contributes as one of several initiatives seeking to increase awareness and interest in the natural sciences and technology. In the report - “I like STA work. They don’t give us stuff just to bore us to death. It’s to help teach us. Assessment of pupil/teacher learning and development levels within the STA-project” (Jan Schoultz ITUF Linköpings University, Glenn Hultman IUV Linköpings University) one can read the following:

By working with the STA themes in the class room, the teachers develop their own expertise within the subject area and in teaching the natural sciences. The teachers believe that they themselves gain benefits and develop via theme meetings, meetings at their own school and through work in the classroom. But the things they have learned are not homogenous. Some have learned pedagogical skills, whilst others have increased their knowledge of a particular subject. In answer to the question; have you learned things whilst working with the STA programme, three teachers gave the following replies:

“I have learned an awful lot. I have become more structured. I have learned how you can build on elements that you have already taught and learned how this might be used elsewhere. For
example using the same skills in the classes at intermediate level. I probably would not have done that automatically at the start. I feel that it has given me a skills base to help me structure what I'm doing.” (Teacher Course Year 6)

“Yes I certainly have. It takes a lot for me to dare to go out and teach things I'm not that sure about. But subsequently, I too got those “ah hah, I see!” moments with regard to natural science. And I think that I will get many more moments like that when we start dealing with engines and so on, because I know even less about motion and movement and all that. Of course, you have to read up on the things you are teaching. You can't just stand there teaching, not really knowing anything about the subject, and then of course you gain your own expertise. Even at the intermediate stage going up to 6, the pupils can ask some really shrewd and smart questions, and you can’t just stand there saying you haven’t a clue.” (Teacher Course Year 4)

“Well ... there’s no doubt about that, along with a kind of wing and a prayer element. It was actually quite hard, especially where the sheer amount of material is concerned, something even I found difficult. I learned an awful lot about the chemical make up of food at the training sessions. Just going to the training course and taking it in. You are made to attend and study the subject so that you are in a position to talk to the children about it.” (Teacher Course Year 5)

The report – Assessment of how the STA programme has helped schools to reach their course targets for fifth grade natural science subjects (Per Anderhag, Per-Olof Wickman) demonstrates that where knowledge and proficiency in the field of natural sciences is concerned, both boys and girls in participating STA classes have 50% better results than non participating pupils. The report draws the following conclusions:

The main conclusion of this evaluation is that those pupils being taught via the STA model learn more, on average, than those pupils not participating in the STA programme. This applies both to girls and boys. There was no instance of a measured variable where pupils performed significantly higher in classes not being taught via STA. Taking into account the large differentials involved and that the results were higher for both low and high performance pupils, there are grounds to conclude that, in general terms, STA helps teachers in natural science subjects vis-à-vis their course targets in primary schools (7 to 16 yrs).

Thus, the conclusion is that the STA programme does, in a decisive way, support and encourage both the lower and higher performing pupils with regards to their study results. The pupils’ knowledge and proficiency are increased considerably with the STA model. However, there are areas where schools may need further help in developing natural science teaching. This, in part, refers to attempts to raise results for girls where nature and people skills are concerned, and also partly to help teachers to a greater extent with regard to their handling of practical skills usage.

Another aspect referred to in several reports is that one of the bedrocks of the STA-project is the encouragement of an inquisitive working method, where pupils are not just asked to “do” something but also given the chance to note down, discuss and present their results. These observations show clearly that pupils achieve development when working with the material in this way. Teachers, meanwhile, recognise that their pupils learn the mechanics of a working method. They take more responsibility and also think
that it is a fun thing to do. Pupils and teachers thrive within the STA environment. The STA material satisfies a need and teachers and pupils are offered a much broader scope for development using this programme.

8. NEXT STEPS

What is planned next for the initiative?

The most important issue at the moment is getting the new organisational structure in place.

Updating the home page is also something that needs to be done in the context of the new organisation.

Planning for a new report/evaluation of the STA programme needs to start.

Gerd Bergman has described, amongst other things, an exciting new project in which STA will be setting up a new database. Here one will be able to see which pupil has had which teacher, and also which themes the pupil has been working on.

STA needs to continue development work and to ensure that we remain at the cutting edge.

Planning of new assessments of STA themes needs to start.
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Since its founding in 1997, European Schoolnet has used its links with education ministries to help schools make effective use of educational technologies, equipping both teachers and pupils with the skills to achieve in the knowledge society.

In particular, European Schoolnet pledges to:

• Support schools in achieving effective use of ICT in teaching and learning
• Improve and raise the quality of education in Europe
• Promote the European dimension in education

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