

TECHin

(inspiring for technology)

**Partnerships that inspire young people in
Science, Technology, Engineering and Maths**

**Global Best Awards 2012
IPN 2012, Conference**

Overview of our partnership program



Teachers have built a bridge and are testing how much weight it can carry.

The lack of youngsters choosing studies in STEM related subjects is a serious problem for Norwegian enterprises. 1 of 5 enterprises in private sector report that they have had to delay or cancel projects due to the lack of employees with satisfactory competence in STEM-subjects.

One effort to meet these demands was that a new cross curriculum topic introduced to the national Norwegian curriculum in primary and lower secondary schools in 2006 - Technology and design (TOD). Until then technology had had no tradition in Norwegian schools. School owners and teachers had no platform to build this new topic on.

In this situation TECHin was established with the purpose to enhance the teacher's competence in the technology area. TECHin is a non-commercial organization of business organizations and national centers for education that want to improve the quality of the TOD.

The purpose is consequently to contribute to increased recruitment to STEM- subjects both at the certificate level, the trade school, College and University level.

TECHin offers courses to the teachers that show the practical applications of STEM-related objectives in the curriculum. The courses demonstrate that STEM related topics are subjects for the future and an important precondition for meeting key challenges in the society.

We have clear evidence that the project have given teachers and students a necessary framework for quality and practical approach to learning in **Technology and design**, and that young people now are more likely to choose STEM subjects (See page 8).

Partnership mission, goals and objectives.

The main mission with this project is to make sure that our enterprises in the future will have better access to employees with necessary skills in STEM-subjects, **and our idea is that the teacher is the key.**

The goal is to enhance the competence for teachers in STEM subject by developing and offering courses to teachers in six different regions in Norway. The teaching resources can be transferred directly to the teachers' classrooms with minor adjustments. They contain practical activities that show the relevance of STEM-subjects and its application into the real world of work. Examples of courses are: Carpentry/building a model house/a tower/a bridge, Mechanical toy (gears, pulleys, hydraulics), Chemistry (cosmetics), Electro installing in model flat, El-driven car/boat, Electronic devices (battery tester/LED-projects, alarm with transistor,) ++. **These courses will thereby give the pupils a unique introduction to a wide specter of occupations, and will therefore also be an important framework for future choice of educations and carriers.**

The clue to our success is that the selection of courses is based on the Norwegian national curriculum and corresponds to the need of the schools and their teachers. It is not routed in the stakeholders' special needs; however the content would be mostly the same.

Surveys indicate that we have succeeded. The teachers attending our courses report that the teachers themselves *and* their own students became very motivated by the practical scope and relevance and that they have few problems in understanding and performing the different activities.

Stakeholders

Employers and working life organizations

Confederation of Norwegian Enterprise (NHO)

Norwegian Technology

Norwegian Oil Industry Association

Norwegian Construction Industry

Norwegian Public Road Administration

Norwegian Railway Administration

Employees organizations

The Norwegian Society of Graduate Technical and Scientific Professionals (Tekna)

The Norwegian Society of Engineers and Technologists (NITO)

Educational Institution

Norwegian University of Technology and Science (NTNU)

Governmental institutions

Norwegian Centre for Science Education

Norwegian Centre for Education in Mathematics

Norwegian Centre for Education in Arts and Culture

Degree of stakeholder interaction and shared responsibilities.

All the organizations listed above have earlier made their own efforts to solve the challenge of the lack of interest for STEM subject in Norwegian schools. Conferences, different courses and school competitions have been arranged in order to solve the problem.

The idea of working together in a joint effort became tempting to us experiencing that we were doing very much the same – to a certain degree also in competition with each other. Together we experience more quality, less budget spending for each organization and lot more fun. We really enjoyed working together on this important issue. It has shown to be a good grasp to have The National Centre of Science Education secretariat as a door opener to the schools. This was difficult for the single partners earlier.

Instead of 12 budgets, 12 reports, 12 course concepts etc., we now have one common concept and achieve far better.

Achievements and evidence of the partnership's impact

About 1000 teachers have participated in our courses. About 15 different courses/teaching resources have been developed and tested. The feedback from the teachers has been overwhelmingly encouraging – both during the courses and in the written reports, e-mails etc. after the courses.

Substantial Evaluation:

All the courses have been evaluated. Figure 1 compares 6 different courses in different regions. The question is: **“Do you feel competent to perform the activities with your pupils?” 93.1% answered yes.**

Figure 1:



To check if the teachers have started TOD project we also did a questionnaire approximately one year after the cours(es).

Figure 2 show that two out of three teachers actually used the activities to inspire the pupils in TOD.

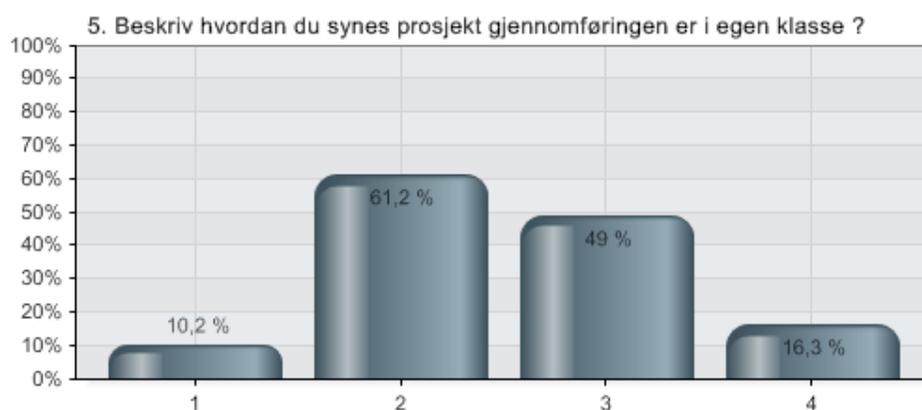
Figure 2:



74,6% of the teachers answered that they have started technology and design project with their class(es) and 25,6% had not started within one year after a course.

Figure 3 shows how the teachers experienced the performance with their own students.

Figure 3:



1: Difficult 10,2 % 2: Inspiring 61,2 %
 3: Demanding more focus and preparation compared to "regular" teaching 49,0 %
 4: Other 16,3 %

(teachers could choose several alternatives)

Anecdotal evidence:

The courses normally lasted for two days and staff at the conference centre said they had never experienced a course where teachers spent so little time on breaks and meals. They had no time for coffee breaks and everything else that could delay building of the bridge, making the cosmetic products, building the house and all the other courses.

We have also experienced a whole group of participants, *after* dinner, returned to the workshop to go further with their project, - instead of small talk in the bar!

Innovation of the partnership.

The uniqueness of this partnership program is that every organization, that has prior spent time and resources in an effort to stimulate youngsters' interest for STEM related subjects, have decided to work together in one program.

First it has given a far better education for the pupils and teachers. In addition we have shaped a Learning Network among the stakeholders of substantial value.

We learn from each other while learning the teachers and the students.

It is easy to see the advantage of such collaboration to integrate twelve different approaches to this kind of work, however, needs an innovative approach to partnership.

Actual and potential sustainability of the partnership

The impact on the students and the teachers and the experience of a learning network is the best guarantee for the future of this program. We save resources and time and have much more inspiring time working on this important issue of inspiring youngsters for STEM-related issues.

Positive change - current and potential

There has been a positive trend in recruitment to STEM subjects since this program have started. The positive trend from 2010 to 2011 is very encouraging (see table below). It is always difficult to see the impact of this single program in a society were youngsters are influenced by so many things at the same time. There have also been other projects for enhancing recruitment. But since this is the most comprehensive non-governmental

program in Norway related to this special challenge we would like to think that we have been an important contributor to the positive change in the statistics.

The number of final candidates in all three STEM-areas, master of technology, mathematical-natural science subjects and three-year engineer, is the highest in decades. For the first time the figure of over 6,000 completed candidates.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Three-year engineering	1966	1 948	1 772	1 940	1 932	1 837	1 577	1 625	1 850	1 923	2 052
Math-nature science subjects	2028	1 531	1 222	1 888	2 055	2 124	2 036	1 950	2 007	1 993	2 284
Technology (essentially the master)	1586	1361	1470	1560	1580	1522	1582	1430	1448	1482	1720
TOTAL	5 695	4 840	5 364	5 388	5 567	5 483	5 195	5 005	5 305	5 398	6 056

The list is drawn up by *the Ministry of knowledge* based on numbers from the Database of statistics.

Benefits to students, business, educators, and other stakeholders.

- This is really a win-win situation. The increased motivation among the students and the educators are really a rewarding observation for the stakeholders and the business some of us represent.
- Increased motivation for students and educators for STEM-subjects.
- Positive development in recruitment to STEM.

Benefits that we all appreciate: Network building through a transition from competition to cooperation among the participating stakeholders.

Ability to be used as a model

There are two main reasons why we feel that our program could be successfully transferred as a model to other countries.

1. Many countries experience shortage of recruitment to the STEM area.
2. Other countries have (more or less) the same organizations and interest groups as in Norway and could therefore form a similar project, like our TECHin.

Any additional information you would like to share

A successful program always has to improve and revise the concept of the project in order to make it more successful in the future. We have therefore new plans for 2012-2015 with emphasize on spreading the project to new groups and institutions. These plans are described below.

TECHin now make our teaching resources on technology available for most schools by gathering all the topics in a special issue of the journal to the Norwegian Centre of Science Education. In addition there will be lots of themes and further links on our web site.

Cooperation with a few teacher training colleges. We have also started to help implementing/enhance technology in their program. We have started with a one-week-project on technology for 30 teacher students at The University College of Oslo. The report from this project will be distributed to the other university colleges in the country.