



Swiss
nano-cube®

Study to determine the demand for a national information and learning platform on micro- and nanotechnologies for vocational, secondary and higher professional schools

Management Summary

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Study Goals and Approach

The aim of the „Swiss Nano-Cube“ project is to develop and implement a **national information and learning platform dedicated to the topics of micro- and nanotechnologies (M&NT)** designed for educational use at vocational schools, secondary schools and higher professional schools.

In order to determine the status quo, the significance and the demand for teaching aids and learning materials regarding the topic of micro- and nanotechnologies at the target schools, **a widespread survey was carried out among teachers, headmasters and head officials of vocational and secondary schools as well as among various associations and business companies in autumn 2008.** This study aimed at determining any basic demand as well as possible contents and methodical approaches for a M&NT-project in the area of education. The survey was carried out between September and November 2008 using electronic surveys, telephone interviews and face to face interviews. **354** teachers from the area of technical and natural sciences and **24** directors of cantonal vocational and secondary school organisations were interviewed. Additionally, numerous business companies and associations were also involved in the study. The **response rate** among teachers and headmasters accounted for **38%** while among the interviewed federal educational departments **83% responded.**

Results

Micro- and nanotechnologies in school education: relevant, but not yet widespread.

The topic of micro- and nanotechnologies was rated to be **relevant** for education at vocational and secondary schools. The majority of the interviewed teachers, headmasters and head officials of vocational and secondary school organisations indicated interest in the subject area of M&NT and supported a deepened discussion of these issues during school education. **85%** of the interviewed teachers and headmasters welcomed the introduction of teaching aids and learning materials to cover the subject area of micro- and nanotechnologies, as the future is expected to bring about a clearly increased importance of these technologies in practice. In certain occupational fields they are already considered as actual technologies of the future (e.g. MEM).

Despite their increasing importance, micro- and nanotechnologies do are currently not adequately represented in school education, according to respondents of the survey. On the one hand this is attributed to the nonexistence of appropriate **teaching aids and background information** for teachers, but on the other hand these topics are neither considered in education and advanced training of teachers.

During school lessons, in most cases there is not much time available to discuss topics which are not part of the classic lesson plan. Due to this reason, topics concerning micro- and nanotechnologies should rather be designed in a way that they can be included in the context of the existing natural sciences and technology education (physics, chemistry, materials science, manufacturing, electronics, etc.) and that they could above all be explained using practical examples. The **suggestion to develop an information and learning platform** and to introduce specific teaching aids in the field of M&NT was welcomed from the **majority** of teachers, headmasters, head officials of vocational and secondary school organisations and industry representatives.

Lack of network, availability and coordination are the main problems

While some cantonal schools as well as some professional organisations and business companies have already made first efforts to promote the introduction of micro- and nanotechnologies in school education, such activities remain rather fragmentary, are not part of a superordinate master plan and are not cross-linked among each other or open to the public.

Teachers and headmasters expressed a need for instructional materials to be used in classes (such as scripts or presentations) and also for the practical experiments. Besides this, e-Learning modules, excursions and advanced training courses for teachers have been requested most.

The first experiences which have been gained in the canton of St.Gallen using a novel “Nano Laboratory” at a vocational school and an advanced training module for secondary school teachers („TEACH-NANO”) were positive and promising. Some of the interviewed experts suggested to make this service available for a broader audience on Swiss-wide scale using a platform. However, currently a corresponding platform which would permit a broad and comprehensive adoption of such materials and activities is still missing

Conclusion

Interest and support for Swiss Nano-Cube by schools, organisations and public authorities

Nanotechnology is a cross-sectional set of technologies and therefore occurs in many industries and products. This trend will even be amplified during the next years and micro- and nanotechnologies (M&NT) will be increasingly important for several occupational fields (industry, commerce, finance, insurance, regulation and jurisdiction etc.)

The comprehensive survey carried out among schools, teachers and headmasters of vocational and secondary school as well as professional organisations and business companies has revealed that a clear need for action exists regarding M&NT in several fields of the professional education. The Swiss Nano-Cube project therefore attracts interest and broad support among schools, professional organisations, industries and public authorities. In fact, five vocational and secondary schools are involved in the project as pilot schools which will assure its practicability. Besides economy, authorities and policy representatives, the project advisory board also encompasses renowned experts from education. The composition of the advisory board underlines the importance of the topic of M&NT for the research and innovation site of Switzerland.

The Swiss Nano-Cube project therefore pursues a goal which is of utmost importance for an education and technology dependent country such as Switzerland. By developing and implementing a platform which is focusing on M&NT, cross-linking of existing structures will be fostered and the development of demand-oriented learning modules for M&NT will be supported. Swiss Nano-Cube, its web-based platform and the different modules will contribute to fulfil the needs for practice-oriented and diverse learning materials in natural sciences in Switzerland.

Outlook

„Swiss Nano-Cube“ will be developed and implemented within the next 2 ½ years covering all Switzerland. The development will be led by the Innovation Society Ltd. (St.Gallen) in cooperation with the Swiss Federal Institute for Vocational Education and Training SFIVET (Berne), also involving authorities, schools, business companies and professional organisations.

The project will be launched in July 2009 and will last for 30 months. After development and implementation, the national information and learning platform will be maintained and adapted according to the current teachers’ and students’ needs by the Innovation Society and SFIVET.

The Swiss Federal Office for professional Education and Technology (OPET) supports financially, in the context of the promotion of the professional education strategy, the development and implementation of the Swiss Nano-Cube project. In addition, further funds will be raised from sponsors.