Planning a New Technology Education Center in Finland
An Investigation of the Need for Systematic In-Service Training Activities on Technology Education.

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Background

Finnish general education curriculum does not properly take in to account the meaning and importance of human-made environment developed on the basis of our own needs, wants and purposes. Thus, children in the schools are not systematically made aware of technology around us. Although there are some elements of technology in a Finnish school subject [*käsityö] educational handicraft (practically the subject is divided in to "tekninen työ" (technical work) and "tekstiilityö" (textile work), as well as in recent teaching materials in primary environmental/science education, they constitute quite narrow perspective to human made environment as a whole thing. Actually, it is quite difficult to "harness" technology to be taught within just one of the current school subjects in a Finnish curriculum. This view is in accordance with Black & Harrison (1985, p.3): "Technology is thus an essential part of human culture because it is concerned with the achievement of a wide range of human purposes" and also with Hacker & Barden (1988, p.21): Our biological needs for food and medical assistance, our physical needs for clothing, shelter, and manufactured products, and our need to communicate information are all satisfied through technological means".

Lindh (1997, p.133) writes: "The aim of Technology Education is that pupils could be more able to understand the logic and functional mechanism of "everyday" technology and can solve technological problems applying technological knowledge and skills they have got."

In Finland technology education is still in the phase of development. According to Alamäki (1999, p. 157): "technology education as a school subject is still seeking its final shape and value." However, recently substantial and valuable work has been done to develop Finnish "käsityö" (especially in "tekninen työ") towards the notion of technology education. In this development especially teachers who teach the subject in secondary (grades 7-9) school have been a target group.

Also some other perspectives to technology education have been taken; there have been and still are examples of technology education accomplished through multidisciplinary approach. This approach has been taken place especially in the context of primary schools (grades 1-6) where the teachers are mainly class teachers.

In Finland there have also been endeavors to develop teaching of mathematics and science in order to increase children's interests on those subject areas. So called "Luma"- project has been initialized by National Board of Education and it has been carried out for several years now

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* Could somehow be translated to "Educational Handicrafts". However, there is no direct English equivalent to "käsityö", but it implies a combination of crafts, design and technology (Alamäki, 1999, p. 14)

(http://www.edu.fi/projektit/luma/). However, the results of the "Luma" seems not to be as good as was expected at the first place. Recently, there has been more discussion about the possibilities for increased collaboration between the developers of technology education and mathematical-scientific subject (Pekkarinen, 2000).

In spite of above mentioned activities, wide range of schools are still not comprehensively and on a wide plane committed to technology education. Actually, the question is, how the teachers can carry out technology education if they do not know what it is about and why they should teach it, since there are no direct requirements in curriculum to teach *about* and *through* technology in the school. This question is relevant both from the viewpoint of secondary school subject teachers as well as primary school class teachers. According to the experiences, term "technology education" [teknologiakasvatus] conjures usually very narrow perspectives and confusion (like; " technology education…yes!…our students are using internet daily" or; "technology education…no!…we haven't got enough computers in our school…so how we can do it?").

However, for example environmental education has got a widely agreeable status in a Finnish general education curriculum. It is seen important to know about the surrounding nature and the relationship of man and nature in the terms of appreciation and caring. Interestingly, in recent environmental/science education teaching materials there is also some contents of technology, for example the principle of combustion engine is introduced (Aho et al., 1995). From the viewpoint of comprehensive technology education this can be regarded only as a marginal and not satisfactory solution. Considering the meaning of the environment we have made by ourselves it is actually rather surprising how little attention it has got from the viewpoint of curriculum development.

Due to the latest development in a Finnish core curriculum, guidelines are quite loose providing only a brief framework. Schools are more flexible to orientate their contents, practices and aims in a desired way. Consequently, there are rather good opportunities to develop and carry out technology through multidisciplinary approach. As was written above, several technology education activities in primary schools have been accomplished through technology oriented teaching across several school subjects (for example Järvinen & Hiltunen, 1999; Järvinen & Twyford, 2000; http://koklweb1.oulu.fi/kytke2005/visiteng.htm). This multidisciplinary approach could be developed to a more systematic and established teaching of technology. Actually, following idea of technology education center is aimed to introduce technology education, not just for educational handicraft and mathematical-scientific subject teachers in secondary schools, but also for class teachers in primary education who are willing to orientate their teaching, through multidisciplinary approach, towards the idea of technology education.

Planning a new technology education center

Above mentioned issued were in an influential role when the idea of technology education center surfaced at the first place. Various interest groups and institutions decided to finance a comprehensive one year project research (from September 1, 1999 to August 31, 2000) on the idea. Among the financiers are Oulu University Outreach, TEKES (National Technology Agency), Central Ostrobothnia Polytechnic Ylivieska Institute of Technology as well as regional consortiums of townships and municipalities in the Oulu South area.

The idea of the center is banked on current loose curriculum guidelines enabling the schools to orientate teaching methods and contents according to their preferences. If the teachers can be assured about the significance of technology education and properly supported in teaching it, they could be key persons and active agents in the field schools. But, what the teachers need to have is a kind of

"empowerment" experience and interest, even enthusiasm on teaching technology. The teachers need to be given tools to think as well as tools to teach technology and they have to be supported at the beginning and along the way in their technology teaching. Moreover, when the teachers have understood and internalized the idea of technology education they could transfer the idea to the children.

Among the questions raised during the project research process are: what kind of equipment and learning materials technology education center should have?, What kind of technology education in-service courses it should develop and deliver?, How the center can effectively support teachers teaching technology?

University Outreach-project aims to introduce Oulu University activities mainly within the Oulu region/county. The board meeting of the University outreach-project (rector of Oulu University Lauri Lajunen is a chairman of the board) has decided that its Ylivieska office (about 100 km south of Oulu) will be emphasizing on general technology education. Thus, the technology education center is planned to be located in Ylivieska. However, it aims to be nationwide, even international in its activities. In the near vicinity of the center is Central Ostrobothnia Polytechnic Ylivieska Institute of Technology. University Outreach is a link between University of Oulu and local know-how at Ylivieska.

Since University of Oulu is the only University in Finland having Faculty of *Technology* and Faculty of *Education* with Technology-oriented class-teacher education program within the same University, there are good opportunities to collaborate in the development of technology education. Actually, there have already been joint research activities on general (not vocational!) technology education (see Järvinen & Hiltunen, 1999) and other collaboration among the students of both faculties as well. Also, contacts have been made to the Oulu University Design and Art Studies Laboratory, as well as to the Faculty of Science. This collaboration can be beneficial also from the viewpoint of the planned technology education center.

In this stage of the planning the roles of the technology education center can be stated as follows:

The technology education center will be:

- A learning environment with appropriate materials, equipment and classroom solutions for technology education

   In above the children could be introduced to a wide range of technology. They can also experiment, design and construct technology. The pedagogical approach would enable the children to solve problems, as much as possible, raising from their own living environment. Thus, the children can experience technology as being a response to the human needs, wants and purposes (Hacker & Barden, 1988).

- A center for organizing systematic in-service training activities in technology education

   In-service training courses are planned to be in an essential role in the center. The teachers are delivered information both of appropriate methods and also contents in technology education. The courses are to be held partly in the center, but also in the field schools around the country. In this way the activities are not just centralized, but spread to the wider area. This is also in accordance with the idea of University Outreach-project.

- A technology education teaching materials and equipment "bank"

The schools can loan and/or rent materials and equipment they would not be able to purchase by themselves. In here the emphasis would be especially on relatively expensive learning environments like Unistep/Unilab, Economatics, Kne'x, Lego Dacta, etc. The idea is that most of the materials and equipment could be on the use of the field schools. In order to loan/rent these materials and equipment the teachers should be, firstly, properly introduced to the idea of technology education, and secondly, trained to the appropriate use of the materials and equipment in question.

- A contributor for technology education curriculum development

Firstly, there should not be any kind of educational center (especially when relatively new subject, as technology education still is, is in the focus) if there is not, in advance, proper understanding of *why* to teach, *what* to teach, *how* to teach. In this regard technology education curriculum development is essential from the viewpoint of the planned center itself.

Secondly, it has be noted that the National Board of Education is still a main authority for the curriculum development. In practice this means that the NBE establishes the basis for Finnish general education curriculum. However, as written earlier, guidelines are quite loose enabling the schools to orientate their teaching quite much according to the chosen emphasis. If the emphasis is in teaching technology, the center's know-how in technology education curriculum can be used on behalf of the endeavors.

- A center to support networking among teachers interested on teaching technology

What is also needed is nationwide, even international collaboration between technology teachers. The center will be supporting networking between the teachers in terms of sharing ideas, information through modern www-based environments. There has already been a small-scale web-based collaboration between some Finnish and English teachers. (see Järvinen & Twyford, 1999) With the help of the center it could be extended.

- A place to arrange seminars on technology education as well as excursions and journeys to the industry and related institutions.

And as a last but not the least thing, the center will be…

- A technology park open to the public

In above the emphasis will be especially on creating an interactive technology park (not science museum or center in a traditional sense) which would enable the children to explore the meaning and importance of everyday technology, but also to get a grasp of the possibilities of modern technology. Moreover, increasing the children's understanding about technology is important (as it is in the whole idea). This comes very close to the notion of "technological literacy" (see Dyrenfurth, 1991) In this regard the aims are quite much in accordance with the aims of "House of Technology" located in the University of Luleå, Sweden:

"Do you want to know more about technology of every day life? Are you anxious to discover how things really work?…Teknikens Hus ["House of Technology"] works with school and pre-school, complementing school education and inspiring teachers and pupils to experiment with science and technology…to give insights into modern technology. By focusing on interactive methods the activities reach a wide audience and increases public interest and feeling for both technology and science. Activities include exhibits, experimental classes for schools, pre- and in-service teacher training and public programmes."

(http://www.luth.se/th/english/index.html**)**

Since Oulu and Luleå Universities (only about 400km apart) have already signed up a collaboration agreement on several areas of science and research, similar procedures between the project reported herein and Luleå "House of Technology" are to be considered in the near future. Actually, initial contacts and visits have been already made.

Present situation

At the moment we are in the phase of gathering data from the teachers. About fifty teachers (including pre-primary-, primary-, secondary and high school teachers) have been informed about the idea of the multidisciplinary approach to technology education and also about the above presented idea of technology education center. The teachers were delivered a questionnaire where their attitudes to technology education in general and technology education center were surveyed. Also, the teachers were asked to indicate their interest to sketched in-service training courses on technology education. During April and May 2000, similar data gathering will be extended to at least twenty more teachers.

Preliminary analysis shows quite a positive attitude towards technology education. Quite many of the teachers who have been thinking that technology education is only about computers and other high-technology or just "modernized educational handicraft", seemed to change their minds towards wider understanding of technology and technology education. If this phenomena can be confirmed in more detailed analysis it will be a fruitful and sound basis for the development of the center. Interestingly, in their answers some secondary education subject teachers on mathematics and science criticized above mentioned "Luma"-project as not been very helpful in increasing students' interests on those school subjects.

During the first week of May 2000 an international technology education seminar will be arranged. The purpose of the seminar is to support the development of technology education in practice in Finland, as well as to contribute to the planning of the technology education center through brainstorming workshop. The venue for the seminar will be both in Oulu University and Ylivieska Institute of Technology. Also, prior to the brainstorming day, a visit will be made to the Luleå "House of Technology in order to acquire food for thought for a brainstorming workshop.

The rest of the time reserved for the project research is going to be used on completing the plans. During the Fall term 2000 decisions will be made about the establishment of the center. Also, proceedings of the above mentioned seminar will be edited. Investments like building and equipping the center are to be completed during two-three year period of time. However, during the winter term 2000-2001 first in-service training courses will be planned and carried out. The data which is currently collected from the teachers will be used as a guidance in planning the courses.

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