

Teacher Training in Technological Education in Finland

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As in many countries, technology education in Finland is still in the early stages of a long term development process. Changing the subjects in the school curriculum needs a lot of time (APP 1).

The name now used for technologically oriented subjects now in Finland is 'Technical Work'. At the moment it is a part of 'Crafts education'. The appropriate strategy might be to talk about 'technological education' in order to activate more than just the craft teachers.

Turku University, Rauma Teacher Training Department, has had a monopoly in Technical Work subject teacher training. It has been done there for about 35 years. The tradition of training is craft-based but the influence of new technology has been realized for years. Also the old emphasis on electricity and machines has naturally brought in electronics and control technology.

Helsinki University has Textile Work teacher training. Added to that, **Joensuu University, Savonlinna Teacher Training Department**, has the Home Economics training covering also Textile Work. Training in Helsinki had already begun about 130 years ago.

Oulu University is a newcomer in this field. In 1992 Oulu University was permitted by the Ministry of Education to start 'exceptional subject teacher training in Technical Work' because of the regional lack of teachers in Northern Finland. Actually initiatives were proposed many times to Rauma TTD but without result. In 1991 The National Board of General Education presented a new initiative to the Ministry of Education, and Oulu was permitted to organize training. At the same time, however, Rauma increased its intake from the normal 24 to 35.

A new type of Technology Teacher Education will begin in Oulu in 1996. 20

primary level class teachers will have the opportunity to study Technology Education for 35 credits (study weeks) as a second subject. This will enable him/her to teach TE at the higher comprehensive and senior secondary school levels, although not as a full-time subject teacher (APP. 2). Oulu has good facilities and infrastructure for new training; the University has Faculties of both Education and Technology under the same roof which makes it the only University in Finland with such an arrangement.

All primary level class teachers in Finland traditionally get brief training either in Technical Work or Textile Work. Teaching vacancies in the schools are normally arranged with an obligation to teach in one of these two subject areas.

Recent Developments

In 1971-1991 there was a steady development trend from Crafts to Technology Education. During that time The National Board of General Education wrote the curricula for the schools and was responsible for In-Service teacher training.

In 1979 a paper for a new subject, 'Technology and Education for Work', was written under a committee for reforming senior secondary education. It was, however, not realized as such, but technology was included in Science education. That brought about a significant development in Science Education; industrial visits, pedagogical versatility, etc.

In 1991, as the last working group before the dismantling of the office, the National Board drew up a plan for introducing Technology Education. It was a late innovation when compared to world mainstream development. However, a substantial number of the relevant innovations in content in technological education had already been made during the preceding 20 years; e.g. launching electronics and computers in the school. The group also proposed 'Technology' as a new school subject.

In 1992 a working group at the Ministry of Education wrote 'Guidelines for the Weekly Periods' as a curriculum blue paper. The trend was changed. The report emphasized the old Craft content again. "Technology" as a new term was discussed in the paper but criticized as being too theoretical, so that it would not be practical enough to replace Crafts. Also there were some interest groups in the country, which wanted to retain Crafts. Another proposal was 'Design and Crafts', which, however, was not approved, e.g. by the teachers' pedagogical organizations.

In 1994 the new National Board of Education published the curricula for the comprehensive and senior secondary schools. Technology was highly valued as a basis for education at both school levels and in the different subject contexts, but it was not approved as a new name for the subject. However, the newly introduced

model represented a new type of curricular thinking, giving quite a lot of freedom to municipalities and schools to write their own curricula and to develop new integrated subjects and options. For this reason it is much more possible today to offer Technology as a school subject. Some primary, junior secondary and senior secondary schools have actually implemented this.

So, in Finland both international innovative trends in 'New Crafts', Technology and Design, have been tried. They have been adopted, even if the name of the subject has been kept as it was 130 years ago. We can say, that the technological development of the country is hidden in the curriculum in Finland.

Science and Maths

In Science Education the main interest in the 1980's was in pedagogical development. Science teachers have traditionally been academically trained scientists and mathematicians with not much experience in pedagogics. When the teacher training system was reformed, there was the need for In-Service training of the already existing teachers.

Science personnel at the Helsinki University Teacher Training Department worked in close collaboration with the appropriate school authorities. Also the UNESCO INISTE exercised a strong influence in modernizing the subject. Iniste also had an idea for introducing technology education. Since the initiators of the new activity were scientists, the influence did not reach the real technology educators. Nevertheless, technology was introduced to make basic Science education more versatile, practical and motivating.

At Joensuu University in 1989 Jorma Enkenberg wrote his doctorate on children's scientific thinking. He has recently, with his colleague Mr. Lakotieva introduced Lego/Logo for technological education. The original idea for that was introduced at an In-Service teacher training course in 1986 organized by the National Board. Then the Lego Automatic series was introduced for the first time in the country, in a course in which Mr. Lakotieva participated. Enkenberg has also researched the "Apprentice Method" in Science and Technology Education. Undoubtedly it has one of its origins in traditional Work Education.

At Helsinki University a productive Science Education research group has been founded around Professor Meisalo, in the Faculty of Education. Jauhiainen, Lavonen and Kuitunen have achieved doctorates within six months; Jauhiainen in general In-Service teacher training strategies; Lavonen in designing EMPIRICA, a computer-based measuring unit for Science Education; Kuitunen in innovation strategy in FINISTE. Sahlberg will attain his doctorate at Jyväskylä University in May 1996 in In-Service training strategies.

Professor Kurki-Suonio of the Physics Department at Helsinki University has recently begun to write about two interrelated areas in Science Education; (1) Didactics (pedagogy) of Physics; and (2) Didactical (pedagogical) Physics. In the case of the latter some kinds of technological applications may be involved.

Mathematics has not been very progressive in the last 10 years. In the 1970's the New Math's Movement naturally was adopted also in Finland. As elsewhere it was gradually and silently removed. However, nothing has been brought in to replace it. The textbooks have been practically the same during the period 1970-96. There has been some private pedagogical development activity. (Haapasalo in Jyväskylä).

In-Service Teacher Training

At the moment there is no longer any centralized In-Service teacher training system in the country. The National Board has organized "Aquarium Schools" for launching different kinds of innovations. The annual conferences and exhibitions disseminate the good practices. In-Service training is taken care of by the regional In-Service training centers and paid for by the municipalities.

Generally, discussion on e.g. a **constructivist approach** is going on at the moment in the country. Its concern is with the whole school, but with special attention being given to the mathematical-scientific subjects.

The Future of Technology Education in Finland – A promising Future

- The new training scheme in Oulu has awakened interest in the other TTD's.
- There is a new interest in research in the area
- There is quite a high commercial interest in the country to bring Lego/Logo to schools, even though it was already tried ten years ago. Some Science educators especially tend to think that Technology Education only means the use of Lego/Logo or increasing the amount of equipment. A CD-Rom is also in the pipeline for inclusion in Lego/Logo to be delivered to all Primary Schools (most of which do not have the facilities...). Nevertheless, Oulu University also has a research project being carried out at the moment on Lego/Logo (Esa-Matti Järvinen).
- Founding a national Technology Education Society was planned in Jyväskylä in October 1995 and will be founded in June 1996.

- New teaching materials have just been published, e.g.: – a kit and a textbook for electronics education supported by NOKIA, ICL and ABB; – a series of constructional kits, the first one being 'Hydrocopter'; – 'EMPIRICA', a computer-based measuring unit for Science education.
- Some international and national meetings and conferences have been organized, e.g. Heinola in 1989 and 1991, Jyväskylä in 1995 and 1996, Oulu in 1996, and Finns have been introducing innovations abroad, e.g. in PATT in the Netherlands in 1986–1995, in UNESCO and in OECD in different contexts, in WOCATE in Weimar 1992 and Paris 1993, in Israel 1996.

As a new approach there is some interest at the moment in introducing teachers' collaboration. It will also mean the integration of subjects. Attached you will find a form to be filled by the teachers in order to discover possible areas of integration so as to motivate them towards cooperation (APP. 3).