

This item was submitted to Loughborough's Research Repository by the author. Items in Figshare are protected by copyright, with all rights reserved, unless otherwise indicated.

On the development of education in technology and entrepreneurship in Finland: the KYTKE 2005 Project as an example

PLEASE CITE THE PUBLISHED VERSION

PUBLISHER

© Loughborough University

LICENCE

CC BY-NC-ND 4.0

REPOSITORY RECORD

Santakallio, Esa. 2019. "On the Development of Education in Technology and Entrepreneurship in Finland: The KYTKE 2005 Project as an Example". figshare. https://hdl.handle.net/2134/1435.



This item was submitted to Loughborough's Institutional Repository by the author and is made available under the following Creative Commons Licence conditions.

COMMONS DEED
Attribution-NonCommercial-NoDerivs 2.5
You are free:
 to copy, distribute, display, and perform the work
Under the following conditions:
Attribution . You must attribute the work in the manner specified by the author or licensor.
Noncommercial. You may not use this work for commercial purposes.
No Derivative Works. You may not alter, transform, or build upon this work.
 For any reuse or distribution, you must make clear to others the license terms of this work
 Any of these conditions can be waived if you get permission from the copyright holder.
Your fair use and other rights are in no way affected by the above.
This is a human-readable summary of the Legal Code (the full license).
Disclaimer 🖵

For the full text of this licence, please go to: http://creativecommons.org/licenses/by-nc-nd/2.5/

On the development of education in technology and entrepreneurship in Finland: the KYTKE 2005 Project as an example

Esa Santakallio

Department of Teacher Education, University of Oulu, Finland

Abstract

Technology and entrepreneurship are new fields of general education within the Finnish school system, and as such do not yet have any official status as school subjects. The development of these fields is nevertheless strongly supported by both international and national educational strategies, the most significant of the latter being the programme of action launched by the Ministry of Education under the title "Finland into the Information Society". Currently the most extensive project in Finland aimed at developing education in technology and entrepreneurship is KYTKE 2005. The project began in 1997 and is being financed by the Ministry of Education and the European Social Fund.

This paper will provide a description of the goals of the project, its content and the evaluation system to be used and examine the results of the first interim evaluation of the impact of the project on the work of schools and their teachers, carried out at the beginning of 1998.

1 Points of departure in the KYTKE 2005 project

The KYTKE 2005 project, which is currently the most extensive entrepreneurship and technology education development project in Finland, aims at meeting the national and international education policy challenges presented in Figure 1. Launched in 1997 and to be completed by the end of 1999, the project is coordinated jointly by the Kajaani





Department of Teacher Education, and the Department of Industrial Economics and Entrepreneurship, within the Faculty of Technology, both part of the University of Oulu.

The project is funded by the Ministry of Education and the European Social Fund. It is part of the European Union Objective 6 Programme for developing extremely sparsely populated areas.

The project is targeted on the Province of Kainuu in Eastern Finland. The province is almost the size of Belgium, with forests covering over 90% of its surface area. It has a population of some 92,000 persons distributed between ten local government districts, with a population density of 1-4 persons/km² \leq .

2 Project aims

The overall aims of the project are a) to utilise the skills of the agents for change (pilot group of teachers and teacher trainees) in entrepreneurship, technology and telematics in local enterprises and business, b) to consult enterprises and the business sector in their training and c) to use entrepreneurship and technology expertise as an aid to promoting future employment in the target group.

Concrete aims

- 1 To organise lectures, distant and multi-form studies in order to provide each local government district in Kainuu with a teacher capable of a) developing telematic connections in the school, b) planning, drawing up and implementing schoolspecific entrepreneurship and technology education curricula c) acting as entrepreneurship agents.
- 2 To create a network of entrepreneurship agents which will act as a link between schools, enterprises and the business sector in Kainuu.
- 3 To promote employment and further education among teachers and student teachers by improving their modern technology reading and utilisation skills and their knowledge of business sector policies.
- 4 To offer telecommunication services planning and user support to the

collaborating companies in the form of WWW services and multimedia products in order to promote the marketing and sales of products and services.

5 To produce systematic quantitative and qualitative data on project effectiveness and the achievement of aims and to report on these both nationally and internationally.

An attempt will be made to draw up and implement the first versions of entrepreneurship and technology education curricula in the project schools by the year 2000. These will be drawn up in close cooperation with the local enterprises and the business sector.

3 Project target group and practical implementation

The target group of the KYTKE 2005 project are teachers in general education, teacher trainees and indirectly the entrepreneurs of Kainuu. Some 350 persons will have participated in the project by the year 2000.

The basic functional element of project in school level is indicated in Figure 2.



Figure 2 Functional context of the KYTKE 2005 project in school level

The trainee school teacher in the project denotes a change agent responsible for acting as a link between education, enterprises and the business sector in his local government district. He will also establish and develop forms of cooperation between local companies, the business sector and educational establishments, including production technology modelling projects or information technology projects implemented using for example the LegoDacta or Easy student learning environments. This cooperation will render the companies as an element of the learning environment at schools, the expertise of which will be exploited in drawing up entrepreneurship and technology education curricula in them. Schools are here regarded as learning organisations which follow changes taking place in educational policies and society and adjust their operation accordingly. The students are regarded as subjects of technology education and implementors of learning projects who will learn everyday technology reading skills and an entrepreneurship-oriented attitude towards life as part of their studies.

The project comprises four main entities:

- a recruitment of teachers and students into the project
- b training
- c school-specific student projects implemented by the pilot persons and launching of cooperation with enterprises
- d drawing up of curricula and their implementation on the basis of experiences gained in student projects.

Teachers and student teachers differ in terms of their education. The project provides student teachers with training connected with information technology, telematics and the use of technology education appliance environments in teaching.

Training in process engineering and electronic appliance environments (1-3 credit units) will be provided at the Kajaani Department of Teacher Education for 180 students in 1998 as part of the technology education scheme. This will introduce the student to the Putte robot intended for preliminary and elementary instruction, the LecoDacta for the teaching of control technology, a basic electricity set, the UniStep for the teaching of electronic systems design and the Easy and TacTic construction set for automation teaching. In future, these study modules will be completed by all students of the Kajaani Department of Teacher Education. In addition, 21 student teachers will complete 6.5 credit units of secondary studies in teaching and education technology from a total of 15 credit units.

Trainee school teachers were recruited for the project at two stages. The first recruitment round was completed in February 1997 at which point written commitments were obtained from a total of 37 teachers in all the ten local government districts in Kainuu. They represent 34 schools of which 22 are primary schools, eight lower secondary schools and four upper secondary schools. Another set of recruitments was completed at the end of 1997, at which point 22 new teachers entered the project.

The pilot teachers employed in the training schools undergo a training period of $11/_2$ -2 years the scope of which is 40 credit units. In practise, they receive approximately 20-30 credit units of supplementary education, as they have already completed some projectrelated studies before the project. The training of teachers recruited at the first stage commenced at the beginning of April 1997 and that of the later ones in January 1998. Of this, 3 credit units are devoted to project training, 15 to entrepreneurship education, 20 to technology education and 2 to pedagogic and curricula training. Entrepreneurship education, a total of 15 credit units, is provided in accordance with the degree requirements of the University of Oulu jointly with its Unit of Industrial Economy and Entrepreneurship. Its aims and content are illustrated in Figure 3, the entirety being attended by 34 pilot teachers.

The most extensive entirety in the project are studies in information technology and technology education, based on the technology education framework illustrated in

Entrepreneurship education framework							
General aims Development of knowledge and understanding of the different subdomains of entrepreneurship							
			Contents				
strategy an business administrati	d environment on	markets and customers	business plan	product	technologies	financial management	
	Individual		Context	Int	erested partie	s	
	Society Environment Enterprises						
Objectives set for entrepreneurship training Internalisation of entrepreneurship Needs and possibilities Interaction Networking							
Entrepreneurial lifestyle							
_							

Figure 3 Entrepreneurship education framework

Figure 4. The main emphasis is on planning, process, information and communications technology and electronics. The studies comprise an introduction to information technology, WWW and Internet training and instruction in the use of the E-mail and the Intranet, computer graphics, hypermedia and multimedia, and the use of new technology education appliance environments in teaching. The pilot teachers will be able to use these environments in teaching after completion of the technology education

items. The project also contains two credit units of pedagogical and curricula education.

4. KYTKE 2005 project evaluation system

The control system of the KYTKE 2005 project is based on an illuminative evaluation method which is indicated in Figure 5. It conceptualises the project into an inputprocess-output form on the basis of the project plan. The input aspects are factors connected with the use of resources and



Figure 4 Technology education framework



Figure 5 KYTKE 2005 project evaluation system

intended for launching processes at the level of the individual, schools and districts which are hoped to promote the achieving of the aims set in the project plan.

Criteria indicators and meters were drawn up for each evaluation system item with the aim of providing maximally detailed, reliable information on the situation with each pilot teacher/school at the moment of evaluation. Education-related evaluation data are collected by means of questionnaires after completion of each educational item. Monthly reports drawn up by the pilot teachers on the actual project activities are collected through the Intranet. Data are also collected through a regular annual questionnaire and a related thematic interview.

The data discussed in the current report were collected by means of a questionnaire handed over to the pilot teachers in January-March 1998 and through a supplementary thematic interview. Special attention in the first extensive evaluation was paid to project input factors and the launching of school-specific process factors. 94.6% of the questionnaires were returned. Only two upper secondary school teachers did not return it, having given up the project at the turn of the year due to a lack of time.

The three main functions of the thematic

interview were: a) to obtain reliable information on the attitudes, experiences and problems of each pilot teacher regarding the project, b) to get to know personally their operating environments and c) to guarantee the consultational nature of the interview.

The interview (n=61) was conducted by one person and it covered all pilot teachers except for one upper secondary school teacher. Interviews were mainly carried out on weekdays at the schools. They were also conducted with the headmasters/heads of the pilot schools, and in lower secondary schools with the actual pilot teachers and their deputies. Particular attention in the interview was paid to problems encountered in project implementation, the quality of project education, support received from the working community in project participation, the degree of networking in the schools and the type of their telematic connections.

5 Results from the first intermediate evaluation

An extensive supplementary education scheme was initiated for the pilot teachers in the first project year in accordance with the project plan. This was accompanied by the establishment of a project follow-up, supervision and control system, exploration of the needs and expectations of cooperation partners. Project information was disseminated to decision-makers in the local government districts attending the project, entrepreneurs and other interest groups. Special Intranet facilities were provided for the project on the server of the Kajaani Department of Teacher Education in order to create a new operative culture and to promote networking. The server is used to distribute project information, to train pilot teachers and to supervise, follow-up and control the project.

A network of 49 pilot teachers to be trained as change agents was set up in Kainuu during the first project year, which covers all the ten local government districts in the province. The network has already established close contacts with local enterprises and the business sector in three districts. At the level of individual schools, however, the visibility of the project has been poor, as expected, due to extensive project training. The actual student projects, which will cover several weeks and will be used as a basis for drawing up the related curricula, will be launched in the schools in 1998-1999.

The pilot teachers have committed themselves well to the project. Only six of them withdrew from it during the first project year. Of these, two temporarily employed ones obtained permanent posts outside Kainuu and four gave up the project due to difficulties in acquiring a substitute and to a lack of time. Of these, the upper secondary school mathematics teachers were replaced by new candidates recruited from the pilot schools, only two schools thus having had to give up the project so far.

As a rule, chief education officers, heads of schools, headmasters and teacher colleagues support the pilot teachers in their project work. In addition, parents and school boards have a positive attitude towards the project, though in five schools the regular absence of the pilot teacher and the simultaneous teaching cut-downs implemented by the local council endangered project participation, due to the massiveness of project training. The interviews conducted at the turn of the year fortunately enabled the problem to be solved through practical training undertaken by the students of the Kajaani Department of Teacher Education. The feedback obtained through interviews and questionnaires suggests that the respondents consider the project control system good. They have made surprisingly little use of the Intranet, however, and do not know how it could be used efficiently. They also consider the writing of monthly reports laborious, many of them not producing them at all. One reason for the unexpectedly little use of the Intranet is the insufficient telematic connections between the schools and pilot teachers. Five schools out of 34 lacked Internet connections completely, ten had optical-fibre connections while the rest relied on modem connections. All project participants will have access to Internet connections either at school or their homes in the course of spring 1998. The pilot teachers feel that the local councils have accelerated and increased network investments in schools attending the project.

The respondents considered technology education and project training good and comprehensive, even excellent as regards training regarding appliance environments for use in such education and the availability of these in particular. Software training, however, aroused some criticism, for it was considered to proceed too rapidly during the lecture periods. It seems on the basis of the interviews that one third of the teachers attending the project had a lack of information technology usage skills which did not allow them to properly keep up with the training. Supplementary software instruction will be organised for them in different local government districts in Kainuu in autumn 1998.

Entrepreneurship education aroused two types of opinion among the pilot teachers. Primary school teachers in particular considered it frustrating, too extensive, strange, and difficult to apply to teaching. Lower and upper secondary teachers, however, regarded the resulting knowledge and skills as valuable from the point of view of their work. Teachers require information on practical implementation the entrepreneurship education in particular. They do not consider the establishment of connections with entrepreneurs and the business sector problematic, however.

It seems on the basis of the first intermediate evaluation that there are good prospects for achieving the project aims set. Decisionmakers in the local councils in Kainuu are making major investments in telematics equipment in schools. They are also confident about the project, which is contained in the operative plan of at least one local government district. The greatest threats are connected with the use of time among the pilot teachers, the cut-down of allocations in local council teaching and cultural matters, endurance of the project organisation and entrepreneurship education. None of these threats would seem to be very serious, however.

Measures will be taken to bring entrepreneurship education closer to everyday school work. The launching of school-specific student projects and business cooperation related to entrepreneurship and technology education requires personal visits to different schools in the province. This poses problems for the project organisation which comprises four persons, which should be solved before the beginning of the next term.

References

- Australian Education Council (1994), *A* statement of the states, territories and commonwealth of Australia initiated by the Australian Education Council. Curriculum corporation.
- Commission of European communities (1995), White paper on education and training. Teaching and learning towards the learning society. COM (95) 590 final. Brussels.

- Department for Education and Welsh Office. (1995), *Design and technology in the national curriculum.* Department for Education. Welsh office.
- Eggleston, J. (1992), *Teaching design and technology*. Bury St Edmunds, Suffolk
- *Kainuu development programme* (1994) http://www.kainuu.fi/kainuunliitto/ engkl007.htm
- Ministry of Education of Finland (1998), The Information strategies of the Ministry of Education and their Implementation. http://www.minedu.fi/eopm/strategi/ alku.html
- Ministry of Education of New Zealand (1995), *Technology in the New Zealand curriculum*. Wellington, Learning media.
- National board of Education (1997), Finnish education in focus. Statistics on education and students in Finland 1997. National Board of Education. Helsinki. Nykypaino.
- Scottish Consultative Council on the Curriculum (1996), *Technology education in Scottish schools. A statement of position from Scottish Consultative council on the curriculum.* Scottish CCC.
- Welty, K. (1997), Design and technology in the Australian curriculum. In Kananoja, T.(ed.) Seminars on technology education Oulu, 7.-8.5.1996; 18.-20.10.1996.(pp. 57-76). University of Oulu. Faculty of Education 69/1997.