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Entrepreneurship and technology education: Finnish initiatives

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Abstract
Future demands with respect to expertise will be extremely high. It will not be enough to have qualified for some occupation; securing a job will require a lot more. As a member of society, each pupil in compulsory education should have the right and opportunity to study technology and entrepreneurship in a broad-based manner to the best of his or her ability. The syllabus should correspond to the educational and instructional needs, experiences, interests and values of every one of the pupils. The first step is to create a syllabus that is based on the expertise that will be called for in the future and will enable the boys and girls to develop and strengthen the skills that will be essential for mastery over their own lives and help them to apply these skills to other essential areas of learning. Essential areas of this kind within the field of entrepreneurship and technology are interactive skills, mathematical skills, communication skills, problem-solving skills, self-guidance and evaluation skills, group working skills and the skills of working with and producing technology.

Outlines of syllabuses used in the Kainuu region of Finland for education in entrepreneurship and technology are given. Descriptions are given of syllabuses tailored to the needs of particular schools or education authorities and of projects carried out by pupils.

Keywords: technology education, entrepreneurship education, curriculum

Regional entrepreneurship and technology education curricula

The changing world - the changing school?
The structures and policies employed in education cannot differ substantially from the values, patterns of thought, structures, policies and tools that are present outside the educational sector. The extensive changes in ways of working already introduced by technological development will lead to major new challenges in learning. Schools formerly occupied a highly prominent position in being able to teach people things considered permanent and part of the established cultural heritage, and achieving this in an extremely efficient manner. The existing system of education, however, rewards people for similarity and carefully learned model solutions. Yet people now have to face an enormous complexity after education, which contains many contradictory elements. This raises the question of whether the traditional school system is capable of keeping up with the prevailing trends, and of educating young people in the middle of a rapid change. (Linturi, 1999; Lehtinen 1999)

The rapid growth in the amount of information and the extensive development of the media still pose a major challenge to education. Education is essentially considered to be a tool for teaching children and young people the means required for finding meaning, organisation and sense in the ever-increasing flow of information with which they are continuously flooded from a large number of media.

Technology will evidently also evoke a variety of changes in the policies employed in schools. The technological changes taking place in their internal operating environments will enable them to join more closely in many types of virtual community which comprise other schools, experts and companies. This will introduce an entirely new dimension in adopting expertise in schools, in which the
keys to success will be cooperativeness and creativity. There are currently already good examples of activities in which pupils are more skilled than their teachers. In some schools, this is considered quite a problem while other schools perceive it as an enormous opportunity for creating new forms of cooperation and joint learning processes in the form of planning courses and maintaining information technology systems in schools. (Linturi, 1999; Lehtinen 1999)

Social challenges

Education should meet future challenges, contribute to creating a future society and culture, and teach us how to control our lives as members of the future society. It should also be noted that the resources assigned by society to organising general education have decreased in the last few years. This has been directly reflected in the preconditions for educational reforms and teaching.

We should be aware of the fact that this is the first time in the history of Western countries that we have access to a tool such as the educational system for constructing future society. In the radical times of enlightenment, the last major period of change which saw daylight in the 18th century, measures were taken to only initiate the system of education (Kyrö, 1998). Schools have in fact been created for implementing the pattern of success of the modern era, a pattern which is still in use. According to Ulrich Beck (Beck et al 1994), the purpose of sociology is to help society to reflect on the consequences of its achievements. Raising values as part of our consciousness calls for this type of reflection. The system of education and the professionals acting in schools should consequently raise the important question of responsibility. Who will be responsible for the education of new individuals and the development of new patterns of operation and success if not the schools and the present generation? We are now on the front line in safeguarding the future of the next generation. It is our duty to assume responsibility for changes, a task which falls upon the system of education in particular. In this sense, schools should not just be engaged in the process of change, but also show the way. There are undoubtedly periods during which the educational system is assigned exceptionally great value. We feel that we are presently living times of this kind.

Grounds of the national curricula 1994 in Finland

Entrepreneurship and technology education are not represented as very significant field in the national comprehensive school curricula (National Board of Education, 1994). There are some points in this framework, however, in which entrepreneurship and technology education are outlined at the level of concrete objectives and general descriptions and with regard to implementing this type of education in individual schools.

'The purpose of entrepreneurship education is to support pupils's knowledge, skills and attitudes, of a kind he will need in his studies and later in the working life, regardless of whether he will be employed as a private entrepreneur or hired by another person.'

'Entrepreneurship education can be used as a means for supporting the entrepreneurship aspect in pupils, i.e. the spirit of enterprise, activeness, creativity and persistence. Pupils should learn to recognise the role of people's enterprise desires and active, creative effort as the starting point for entrepreneurship.'

'The entrepreneurship education given in primary schools should emphasise attitudinal elements, such as internal entrepreneurship, acquiring study skills and assuming responsibility over matters. A natural way of discussing issues connected with entrepreneurship is to introduce pupils to working life.' (National Board of Education, 1994, p.36-37).

Technology education is not mentioned directly but rather referred to as an entity composed of technology and information technology.

'General technological education requires the knowledge and skills also necessary for participating in technology discussions.
and decision-making and for solving problems by utilising the opportunities offered by technology. Social development in different spheres of life requires that all citizens should possess new capabilities for utilising technological applications and an ability to influence the direction of technological development.

‘Pupils should be given a chance to become familiar with technology regardless of sex and to learn to understand and utilise it.’ (National Board of Education, 1994, p.11-12)

Entrepreneurship and technology education are currently only optional building elements in creating the profile of school curricula, though it is absolutely essential that they should be linked with the sphere of experiences of children and young people and with issues they consider important and of topical interest.

When contained in curricula, entrepreneurship and technology education will provide a natural channel for opening the school doors to the outside world through cooperation with different types of interest group, such as private enterprises.

Joint elements in entrepreneurship and technology education

Technology and entrepreneurship serve to support human development and can also be assumed to act as the key to success in future (Siimes, 1999). Knowledge and expertise will occupy an increasingly prominent position, though their economic exploitation will require an entirely new attitude towards and adaptation to society and organisations, for these skills must be brought to the fore and utilised in a wealth of operating environments. New ideas, problem solving skills and the utilisation of advanced technology in particular will occupy an important position in this. Employees or entrepreneurs are required to master a number of skills, know how to find new properties in themselves and try to express these in a meaningful manner. (Kyrö, 1998).

Entrepreneurship and technology education share a number of joint objectives and branches of education. In addition, a natural link to curricula is provided by the contents, teaching methods and teaching arrangements connected with the topics in which the teaching is given. Essential joint expertise skills have to do with problem solving, planning, interaction, mathematics, communications, self-control and assessment, team work, technology production, and working.

The preserving of employment requires the continuous keeping up of one’s professional skills. These increased expertise requirements have already been expanded by having to cope with information and communications technology. The following personal properties will be emphasised: self-confidence, independence, willingness to perform, adaptation capabilities, dynamism and innovativeness. (Linturi, R. 1999; Hautamäki, A. 1999).

One principle governing entrepreneurship and technology education is active participation when faced with different types of problem. The various topics offer rich contexts for problem solving. Being able to identify and adopt new solutions rapidly will help people to survive in their everyday lives. Problem solving skills include critical thought, creativity, reflection and logic through which new ideas are already be aimed at in schools. The resulting solutions often involve combining the existing issues to form new entities.

Entrepreneurship and technology studies offer a natural, authentic opportunity for developing group work skills. Many problem solving tasks require negotiation skills, discussion skills, cooperation, and approving other people. In the absence of team work skills, the situation would be much more difficult. If resources are assigned to developing these properties in the comprehensive school, future society will benefit.

Social skills will also be emphasised. It is likely that the most important skills in future will include an ability to understand different cultures, approve and value dissimilarity,
interpret verbal and non-verbal messages, manipulate, master contradictory messages, recognise illogicalities and distortion, possess a community-based set of values, master the most important cause and consequence relations pertaining to the natural environment and society, and know how to use information tools. Instead of factories and belt conveyors, the future will call for well-balanced, active people.

In the middle of all this, schools are still required to educate citizens capable of living in our society and to give them, as well as possible, the knowledge and skills that will best help them to survive in life. Most of all we should light the fire in our pupils which makes life worth living. All this despite the fact that even we sometimes fail to understand what society is, what man is and what the knowledge and skills are that will be of use in the future.

Regional curricular requirements
The long-term structural trend in Kainuu has been characterised by the slow rate of development of the regional economy when compared with the national average. This is reflected by the low standards of education of the population, accelerating out-migration (most notably young people, the most educated ones, women), the narrowing down of the operating conditions of entrepreneurship and services as a result of the decreasing population base, the small scope of the foundations for business when compared with the rest of the country and the gradually increasing proportion of the older age categories of the population.

Vision of Kainuu 2005
In its development programme for 2005, which aims at reversing the prevailing trend, the Kainuu region formulates its vision of future as: ‘Kainuu is a region with a self-confident, skilful population living in a clean, secure, intellectually stimulating environment. Success is created by viable companies and enterprising people.’ (Anon, 1994)

The challenges to the strategy of education in Kainuu are thus its sparse population, population loss and the small number of tertiary educational establishments. Technology education and telematic connections can be used as a means for reducing marginalisation among students in the sparsely-populated parts of Kainuu and providing all students with equal study opportunities regardless of their places of residence. Employing modern technology in teaching will be used as a means for increasing

| Area, km² (area almost the size of Belgium) | 21,566 |
| Population 31.12.1997 | 93,218 |
| Percentage aged 0-14 years | 18.9 |
| Percentage aged 15-59 years | 65.6 |
| Percentage aged over 60 years | 15.5 |
| Degree of urbanisation (%) 1995 | ~70 |
| Total net migration, persons 1998 | -1201 |
| Level of education, persons with upper secondary education, aged 15 or over, who have completed an educational programme (%), 1996 | 40% |
| Level of education, persons with higher education, aged 15 or over, who have completed an educational programme (%), 1996 | 9.2% |
| Percentage of labour in primary production 1995 | 12.2 |
| Percentage of labour in processing | 22.3 |
| Percentage of labour in services 1995 | 62.4 |
| Inter-municipality commuters as % of employed persons | 12.2 |
| Rate of unemployment 1997 (%) | 24.3 |
| Dependency ratio 1995 | 2.1 |
| Gross domestic product Per capita GDP 1996, Finland = 100 | 69.8 |

Table 1 Parameters of the Kainuu region

According to the regional strategy and development programme formulated for Kainuu, entrepreneurship within the area can be created by developing people's ability to use and understand modern technology. KYTKE 2005 is a regional entrepreneurship and technology education project, the aim of which is to respond to the structural changes posed in general education, of the kind referred to in the regional strategy.

Project on developing entrepreneurship and technology education in Kainuu

KYTKE 2005 is coordinated by the Department of Teacher Education in Kajaani. KYTKE 2005 is a regional entrepreneurship and technology education development project which conforms to international, national and regional information and development strategies in general and teacher education. One of its aims is to create regional entrepreneurship and technology education curricula in the hope of developing the welfare and future of the Kainuu region. (Santakallio and Mankinen, 1997, Mankinen, 1998 and Santakallio, 1998)

The challenge of the project has been and will be the integration of two new entities into the everyday operation of schools. The pilot teachers involved in the project have already undergone most of the extensive training planned for them. Problems in the present operation are differences in the operating environments of schools (which place restrictions on practical teaching arrangements): location, size, premises, teachers' age structure and motivation within the community. Problems have also been caused by legislation issues such as the opportunity of teachers to attend project training during a sickness leave. These problems can be expected to remain in future.

It is hoped that the curricula to be drawn up will serve to contribute towards the objective of future education (Aaltola, 1998). In addition, they should act as catalysts for disseminating the ideas in schools and local government districts. To those persons not interested in the topic earlier, they also make a good point of departure for looking at entrepreneurship and technology. The curricula will be completed by the end of 1999 and it is hoped that they will be used as the starting point when preparing the foundation for national curricula early in the next millennium.

The KYTKE 2005 project pilot network has considered the discussion of issues and the creation of material to be valuable (though laborious, due to a lack of teaching material and literature on the topic to support school work). Having to ponder on joint elements in two separate topics (ie. joint entrepreneurship and technology education elements) has opened up new perspectives to school teaching. The school is no longer seen as a separate island in society but as a functioning part.

The organised training and the networking of the pilot teachers have pointed to major attitudinal changes in the participating teachers as regards entrepreneurship and technology education. Almost all the teachers have reported that they currently perceive the concepts as 'everyday' ones. This in turn has provided them with a view of the necessity and meaningfulness of the operation and helped them in finding policies of their own. The discussion and contemplation on different educational sub-fields, their characteristics, importance and objective during the project have served to make clear the overall goal.

It is problematic to introduce new things to the traditional school community, for it may be difficult to find an actor of the same opinion. One factor hampering the finding of nearby cooperative enterprises may be the remote location of the school. Cooperation should not be prevented by geographical distance, however, but it is hoped that the actors have enough imagination and willingness to experiment so as to also implement different projects in future.
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