

CHALLENGES OF THE INFORMATION SOCIETY TO ENTREPRENEURIAL- AND TECHNOLOGY- EDUCATION IN THE FINNISH COMPREHENSIVE SCHOOL

Matti Parikka and Arto Ojala

Even if the concept Information Society has versatile meanings for its details, there is an approximate agreement about its general essence. There is an understanding e.g. about its emphasis on utilizing the computers, software and networks diversified and about the participatory, self originated activity culture of the citizens. As a result of these the central essence of Work has been changed from reproduction to thinking, understanding and planning. This is seen e.g. in many industries as transfer of the routine works to the countries of cheap labor and as increasing focus for research and development of new products in the home country. Today emphasized are teamwork, spontaneous, self-directed preparation for different activities, as well as adjustment to fast changes and uncertainties.

'National Core Curriculum for Basic Education (2004) for Comprehensive School' stresses the importance of having a new kind of culture for studying. The value basis and task of education, the learning approach, learning environment and methods emphasize the importance of learning initiatives, meaningful, innovative and self guided working skills, as well as adopting the skills to solve everyday problems, instead of mentioning only the learning contents (pp. 14 – 19). Entrepreneurship and consideration for the demands of the industrial society have been presented in the document added to the general aims, especially in studies of technological concepts and systems in 'handicrafts' (pp. 242 – 246). The curriculum also consists of 'subject entities' on entrepreneurship ('Participatory citizenship and entrepreneurship') and technology education ('Man and technology') (pp. 42 – 43). Their aim is to challenge students to strive for skills for such activities, which they will need both during their studies and later on at working life.

Both entrepreneurship and technology as concepts connected with industry are as old as mankind and familiar phenomena for all in everyday life. As education contents in general education they may, however, wake up questions. – What is their meaning in the information society? – What are the connected aims in general education; what are the background values? – Why their importance is stressed so much in different contexts? – Which contents and knowledge structures are central and how they should be handled? – How the education institutions could co-operate with local entrepreneurs and industry?

Basic research of the area considering basic education is just to be started, and so far it is difficult to find out support or ideas from it for applications for everyday work. In the following the challenges of information society for entrepreneurship and technology education will be clarified and a framework for curriculum will be drafted in order to support the thoughts about the topic. The approach in this paper is basic general education. No standpoint will be taken for social meaning of the information society or its benefits or detriments. The idea of the paper is to wake up systematic discussion about writing the curriculum and drafting different alternatives for studying the topic.

1 Concept 'Information Society' for Comprehensive School education

There have been great changes in the society and in the life of individuals in recent years. The changes have focused mostly on the economic, structural and mental revolution of the society (Kurikka 2002). New opportunities of the information technology are utilized increasingly in addition of technology companies also in traditional industries, as well as in service- and administration- sectors (Tyrväinen, Warsta and Seppänen 2004). Utilization of information technology in the business operations has also generalized globalization of the companies, cut the life cycles of the products shorter and increased both domestic and foreign competition (Ojala and Nahar 2004). Change from traditional industrial society to information society does not only mean revolution in industry but also changes the work image of the citizens. It preconditions learning new knowledge and skills appropriate for the demand of the new kind of work. According to research (Kurikka 2002) knowledge, skills, know-how, creativity, communication and culture are the key concepts for survival in the modern society.

Historically the actual starting point for development of the information society was the clear majority of citizens being literate. In Finland the development began at the end of the 19th century, when on the initiative of Uno Cygnaeus Finland had the 'Folk School' for all in 1866. Also founding the general library services very early in the country had a great meaning for the development of the information society. Information society based on handling information on new communication technologies like Internet and e-mail is considered to be started in the beginning of the 1990s in the US, when the ARPANET, developed for military purposes in the 1970s, was disseminated also for the scientific communities (Rogers 1995). The first network in Finland for transfer of data was founded in 1983 (Teknologiakasvatus nyt! –projekti 2004).

The etymological definition of 'Computer Society' is more complex than above. Usually it is based on analysing the differences of the concepts 'knowledge, information and data'. Knowledge (understanding, consciousness) is born on available information as a result of handling process in human brain or interpretation. Computers on the other hand process (compute, calculate) data in digital form on software. The results of the calculations will the computer translate into information shown at the screen in understandable form to the user. An additional difficulty is that Finnish language does not have expressions for these three concepts like e.g. in English. We have to use the same term ('tieto') for data, information and knowledge. Do we want in the concept 'information society' emphasize consciousness and understanding (knowledge society) or the content of information (information society) depends on which one of the processes we want to emphasize, the importance of human thinking or functions of the computer. Both cases deal anyway with 'computer society' based on technology. Utilizing machinery preconditions added to the mentioned literacy also always skills to use (and produce) them.

In everyday thinking, speeches and even in research the information society is often described especially with the help of know-how connected with information and communication technology, 'skills of computer society' (computers, Internet, e-mail, mobile phones) (e.g. Tarjanne 2004; Kurikka 2002). Thinking general basic education also other kinds of technology on programming the computers should be considered. Such areas are e.g.:

- Automatics and robotics
- Machines, mechanisms and their functions
- Basics of production, storing and using energy (Teknologiakasvatus nyt! –projekti 2004).

The basic idea of computer society covers the own activity of its members as ‘participatory citizenship’. It means, added to free surfing in the Internet, also possibilities to take care of many things like e.g. payments, shopping, orders and other applications through networks. The concept of society itself presupposes collaboration. Community and community discussion between different interest groups and also individual contacts with administration are possible with it.

In public discussion the problems of resources for information society is often handled with the term ‘digital gap’. Generally it means insufficient knowledge capital of the nation and limited resources. In these cases the communities and their members do not have resources enough for purchasing computers, software and networks for all. ‘The gap’ is already in literacy enormous in the world because e.g. the number of illiterate in the world is supposed to be much more than European population. Another problem is that in many cultures gender is the problem; female are marginalized concerning technology because it is supposed not to belong to their role. There is neither any global scrutiny about the willingness for computer skills for all. On the other hand ‘Internet addicted’ or ‘Marginalized from reality’ are also phenomena connected with information societies.

2 The values connected with the environments of children and youth are changing

Clarifying the basics for values and awareness of it are central starting points for reforming education. Changing world and especially when changing happens as an outcome of rapid development of technology like a blow-up and also globalization is spreading, the schools have many new challenges.

The values, ideals, wishes and dreams of children and youngsters today, their environment and image of the world have totally changed from the earlier ones; from e.g. the agricultural era. Their active and experienced life environment has from beginning on been technology centered. They were born in a society with computers, networks, play consoles and mobile phones, and their all applications have been used (Suoninen 2001). For example through the Internet children and youngsters can access information easily and quickly. The problem is how a child can separate the right information from the wrong one in the information flow. Also appreciation for the entertainment life style has been growing.

Development of information technology is also seen at almost every workplace as utilization of different applications. How to use them skillfully is central in almost every job.

These facts must be considered already in education in the comprehensive school. Equal opportunities are the important value basis for education. That brings the necessity to offer girls and boys equal opportunities already at school to become familiar with different kind of work (National Core Curriculum for Basic Education 2004). Entrepreneurship education has the possibility to break the myth of female and male work. Handicrafts education in comprehensive school has not been able to make any impact on that! Information technology and its versatile use in industry and business are central for inspiring many values (Kurikka 2002).

Kurikka has made a comprehensive questionnaire research (N = 3990) in 2001 in Finland on attitudes of young adults (age 18 – 26) towards computer technology and its use and the connected social development.

Attitudes of the young ones towards the information society are positive. Majority thinks that every student should already at school learn to use computers. Even if the computer belongs today to every youngster’s life already from the early age, most of them would not live without the opportunity to use information technology (Kurikka 2002).

When thinking the opportunities to be employed in the future 53 % of the young ones considered information society skills 'very or quite important' and considered them to have quite an impact. The oldest students emphasized computer importance least and the youngest ones at the highest rate. Differences considering the gender revealed that women thought computer skills more often than men to be an important factor to get a job. Students considered good computer skills to be an asset to get work. Ratings of the students were clearly better than those of working or unemployed youngsters (Kurikka 2002).

The young ones think that computer technology belongs inseparably to working life. About every fourth young one was ready to fully accept a statement, which proposed that in the future there might not be any profession without computers (Kurikka 2002).

The comprehensive school students today will be fully occupied in working life at least still in the 2050's. It is quite difficult to foresee, which kind of skills they could have the most benefit of or if some skills would already be harmful when most of "assembly line work" has been moved to the countries of less expensive labor and when globalization will still be increasing. Quite many people will at that time do R&D work, or distance work through computer networks. On the other hand there are already now a great lack about professionals with versatile skills on metal, construction and forestry. Probably planning (design, management), flexibility, creativity, critical thinking, taking responsibility, versatile social skills and knowing different cultures will be expected in all the professions in the future.

If we accept that above we as teachers have to move from knowledge and information centered teaching to student centered activity emphasizing doing and experiences. Then activities stressing critical thinking, inquiry, creativity and teamwork will be emphasized more than before in all studies. Central in work will be everyday skills needed for intended work and processes developing problem solving and creativity. Individual skills will change to be mostly only tools.

Networks of the information society make construction of different social relations and communication needed to keep them up possible in real time all over the world. This will create new possibilities also for innovations. Fresh thoughts and ideas may give many new vital possibilities for competition (Pakarinen 2004).

3 What would challenge studies to advance entrepreneurship?

Most of the models interpreting entrepreneurial education rest on the central views of activity pedagogy. Starting point for pedagogical thinking and activity is the student and development of personality and collaboration, communality. Study methods should so emphasize activity. The teacher should stay in the background as an activator and a resource organizing and guiding to the source of information (Heinonen 2002).

The adult learner is seen as an intentional subject constructing the aims, activity and consciousness. Learning is explained to happen on own experiences of the learner and on interpretation of reality structures, which have certain meaning for the learner. Each learner will interpret the found phenomena through his/her own life history to be the inner models. Then also entrepreneurship as an aim will not only be mediating values from the teacher to the students but one of the learner's environments for thinking, activity, study processes and strategies (Koiranen 1997). So the working methods stressing students' activity are central. They also are tools for life-long learning.

Division of entrepreneurship in 'self oriented', 'inner' and 'outer' entrepreneurship clarifies applications of school education. Self oriented entrepreneurship means the individual way to act generally enterprising and with responsibility in life (Kyrö 1997). Inner entrepreneurship refers in entrepreneurial activity as a member of an organization or as a

worker in a company. Outer entrepreneurship is mostly activity as the responsible director of an own enterprise (Kyrö 1997).

Division above can also be regarded as the frame of progress for entrepreneurial education. In early and basic education the focus is own entrepreneurship; in upper grades of comprehensive school that can be added with inner entrepreneurship as organization; in upper secondary and vocational education the outer entrepreneurship or students' responsible enterprising may be done. Even if the aim of entrepreneurship education in general education is clearly targeted at own and inner entrepreneurship, in the background there is a wish to have as many students as possible as adults to be also outer entrepreneurs. So the distant aim is that students would grow to be citizens creating work themselves.

Education should be colored by versatile challenges for students to be creative, innovative and independent. Then a break in the education methodology should be made in order to activate teachers and students to move from carefulness and security to courage, risk taking and independent decision making; from resignation and withdrawal to initiatives, influencing, challenges and commitment; from lonely hard work to team work, openness and networking; from avoiding the possible hazards to seeking the opportunities (Koiranen and Pohjansaari 1994). Recent development of society and industry has given birth for the efforts for changes above. They touch every citizen even if he/she would not plan an entrepreneurial career. Everyday work in schools could totally happen on the spirit of own and inner entrepreneurship; the emphasis being on the fact that participation in school education means an enterprise for the student.

In entrepreneurship education and studies the activity must (1) be legal, ethical and moral. It must (2) realize the entrepreneurial process and (3) challenge students to take responsibility for own activities and do the work responsibly. The first demand should already be clear for everybody (economic criminality, tax evasion, etc.). In the second demand the process means that in every project students (and teachers) should in some sense get own experiences in the sequence of a useful enterprising activity.

The facts, how in everyday reality all the products and services always start from an idea; how the commercial interest will be found out and the possible production decision made, how it is made, how the product is transported from the producer to the consumer and which immediate and indirect costs are consisted in the whole process. A surviving company must make profit for the owner; the income must be greater than the outcome. Added to that also must be scrutinized how the product suits to the circulation in Nature and will promote sustainable life style. The third demands are closely connected with the first ones.

Original for entrepreneurial activity is that everybody should take responsibilities in teamwork, take care for the tasks and work properly without outside control and commit with common aims. As a whole, students should understand when becoming older that well-being of a nation, gross national product and the basic prosperity of the nation is just formed as results from work and different entrepreneurial activities.

The things and phenomena are learnt best in the original contexts. The most real learning environment for entrepreneurial education is (out-of-school) everyday life, e.g. home and living at home, working life and industry, traffic, communication, leisure and hobbies. The most contents and also cues for methodology for entrepreneurial education are found there. That above means that organization of learning and the problems handled should not be made only by the teacher. On the contrary students should be developed to observe and find them out themselves. Working should lead learners to real entrepreneurial experiences; they should have opportunities to develop their creativity and design skills, to make choices, to take risks, cope uncertainties and constraints, learn to commit themselves with the chosen aims, take responsibilities and have experiences of success as results of own entrepreneurial

activity. In practice the entrepreneurial projects in school should bring some kind of extra value compared with them, who are not interested in entrepreneurship.

4 How entrepreneurship education should be written in the curricula?

In Finland we have organized a lot of separate experiments for entrepreneurship education and there are already three doctoral dissertations about it. Two of them handle discourses on the topic (Erkkilä 2000; Remes 2003) and the third one general attitudes of upper comprehensive school and upper secondary school and vocational students on entrepreneurship (Nevanperä 2003). Most of the experiments on the area have, however, been shorter projects or theme work. Nature of education is, however, a longer term and a clearly defined activity. It preoccupies a clearly analyzed framework and curriculum on that basis. Ad hoc projects made on exciting interests or theme work might only bring few results if the projects are not clearly attached with each other and with some more general frame of scrutiny and if their longer-term impact cannot be checked or if it is not even tried. The education atmosphere will not, however, change to support entrepreneurship just like that but takes time; even several years. So the curriculum for entrepreneurship should be developed through experimenting systematically different possibilities. The distant aim should be a longer-term yearly sequence e.g. like organizing traffic education in Finland.

The more clearly the realization of entrepreneurship education is planned agreeing with students' parents, representatives of surrounding industry and other partners, the more sure will also the everyday life in the school change so that 'The spirit of Entrepreneurship' or 'Entrepreneurial active' school can be talked about. Even if the topic can and should be studied in every school subject, it would be better, if one subject would clearly be given the main responsibility for the matter. Handicrafts and technology education already have a lot of contents connected with entrepreneurial activity, topics and supporting methods. The same can be understood from the document 'National Core Curriculum for Basic Education 2004'. The choice would at the same time challenge teachers of Technical Work and Textile Work to collaborate. It also would increase the girls' opportunities for equal opportunities more than before in order to survive in the technological society and become interested in technological professions. That would also encourage teachers to write the curricula more balanced for technology education than before and bring more emphasis on machines, electricity and electronics (Parikka 1998).

In the following shortly some central curricular topics connected with entrepreneurship and technology education. They are not scrutinized separately, because technology is an area of activity and productivity and always connected closely with entrepreneurial and commercial activity. Without marketing technology is not proceeding either.

Entrepreneurship is at its best one of the environments for development of learner's thinking activities, skills and active experiments, research, planning and design. Curriculum will then be changed from 'the bureaucratic orders' to a study plan made cooperatively with different committed partners. That may consider fairly everyday living environment of the students, the interests of the age groups and the situations in the changing society. So it will be natural to trace entrepreneurial learning entities from many areas of the society and its industries and work on them in school from the viewpoints of different subjects. Considering the originalities of municipalities and schools the meaning of the curricula is that the responsible people are aware of the special local conditions for local and regional development. That is why it is natural that practical realizations of entrepreneurship education may differ between schools.

Following table collects the approaches above according to Parikka (1997). Every area of emphasis is clarified with statements for aims and it gives practical examples. The table does not try to be hierarchical or in order of importance. It tells about the aspects handled above also as practical examples in as general form as possible and even proposes varied interpretations. The table can best be used as some kind of a list when drafting the curricula for entrepreneurship education and for discussions between the interest groups.

TABLE 1. Information society –affected changes in entrepreneurial and technological education

EMPHASIS	AIMS	PRACTICAL EXAMPLES
Changes in work image	Specialties of work and professions in the future	Future workshops will be founded, future professions and opportunities to get a job will be researched, alternatives for own paths to the future are developed and the future images of local enterprises are mapped out. Enterprise ideas will be developed.
Reforming learning concept	Active observation and ideas. Own aims, assessing oneself, learning to learn and responsibility for own work. Life-long learning	Individual learning (the teacher can not learn instead of students!), own and team work, group and self-assessment practices.
Education for equal opportunities	Breaking down the myth about female and male jobs	What is the professional gender division, the differences between the salary of female and male jobs, what is the reason and should the status continue? Does some profession suit only for another sex?
Consumer education	Critical, responsible and considering consumer	Planning and following money consumption. Discuss about product safety, information security, and issues dealing with usability, price, and quality
Education for internationalization	Increasing understanding and interchange of different cultures and nations	Versatile opportunities for practice in everyday language and speaking also in foreign language: * acquainting with foreign cultures * pen-pals, e-mail connections * making videos and exchanging them with godfather classes and schools.
Technology education	Acquainting with technological systems and the possibilities to utilize them. Understanding of the balance of nature and technology to be the starting point for sustainable life style. Adopting intentional work and innovation processes. Awareness of costs of working materials, tools and machinery and costs – quality –analysis.	Acquainting with the production and marketing processes of industry, the life cycle and value chain analysis of the products. Mapping out and developing the skill development programs of the enterprises with the local companies. Collaborative projects with ‘godfather schools’ utilizing the networks. Products to be sold. Entrepreneurial training and practice. Plans for purchasing tools for homes and the cost analysis.

Aesthetic education	Adopt the meaning of aesthetic approach in life and as the guarantee for product sale	Preparing different enterprising ideas up to practical realizations. Stress especially on importance of aesthetic aspects in design and marketing.
Mathematical education	Understanding the importance of mathematical skills for entrepreneurship	Understanding and following up all entrepreneurial activity as a profitable activity and funds. Projects will be attached always strongly with monetary follow-up and assessment of the results.

Even if the basic principle is to realize as open learning environments as possible and entrepreneurial topics in school, it does not mean that the curricula would use only general expressions. Recommendable is to write a framework curriculum, which would clarify at least:

- The value background or ‘Curriculum Ratio’; the general aims
- Education sequence; what are the targets in every grade and school stage
- Sharing the responsibility between the subjects and/or teachers and the contracts with emphasis with different collaboration partners
- Clarification of the contents of the projects and collaboration with the companies
- Study strategies and activation of the students and the partners within plans, decisions, realization and evaluation and how the methods or the projects will be organized
- How the impact or accountability of the studies / education will be evaluated.

(Parikka 1997).

If the curriculum remains very general, it will easy keep things as before in the classroom (Miettinen 1990). In the entrepreneurial projects the effort should be to move out in the society and industry, to the environment, for which the School is educating. It is also good to emphasize, that already as a concept ‘Entrepreneurship’ is a process, which is experienced best as different realized projects (Ojala and Pihkala 1994). At least in the beginning it might be useful to name the plans as ‘development of the school’ and ‘experiments’. It would make the commitment of different parties in the projects easier.

References:

- Erkkilä, K. 2000. *Entrepreneurial Education. Mapping the Debates in the United States, the United Kingdom and Finland*. New York: Garland.
- Heinonen, A. 2002. Itseohjattu ja tutkiva opiskelu teknologiakasvatuksessa. Luokanopettajakoulutuksen teknologian kurssin kehittämistutkimus. Joensuun yliopisto. Kasvatustieteellisiä julkaisuja 79.
- Koiranen, M. 1997. *Henkinen kasvu yrittäjyyteen*. Teoksessa M. Parikka (toim.) Kasvu yrittäjyyteen. Jyväskylän yliopisto. Opettajankoulutuslaitos. Opetuksen perusteita ja käytänteitä 27, 23 - 26.
- Koiranen, M., & Pohjansaari, T. 1994. *Sisäinen yrittäjyys innovatiivisuuden, laadun ja tuottavuuden perusta*. Tampere: Konetuumat.
- Kurikka, P. 2002. *Kahden kerroksen kännykkäkansaa. Nuorten tietotekniikan käyttö ja asenteet tietoyhteiskuntaa kohtaan Nuorten Suomi 2001 –tutkimuksessa*. Helsinki: Sitra.

- Kyrö, P. 1997. *Yrittäjyyden muodot ja tehtävä ajan murroksissa*. Jyväskylän yliopisto. Jyväskylä Studies in Computer Science, Economics and Statistics 38.
- Miettinen, R. 1990. *Koulun muuttamisen mahdollisuudesta*. Helsinki: Gaudeamus.
- National Core Curriculum for Basic Education. 2004. Helsinki: Opetushallitus.
- Nevanperä, E. 2003. *Yrittäjyys Suupohjan opiskelijanuorten ajattelussa. Tutkimus Suupohjan seudun nuorisoasteen opiskelijoiden yrittäjyysnäkemyksistä sekä yrittäjyysopetuksen opetussuunnitelman kehittämissuunnitelmista*. Jyväskylän yliopisto. Jyväskylä Studies in Business and Economics 24.
- Ojala, A. & Nahar, N. 2004. *A Conceptual Model for IT-supported International Subsidiary Establishment Process. Managing New Wave Information Systems: Enterprise, Government and Society*, The 15th annual ACIS conference in Hobart, Tasmania, Australia.
- Ojala, A. & Pihkala, J. (toim.) 1994. *Alkutaival yrittäjyyteen koulussa*. Helsinki: Opetushallitus.
- Pakarinen, M. 2004. Monikulttuurisuus ja tietoyhteiskunta. Sitran raportteja 36. Helsinki: Edita.
- Parikka, M. 1997. *Kuntakohtainen opetussuunnitelma avaa yrittäjyyskasvatukselle omaleimaisia mahdollisuuksia*. Teoksessa M. Parikka (toim.) Kasvu yrittäjyyteen. Jyväskylän yliopisto. Opettajankoulutuslaitos. Opetuksen perusteita ja käytänteitä 27, 81 - 86.
- Parikka, M. 1998. *Teknologiakompetenssi. Teknologiakasvatuksen uudistamishaasteita peruskoulussa ja lukiolla*. Jyväskylän yliopisto. Jyväskylä Studies in Education, Psychology and Social Research 141.
- Remes, L. 2003. *Yrittäjyyskasvatuksen kolme diskurssia*. Jyväskylän yliopisto. Jyväskylä Studies in Education, Psychology and Social Research 213.
- Rogers, E.M. 1995. *Diffusion of Innovations*. Fourth Edition. The Free Press. New York.
- Suoninen, A. 2001. *Nuoret mediamaailmassa*. Teoksessa M-R. Luukka, J. Hujanen, A. Lokka, T. Modinos, S. Pietikäinen ja A. Suoninen. Mediat nuorten arjessa -13-19-vuotiaiden nuorten mediakäytöt vuosituhaten vaihteessa. Soveltavan kielentutkimuksen keskus, Jyväskylän yliopisto, Jyväskylän yliopistopaino, Jyväskylä. 20-47.
- Tarjanne, P. 2004. *Tietoyhteiskunta – kulttuurimme perusta*. Keski-suomalainen 4.10. 2004, 4. Tekniikkakasvatus nyt! –projekti. 2004. University of Oulu. Internetin historiaa. 2004. CSC – Tieteellinen laskenta Oy. Opetusministeriö.
- Tyrväinen, P., Warsta, J. & Seppänen, V. 2004. *Toimialakehitys ohjelmistoteollisuuden vauhdittajana –Uutta liiketoimintaa lähialoilta*. Tekniikkakatsaus 151/2004, Tekes, Helsinki.

Key words: Information society, entrepreneurship education, technology education

Authors: Matti Parikka, EdD, docent in technology education

Arto Ojala, M.Sc.econ, lecturer in information technology