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# **Producing competencies for learning economy**

**Sitra Reports series 9**



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Foreword	5
1 INTRODUCTION	7
2 LEARNING ECONOMY	9
Innovation, education and flows of knowledge	12
Learning economy vs. education – a global question	16
Rationale of the research	16
Role of VET providers in innovation networks	20
Research questions and analytical framework	24
Data collection	26
3 THEORETICAL BRIDGES BETWEEN ECONOMY, FORMAL AND INFORMAL LEARNING	28
Qualification	29
Knowledge	32
Cognitive skills	34
Competence	35
Tacit knowledge	36
The acquisition of competence or tacit knowledge	40
Social capital	44
On-the-job learning	48
4 EDUCATIONAL REFORM AND POST-REFORM POLICY GOALS	51
Raising the standard of education	54
Decentralisation and strengthening of VET providers' autonomy	56
Curriculum reform and open learning environment	57
Contribution to regional development	58
Improvement of industrial relations	59
Finnish educational policy at the beginning of the 21st century	59
5 FINNISH POLYTECHNICS – A REFORM FROM WHICH MUCH IS EXPECTED	63
International development of higher education	63
Strategy and objectives of the polytechnic reform	65
The post-reform system of higher education	68
Polytechnics in action – features of re-structured higher VET	74
Curriculum reform – a way to improve the quality of learning	75
Synergy benefit of multi-disciplinarity	77
Regional role of polytechnics	79
The networks between polytechnics, industries and public services	82
Debatable higher standard	88
Co-operation between universities and polytechnics	91
At the midpoint of the reform	94

6 UPPER SECONDARY VOCATIONAL EDUCATION	
– AN UNDERESTIMATED WAY TO THE LABOUR MARKET	96
On-the-job learning aggregates the diverging field	97
Theory and practice of on-the-job learning	102
Different traditions	104
Experiences of the field of social and health care	106
The fast tempo of the change in technical fields	109
Towards diversity in vocational training	114
7 THE ECONOMY AND CHALLENGES OF LEARNING	116
Challenges of learning economy and development of education	122
SUOMENKIELINEN TIIVISTELMÄ	126
References	140
Appendix 1. List of interviews	
Appendix 2. Interview themes	
Appendix 3. An example of Atlas/ti analysis	

# FOREWORD

This study was carried out as a part of the Research Programme on the Finnish Innovation System financed by Sitra, the Finnish National Fund for Research and Development. The national innovation system is defined as the system of organisations and actors whose interaction shapes the innovativeness of the national economy and society. The main goal of the research programme was to identify the future challenges of the Finnish innovation system. In a rapidly changing techno-economic environment, the Finnish innovation system cannot be expected to repeat its recent successes without continuous and effective development effort.

The research programme included 12 research projects that represented several scientific disciplines: sociology, economics, innovation research, psychology, jurisprudence, etc. The cross-disciplinary approach was chosen to gain many different, but complementary, perspectives on the structure and functioning of the innovation system. The close cooperation of scholars from different disciplines was aimed at creating an innovative research environment for the programme. A particular emphasis was laid on understanding the micro-level innovation processes and innovation networks. The research projects went beyond the traditional organisation- and institution-oriented studies of innovation systems in order to better understand the drivers and context of modern innovation processes. In the changed environment, innovation policies cannot be effective without a deep understanding of these processes and their environment. The results of the whole research programme were synthesised in the programme's final report *Transformation of the Finnish innovation system: A network approach* (Gerd Schienstock and Timo Hämäläinen).

Sitra wants to thank all the researchers, policy makers and distinguished foreign experts that contributed to the success of the research programme. The results of the research programme provide plenty of challenges for further research and future innovation policies.

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August 2001



# 1 INTRODUCTION

The emergence and expansion of the knowledge-intensive industries has caused the lack of highly educated and skilled labour force to be felt more acutely. The ongoing technological change has been compared with the so-called electrotechnological revolution one hundred years ago. In its time the electrotechnological revolution required many more educated engineers in industrial plants. The ongoing opto-digital revolution requires a higher level of education throughout the labour force. A burgeoning knowledge-intensive industry expects of its employees not only higher degrees but also more facilities for lifelong learning. The new technological applications in industry necessitate closer co-operation between education and industries. The Finnish education system has made diverse efforts to respond to the challenges.

The polytechnic reform of the 1990s is the most significant development, increasing the number and share of tertiary level students dramatically. In 1990 there were places to study on tertiary level for about one seventh of the age group. Nine years later universities and polytechnics could offer student places for four fifths of 19 year-olds. The number of places on tertiary level now exceeds 50 000 (Statistics Finland 1999a, 59). The expansion has been most dramatic in the education of information and telecommunication engineers. In 2000 the number of IT engineering student places showed a fivefold increase over five years. The emergence of the Finnish information society may well lead to comprehensive tertiary education.

The expansion of tertiary level, besides decreasing the number of students in secondary vocational education, has also affected the existing working of the schools. The construction of the national education system rendered learning processes more school-like, duly decreasing practical learning and on-the-job learning. At the end of 1990s the state educational administration initiated measures to correct this development. A special on-the-job period was incorporated into the curricula of secondary vocational education. This new study period aims to familiarise students with the practical work of the industrial branch they are studying. It helps them in transfer to working life and landing a job. It also improves the orientation of those students going on to study in polytechnics. The new periods also mean a change in the definition of the concept 'learning'. Informal and non-formal learning have achieved validation.

This report considers the development and changes occurring in Finnish vocationally oriented education on the tertiary and secondary levels in the 1990s. The study is based on a systems approach, with the main focus on the position of the polytechnics and secondary vocational schools in the national and regional innovation systems. In the second chapter we discuss the changes occurring in working life and their implications for the education system. The third chapter addresses the definition of certain key theoretical concepts, used in the study and also in the Finnish education reform discourse. The fourth chapter concentrates on educational reform policy and the position of vocational education within it. Chapter five reports the results of the studies in polytechnics and chapter six the results of the studies in secondary vocational schools. Finally chapter seven summarises the results, draws conclusions and evinces some policy recommendations.



# 2 | LEARNING ECONOMY

The impacts of learning-intensive economy in the area of education can be divided into three forms of development, all of which are expressions of the main impact, the convergence of education and industry. In the new social environment of learning-intensive economy and production, the communities of teaching in the institutes of vocational education and polytechnics establish network linkages with communities of working in local enterprises and with other communities of practice in other educational and research institutions. The three forms of development are (1) integration of vocational and academic education, (2) setting of skill standards in close co-operation with actors of regional industry and (3) offering work-based learning for students (see e.g. Stern, Bailey & Merrit 1996).

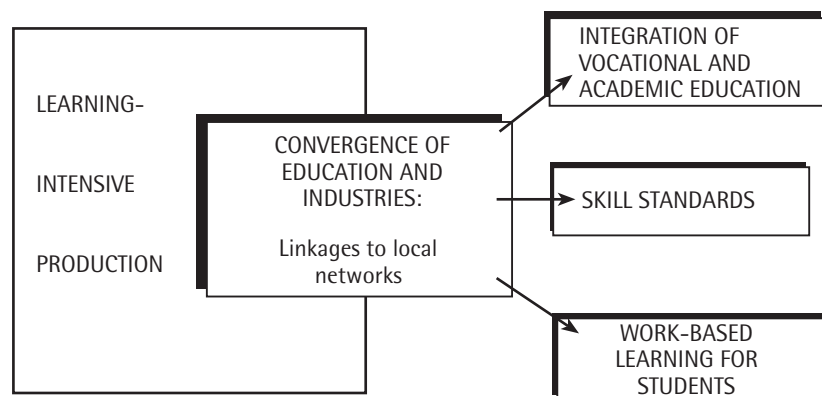


Figure 1. Change of industrial paradigm and regeneration of vocational education in OECD countries.

Three interpretations emerge of how the communities of education should react and how the institutional structure and functioning of schools should be reorganised in the conditions of new innovative network economics. The first can be called the model of centralised education. Its interest is in conserving the existing structure and functions of education. The integration of vocational and academic education, from the point of view of the centralised education model, means that measures will need to be taken within the school institutions and in most formal agreements between them. Within the centralised model the setting of skill standards is the duty of the state and the education and labour administrations. Work-based learning implies practical training periods with only tenuous linkages to "real academic learning" in classrooms. The idea behind the model of centralised education as a response to the demands of learning economy echoes the slogan of neo-classical economics "business as usual" (see e.g. Lundvall 1999): "education as usual".

In contrast to the former model there is the model of mechanical learning markets. Within this model the integration of academic and vocational education means to constrain module formation in education and the external power of decision-making in the curriculum. The setting of skill standards is the exclusive prerogative of employers and their organisations and the only supportable form of work-based learning is the apprenticeship system. The idea behind this model is characterised by the slogan "work as usual"; despite the upheavals work will always revert to its traditional forms, so in the case of education the simple learning-by-doing formula is sufficient.

The third interpretation is the model of learning networks, perceiving the convergence of education and industry as a dynamic and perpetually changing network process. The integration of academic and vocational education is a process of building up network linkages between the communities of teaching in different educational institutions (inter-relations) and within an educational institution (intra-relations). The setting of skill standards means networks which link the communities of teaching in schools and the communities of working in enterprises. Offering students effective work-based learning presupposes well functioning networks of industries, education and other supporting actors. From the perspective of learning economy these networks form a "meta-community", which can well be called "the multidisciplinary communities of learning".

The analysis of VET (Vocational Education and Training) systems enables identification in several respects of features of the three interpretations mentioned. The whole orientation of educational functions, structures and essential concepts is different. A tentative formulation of the relations between the three interpretations and the types of the orientation of the vocational education is summarized in Table 1. The orientation and implementation of VET is tightly linked to the development of economy, but not only economy, the concepts of learning and knowledge, and the role of training in the individual life course also influence the formulation of education policy.

	Types of orientations of vocational education		
	"Education as usual" CENTRALISED LEARNING	"Learning economy" NETWORKED LEARNING	"Work as usual" MECHANICAL LEARNING MARKETS
<b>Institutional structure</b>	Separated and isolated VET institutions	Multi-disciplinary communities of learning	Industry dominated VET system
<b>Curriculum</b>	Strict, separated, science-based	Flexible, integrated and work-based	Work-based skills
<b>Know-how</b>	Different science-based theoretical skills and divergent action-oriented know-how	Integrated theoretical and action-oriented skills	Action-oriented skills
<b>Learning</b>	Subject-based and teaching orientated model, student is a passive object, academic and practical skills are separated. Importance of formal certification.	Practical training and academic skills are integrated. Student is an actor and institution is construction of learning environment. On-the-job learning. Development of competence is essential	Emphasising on-the-job learning (trad. apprenticeship). Contemporary work skills are basis of training. Learning is directly connected to production of narrow qualifications.
<b>Knowledge</b>	Emphasising explicit type of knowledge	Integration and reciprocity of tacit and explicit knowledge	Simple concept of tacit knowledge
<b>Integration of academic and vocational education</b>	Formal, centralized directed co-operation	Flexible, case-specific integration	Externally specified formulation
<b>Education and life course</b>	Formal training and work are separate periods. Emphasising re-training and further training activities	Personal development and career integrated into formal training. Integration of education and work.	Retraining through new technology or work methods
<b>Definition of know-how standards</b>	Centralised (national or municipal)	Shaping in the interaction of educational institutions and enterprises	Dictated by business life
<b>On-the-job learning</b>	Student is in charge of the practical training	Shared responsibility within educational institution and enterprise	Apprenticeship is emphasised; all needed learning on the job
<b>Orientation of the educational policy</b>	Sectoral policies and administration	Educational policy as an integrated part of regional industry policy	Education policy is subordinated to industry policy

Table 1. Concepts of learning and knowledge in the framework of formal education.

## **Innovation, education and flows of knowledge**

It is fruitful for local economic life and its well-being that the actors of different fields enter into closer co-operation and interaction. In a network combining actors in education and working life, the local innovation capacities and potentials could be better exploited. Such a network combines different modes of acting and thinking into close co-operation, a situation which is in itself a fruitful environment for the creation of new knowledge and innovations. The main point of closer co-operation and interaction between different fields is, however, the need to optimise the local flow of knowledge.

According to Lash (1995, 165–170) working life is at present undergoing a change. The society of mass production is turning into a society of reflexive production. The new paradigm of production means that flows of knowledge are replacing conventional flows of capital. Lean production, flexible production, customer-centred production and anthropocentric production (Alasoini 1993) are all definitions of a phenomenon of increased self observation and self evaluation. The question of quality is fundamental. Effective reflexive production presupposes closer relations between education and industries. Responding to the demands of customers presupposes constant readiness, self-evaluation and self-observation. This concerns both firms, working groups and individual workers. Constant self-evaluation entails workers' higher qualifications and continuous learning at work.

The perspective emphasising knowledge and flow of knowledge, however, is problematic if for no other reason than that the influence of knowledge, education, innovations and other non-material and non-economic production factors on the development of production can be clearly and unambiguously quantified. An understanding of the importance of knowledge and flows of knowledge as a core factor of increased production rests beyond traditional and neo-classical theory, on growth theories emphasising knowledge and innovations. From the perspective of traditional – or neo-classical – growth theories knowledge and knowledge flows are external factors whose importance for growth and the economic success of the community is slight and undefined (OECD 1998, 88). In order to come into being at all, knowledge flows require the adoption in all production and economic spheres of a work practice focussed on continuous learning. In learning the prime concern is the transfer and transferring of knowledge, information and skills from those who possess them to those who need them. Learning from the other side is also an event in which observations and findings help and lead to the processing of new issues and problems. The latter also entails opening up new perspectives for the development and improvement of existing practices (Stern, Bailey & Merritt 1996). What is much more problematic than the general definition is the nature of learning; whether it is an individual or collective event, and if the latter, on what level and in groups organised by what means and in keeping with what mechanisms it occurs (e.g. Lundvall 1999).

Access to a decisive position in the management of knowledge flows is a consequence of the increased importance of innovations as competitive factors. In the ever-widening markets of a globalising economy, innovations constitute the essential content of production. Where once all that mattered was the capability to produce a lot, efficiently and cheaply, what now matters is the capability to manage the knowledge and information flow in the field. The most essential element in the management of knowledge flows is just this ability to learn. Generally learning in an individual enterprise manifests itself not only as improved competence, but also as a sustained and diverse development of small steps to develop products, services, working methods and the entire production. Increasing and improving competence and continuous stepwise development activity are intimately related, and in practical life virtually undistinguishable.

It is exceedingly uncommon for an innovation to be an intellectual and operational overturning of the existing. Thus it is problematic to investigate the companies' innovation activities and knowledge flows. If research focuses on patents signifying a relatively important innovative breakthrough in products or processes, for example, there is always the danger that a major part of companies' innovative activity is not included in the investigations.

When an ongoing change is contemplated as a whole we are concerned with the transformation of conventional industrial operations into a learning-intensive production organisation. Where once there was one comprehensive enterprise with its sub-functions producing readymade goods from raw materials for the market, there is now a network of more or less independent actors. It is likewise possible to arrange education for traditional industrial companies as a part of their own operations, for example, in the form of the company's own vocational school. In a learning-intensive economy producers of education and its recipients participate in the network with other producers as equal partners.

"TRADITIONAL" INDUSTRIAL CONCERN	"POST-INDUSTRIAL" LEARNING-INTENSIVE ORGANISATION
Working capital	Experts
Exchange capital	Knowledge, reputation
Fixed capital	Structure, networks, organisational capital
Investments	Research and product development
New investments	Recruitment
Investments in improvements	Development of personnel
Sale of property	Resignations, redundancies

**Table 2. Traditional industrial concern and the learning-intensive organisation.**

(Source: Kasanko & Tiilikka 1999.)

An enterprise upgrading the quality of its products also tries to optimise the flows of knowledge it uses. According to Kauzo Koike (1988, 182–188) in a modern enterprise the employees' career incentives must be connected to their acquisition of knowledge and information. Likewise, an enterprise's status in the flow of knowledge of the whole cluster is decisive for its success. The increased importance of the flows of knowledge implies ineffectiveness of the conventional separate school system. This also concerns the theoretical analyses: viewing education and industries as autonomous social fields or separate structures does not provide tools to analyse the prevailing situation and the course of development. With a view to innovations and flows of knowledge examining the relations of education and industries as a *network* of co-operation and interaction is more fruitful. According to Lash (1995, 171–173) the central European system of on-the-job learning and local polytechnics has responded optimally to the challenges of optimising the flows of knowledge. The traditional and institutional proximity of education and industry has made it possible to build up a network of high confidence, enabling the transfer of knowledge between schools and enterprises. The base and the core of the local network is the local polytechnic. On a national level the network of universities functions likewise as an umbilical cord for the flows of knowledge.

Joint activity between companies and research institutes is deemed pivotal for the production of innovations. In this process Bartholomew (1997, 5) posits eight factors with special bearing on technological knowledge bases and flows. These factors are the tradition in scientific education, the funding of basic research, contacts to foreign research institutes, the commercial orientation of research institutes, job mobility, risk money markets, technological development of other local fields of technology and national technology policy.

In the model the university, the research institutions and the institutions of higher education are defined as the main creators of innovation. This is supported by the fact that high technology requires special skills and knowhow and specialised human capital which, it is assumed, only the universities can produce. At least in some areas the level of knowhow must meet the highest international standards. According to this thinking the education system must not only concentrate on improving the general level of education, but also ensure the cultivation of extremely gifted individuals and enable them to realise their full potential. This, in turn, is expected to increase the amount of human capital available and improve the preconditions to accomplish innovations. (Bartholomew 1997, 6.)

According to Bartholomew (1997, 8) technology policy may be either *individualistic*, when the government and officials intervene as little as possible in the technological development, or *communitarian*, when the government is active in its participation in co-operation with industry and the universities in the development of technology, the allocation of resources and funding. Finnish technology policy is essentially communitarian.

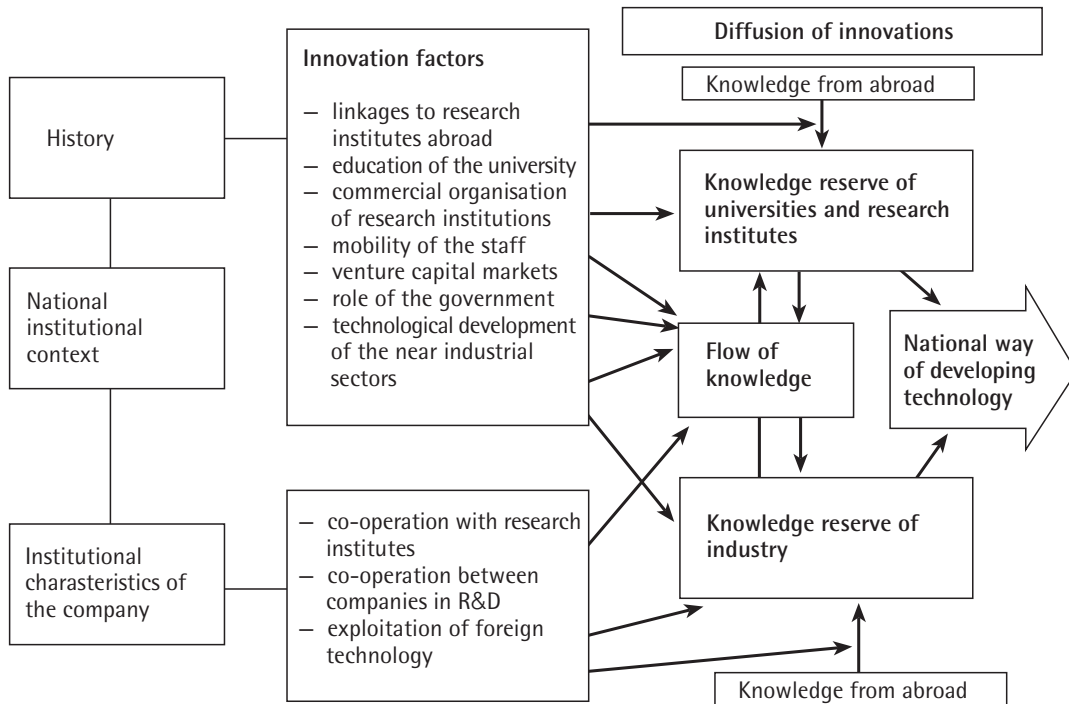


Figure 2. National innovation system.

In the last two decades Finland has indeed invested heavily in the development of a national science and technology policy. For example, in the 1990s the growth in research funding in Finland was clearly above the average for the OECD countries. Finnish technology policy has made a conscious effort to shift the focus of production and export away from low-refined bulk products to products which are more highly technologically developed. One of the most important areas of Finnish technology policy is a selective developmental line directed towards the accomplishment of top-level research. The funding allocated to the companies' research and product development has increased particularly rapidly in Finland. Compared to the other Nordic countries Finland's public research and development funding has been concentrated markedly on industrial innovations. In 1995 only 26% of Finland's research finance was allocated to the universities, while in Sweden and Norway the corresponding figure was 39% and in Denmark 36%.

## **Learning economy vs. education – a global question**

International bodies like the OECD and the European Commission have focused their interest on the problematic question of the relation between economy and education. Numerous surveys have been made and the main trend is an expansion of education in all its forms. Between 1990 and 1998, the average time a child could expect to spend in education rose from 15.1 years to 16.4 years. The rate at which populations attain upper secondary education has risen steeply with each successive age group. The number of students enrolled in higher education grew more than 20 percent between 1990 and 1997 and in eight countries by more than 50 percent. In addition adult participation in continuing education also increased (OECD 2000c). Other indicators also show that the role of education is becoming more crucial all the time; public expenditure on education has grown faster than GDP, the more is spent per student the better education brings significant rewards in terms of employment and pay prospects.

## **Rationale of the research**

In its reports the OECD (2000b, 2001) defines knowledge economy as economy that is directly based on the production, distribution and use of knowledge and information. Economy is dependent on the effective use, creation, acquisition, distribution and use of knowledge. Increasing demand for higher education certificates is usually argued for by changing employment trends between industries (from basic industries to hi-tech industries and services), employment trends within industries (a true upskilling process) and upskilling trends within occupations (professionalisation). International labour statistics shed light on the fact that increase of skills demand is due to all these three categories.

Knowledge economy is learning economy. In this context learning can be defined as a process of the acquisition of competence and skills that allow both the learning individual and the organisation s/he is a member of to be more successful in reaching individual goals and those of the organisation (OECD 2000b, 29). Educational credentials (such as average years of schooling, diplomas and degrees) are only a proxy for competences and skills. The speed of knowledge production and knowledge mediation in the private sector must be balanced by a new division of labour and collaboration between formal and informal institutions of learning. This means that all education and training depends increasingly on



the co-operation of many partners (public, even international authorities, firms, employers' associations and trade unions, that is social partners, schools and colleges, individual students and teachers, researchers) (Gray & Broguard 2000).

The OECD (2001, 36–41) research could not, surprisingly, find any strong relationship between the tertiary education completion rate and GNP ( $r = .27$ ) as it did between secondary education and GNP ( $r = .56$ ). The report speculates for an explanation. Perhaps tertiary education is less crucial for economic performance than secondary education. One reason for this could be that the difference between the lowest level of higher education and the upper secondary level is not very large (ISCED classes 3,4, and 5). Higher education is very heterogeneous: not all degrees affect economic growth to the same extent (engineering and science vs. humanities and social sciences). Upper secondary education produces literacy and numeracy skills and knowledge of work life culture (key competences) and is even less specialised than higher education, which is used more as a selection device.

On the other hand, the economy may be wasting human capital; it does not make effective use of labour with higher education degrees. Economic performance depends on the organisation of work and job contents. The firms have to implement (via the workers) the innovations produced by highly educated experts. Tertiary education attainments are necessary for lowering production costs and for creating technical innovations, but secondary level attainments and social innovations enable reduced transaction costs within firms. (Cf. organisational or social capital.)

The research takes the region as a statistical unit. There are huge regional differences inside the countries compared, e.g., the former East German states have a high education level, but GNP per capita is low. When these states are excluded from the data, the correlation between HE and GNP is  $+ .64$ . The UK correlation is also high:  $+ .66$ .

The OECD report "Knowledge Management in the Learning Society" contrasts school learning and on-the-job learning in the following way (OECD 2000b, 55.)

If the epistemologies of school and work are as contradictory as this table suggests, they must be brought closer to each other. School can no longer be seen as a place or a building but as a node in a network of interactions. New economy points to the necessity for effective partnership between private sector actors (firms) and educational institutions of the public sector (upper secondary and higher education). Teachers must break the isolation of classrooms in order to share semi-formalised knowledge on learning and teaching among themselves and with partners. In the development work for education it is necessary to find ways of making teachers aware of existing internal and external networks, to strengthen these networks, and to learn how teachers can deploy the networks in their own professional interest (OECD 2000b, 75).

"In doing school" knowledge is"	"In doing a job knowledge is"
<ul style="list-style-type: none"> <li>• declarative (facts)</li> <li>• usually explicit</li> <li>• easily stated</li> <li>• abstract</li> <li>• logical</li> <li>• in the mind</li> <li>• an end in itself</li> <li>• remote from application</li> <li>• learnt sequentially</li> <li>• linked to the text</li> <li>• stored in semantic memory</li> <li>• usually fragmented</li> <li>• a stack of information</li> <li>• to be remembered</li> <li>• forgotten quickly</li> <li>• rehearsed during revision</li> <li>• tested by examinations</li> <li>• a process of acquisition</li> <li>• tenuously related to identity</li> <li>• linked to being taught</li> <li>• learning before doing</li> </ul>	<ul style="list-style-type: none"> <li>• procedural (how to)</li> <li>• often tacit</li> <li>• more easily demonstrated</li> <li>• concrete</li> <li>• intuitive</li> <li>• embedded in action</li> <li>• a means to an end</li> <li>• close to application</li> <li>• learnt piecemeal</li> <li>• linked to persons/events</li> <li>• stored in episodic memory</li> <li>• usually integrated</li> <li>• a stock of experience</li> <li>• to be understood</li> <li>• forgotten slowly</li> <li>• rehearsed through practice</li> <li>• tested by performance</li> <li>• a process of engagement</li> <li>• strongly related to identity</li> <li>• linked to being trained</li> <li>• learning in doing</li> </ul>

**Table 3. Schooling vs. apprenticeship.**

(Source: OECD (2000b) Knowledge Management in Learning Society.)

Two of the most alarming indicators of the mismatch between education and work are the high youth unemployment rate and the lengthening transition period from school to work. The OECD (2000a, 10) thematic review suggests that special transition policies are needed. The basic goals of such policies should include:

- high proportions of young people completing a full upper secondary education with a recognised qualification for either work, tertiary education or both;
- high levels of knowledge and skill among young people at the end of the transition phase;

- a low proportion of teenagers simultaneously without education and without employment;
- a high proportion of those young adults who have left education for a job;
- few young people remaining unemployed for lengthy periods after leaving education;
- stable and positive employment and education histories after leaving upper secondary education;
- an equitable distribution of social and economic outcomes by gender, social background and region.

The OECD study points out that transition policies cannot be made effective in a vacuum. Successful transition systems need a healthy economy and well organised pathways that connect initial education with work and further studies. It seems that systems in which students are evenly spread over three principal pathways (apprenticeship, school-based vocational or general education) have advantages in achieving effective transition outcomes, because the young have wider choices to integrate into society. What has been done in this respect in OECD countries includes the following examples:

- diversified links from vocational training to tertiary education;
- increasing vocational content in general education;
- specialisation delayed and the vocational programmes fewer but at the same time broader;
- increasing liberal content in vocational training;
- modular curriculum structures and personal curricula;
- expanding non-university sector of higher education.

Changes in job and career patterns, choices open to students after compulsory education and the growing flexibility of labour and education systems create a network of dependent choices which a young person cannot manage without the help of good information and guidance and tightly knit safety nets for those at risk (dropouts) (OECD 2000a, 13–21) .

The IPTS (2000, 66–67) Futures Project (1998–2000) identified three areas of skills gap and shortage for the coming years in the EU area. The first area is the lack of highly qualified research and development personnel. The project estimated a need for 1.6 million ICT (Information and Communications Technology) vacancies to be filled by the year 2002. But also life sciences and other sectors with cross-disciplinary skills are rapidly expanding. As an example the report cites mechatronics, which requires a combination of skills in materials, chemistry, engineering and informatics. The project takes the view that Europe is “under powered” in RTD labour force: EU 5 researchers per 1 000 workers, USA 7/1 000 and Japan 9/1 000. The second issue is net capability and basic network literacy, because the number of new ICT users is increasing constantly. The third mismatch is more social in nature. The decline of traditional families, rising divorce rates, single parent families,

more women working, people having multiple jobs blurring leisure time and work time boundaries, "24-hour-society", time pressures on both individuals and firms etc. This development – the project calls it the emergence of the Mosaic Society – has profound employment and other social implications: short term contracts, self-employment, freelancing and outsourcing, polarisation of skills demand.

## **Role of VET providers in innovation networks**

Today, the most fruitful approach to research can be found by using the concept of regional networks (or clusters) of expertise, which is closely linked to the idea of a learning region (CERI/CD (99) 10) well attuned to the requirements of the learning economy. The concept of a 'learning region' offers a suitable basis for the analysis on the role and working of secondary vocational schools and polytechnics in new conditions. This, however, assumes that the 'learning region' must be viewed in the widest economic, social and environmental terms.

The model of a learning region comprises a number of different elements. The firms in the learning regions are globally competitive and the basis of this competitiveness is the innovative capacity in firms and in the regional (network) system (Maskell & Malmberg 1999; Castells 1996). Individual learning, both through formal education and learning-by-doing, is a necessary condition for the high level of a region's innovative capacity (Edquist 1997). In a learning region, individual learning should be tailored to the needs of the regional economy. Regional education should be flexible enough to adapt to the changes of regional economy, but it should also be proactive enough to promote the necessary development in regional economy. Organisational learning in regional networks provides the key to high levels of innovative capacity. A learning region is characterised by regional institutions which facilitate individual and organisational learning.

The study considers education as a potential participator in regional networks, and the theoretical framework of the study will be constructed through adaptation, re-combination and analysing of the following three concepts: learning as a social and contextual event (e.g. Jarvis 1992; Resnick 1987; Tuomisto 1998), social capital (Woolcock 1998; Maskell 1999; Nahapiet & Ghoshal 1998), and on-the-job learning. The concept of 'contextual learning' refers to such phenomena as team learning, organisational learning, etc. By social capital we mean something that exists in people's everyday interaction in networks and only in them. Social capital is not an individual entity. The importance of social capital for education is in the fact that social capital strengthens and increases the accumulation of intellectual capital. In this study, we are interested in the configuration and functions of social

capital in regional networks of educational institutions. A third concept is on-the-job learning as a contextual and social capital-creating event.

Focusing the flows of knowledge and relations between education and industries the conclusion of the high standing of knowledge has also articulated the problem of the importance of *social capital*. The concept of social capital refers to an actor's attachment to the network of social interaction and support. Social capital is something other than the traditional human capital, and it is something one can cultivate only in conditions of social interaction and co-operation. The aim of the project is to study the interface between human and social capital and the question, how the social capital of the environment can support formal education. High social capital or fixed relations of social interaction make it possible to codify tacit knowledge into a transferable form (OECD 1996a, 1996b, 14; Hatchuel & Weil 1995). In this way social capital has close connections to social innovations and innovations in general. The project checks the connections of recent reforms in Finnish vocational education and training with the research in progress. Two programs of the OECD: 'Schooling for Tomorrow' and 'What works in innovation in education' are particularly interesting.

The technological and social developments require that the role of the VET organisations should be changed, the traditional target for initial, regular course delivery should be combined with new targets and strategies for adult training and innovation facilitating activities. VET providers should define their own specific roles within innovation networks and they should look for strategic alliances with other knowledge providing institutions in their regional context (Nieuwenhuis 1998). According to Rosenfeld (1998), VET organisations should develop the following four activities to support technology diffusion and innovation:

1. Education as a gateway to the workplace.
2. Adaptation of the workforce to new technology by upgrading skills and retraining.
3. Acceleration of the deployment of new technologies through establishing an intermediate role in several forms.
4. Establishing of networks of learning companies and learning communities.

The increase of on-the-job learning as an element in vocational education is a phenomenon related to the convergence of academic and professional education. According to Berryman (1995) learning which attaches students to practical situations in working life can promote and enhance their theoretical and abstract comprehension. Increasing the work-related learning – such as integrating academic and professional education – is a global phenomenon; in German-speaking central Europe and in Denmark on-the-job learning based on the apprentice system is a tried and trusted method (Metsä-Tokila, Tulkki & Tuominen 1998), in the UK a similar system was introduced in 1988 and 1992 (Sweet 1995). Throughout the 1990s France, Australia and Sweden arrived at their own solutions (Stern, Bailey & Merritt 1996).

In principle there are two ways to arrange on-the-job learning; one is the traditional apprentice system and the other the acquisition of working experience linked to learning at school. The former practice is used in German-speaking central Europe. In the UK what is known as the modern apprenticeship system was introduced in 1992 for 16 and 17 year-olds without any place to continue their studies. At present some ten percent of the age group are now within this system (Sweet 1995). In 1994 Spain passed a new law on apprenticeship (Planas 1995). In Holland the number of apprentices increased by 50% in the period 1986 – 1992 (Streumer 1994). Australia has followed the example of the UK in introducing a modern apprenticeship system. In Finland in the past ten years the number of apprentices has risen from 8 000 to over 17 000. Superficially it would appear that the apprenticeship model is internationally favoured.

In point of fact the age of those in apprenticeship has risen significantly. For example, in Finland the share of those under the age of twenty when embarking on apprenticeship fell from just over 50% in 1981 to approximately one tenth in 1995 (Peltomäki & Silvennoinen 1998). This rise in the average age of apprentices is a pan-European phenomenon, for example in Holland the average age is considerably higher now than it was in the 1980s (CEDEFOP 1995, 7–8). What lies behind this rise in the average age is the connection of apprenticeship education to national employment policy, which has made it a means of educating the adult population for a vocational qualification. In Finland the development has led to a situation in which vocational education is virtually reduplicated. Basic education has come to assume the role of providing the meta-competences required for working life, while apprenticeship education provides the special skills required in specific workplaces.

While in some countries the faith in old apprenticeship systems more or less endures, and in others new comparable systems are introduced, there is a third group which has set about developing forms of teaching and learning which connect formal education and working life together. In France both secondary vocational education of two years leading to a diploma and the three-year courses of the technical institutes of the universities have added an extensive period of on-the-job learning (OECD 1994, 118). In Australia, too, secondary vocational education has come to include on-the-job learning, which did much to increase the popularity of training programmes. Whereas before approximately one third of the age group completed vocational education, after the reform no less than three quarters do so (Sweet 1995). In Canada it is possible to take high school education according to a hybrid model which includes working life periods. In 1992 Sweden increased the duration of secondary vocational education to three years and a period of on-the-job learning of some six months was added (Gustafsson & Madsén 1995).

The most significant advances in combining education and working life this decade have been achieved in the field of formal vocational education leaning on the educational institutions. This is natural if only because within the system relying on the educational institutions it is possible to advance simultaneously on

all three main fronts; to promote the integration of vocational and academic education, to intensify co-operation and interaction with working life in the area of determining standards of knowhow and to offer students opportunities to acquire both theoretical and working skills and for the fruitful combination of these two learning processes. In the light of this it is in no way surprising that in Germany the dual apprenticeship system is coming in for increasing criticism because of the uncertain position of the educational institutions (Rauner 1995; OECD 1994, 123). In the opinion of the critics the dual system should in future be developed in such a way that the extent of theoretical studies in the institution, its position and importance should be stressed alongside study at the workplace.

Institution-based apprenticeship learning can be arranged in numerous different ways. The most traditional of these is to arrange on-the-job learning in the form of practical training. This model is known throughout the world. In Finland there are two different traditions in the implementation of practice at a workplace. In the technical fields it has been common for students to undertake practical periods during holiday times, and their implementation has been entirely at the responsibility of the student and the employer. In practice the student has concluded a normal but temporary work contract and the educational institution has had no pedagogical or other interest in its successful fulfilment. In education in the fields of social and health care a different method has been in use. Such periods have been called practical study and their progress has been carefully monitored and supervised by the educational institution. The responsibility of the supervising teacher has been at least as great as that of the student and the person nominated at the workplace. The direction of the reform carried out in Finland at the end of the 1990s would appear to be one of extending the model of social and health care education to cover the entire field of vocational education.

In the USA in particular the model of enterprises operating in connection with the schools has been popular. No less than one fifth of vocational institutions have a connection to an enterprise so integrated (Stern 1992). The law of 1994 (*School-to-Work Opportunities Act*) mentions the enterprises specified by schools as one form of work-related learning. The research suggests that students consider practical training completed at enterprises operating in conjunction with schools to be an effective and supportive method (Stern et al. 1994). In Finland similar arrangements have been made, especially in the field of forestry and wood and in the hotel and catering educational institutions, but there are also examples in other educational fields. In a certain sense the teachers' training schools, the university hospitals and the teaching social centres can be said to have implemented such a model.

At the beginning of the present decade in Denmark workshop schools known as production high schools were set up for young unemployed people. In these general and professional education were combined and the young unemployed were offered an opportunity to complete a basic vocational qualification. In 1992 there were 120 such schools in Denmark with 9 000 students (Danish Ministry of Education 1994, 132). In Finland workshop activity arranged in the same way in

the 1990s as a form of work-based vocational basic education has increasingly replaced apprenticeship education. In 1995 the number of new apprenticeship agreements concluded with those under the age of 20 was just over 1 000 (National Board of Education: apprenticeship statistics; Peltomäki & Silvennoinen 1998, 53): in the same year the number of those beginning in workshop schools was almost 2 000 young people (Virtanen 1998, 139). Whereas in 1992 there were 60 workshop schools in Finland, this number had risen to 350 in 1997 in a total of 177 municipalities (Virtanen 1998; Pihlaja 1997; Arminen 1996). The number of innovative youth workshops apparently increased towards the end of the decade at least because their establishment has been fostered by ESF (European Social Fund) funding.

## **Research questions and analytical framework**

The study contributes to the Sitra's Research Programme on Finnish Innovation System by contemplating the educational system as a part of the regional innovation network. The research task of the study is defined as: *How could the current vocational education system respond to the challenges of the learning society?*

The study is guided by five research questions:

1. What is the role of the upper secondary vocational and polytechnic education in the innovation system?
2. What is the coherence between the changed occupational structure and the structure of training supply of the polytechnics?
3. Are the modernised programmes targetted at improving the role of polytechnics as an active partner of the regional innovation network?
4. What is the responsibility of VET providers and industries for developing competencies?
5. What kind of network have VET providers built up and what are the forms of interaction with other actors?

The analytical framework of this study aims to identify both structural aspects and forms of actions of the VET system as a partner of the learning community and as an actor in the innovation network (see Figure 3). From the VET point of view, the main partners in the region or sector are other educational institutions, regional development agencies, industries and the public sector, and universities



and research organisations. The forms of interaction are numerous. There are formal and informal connections between partners, actors could be administrative staff, teachers or students, and increasingly students write their theses for companies, co-operative projects are implemented, and on-the-job training will be an obligatory part of studies.

The following framework is a methodological basis for the collection and analysis of data and research information. It is theoretically related to recent innovation studies and it is also connected to the aims of national and European education policy. It will be an instrument to demonstrate the weaknesses and strengths of the VET system for policy recommendations.

- (1) The structural operational environment can be described as a regional network. In this network there are various more or less independent VET actors, industrial actors and other actors.
- (2) Action in the regional innovative network of learning is always a co-operative and interactive process. We find that every junction in a network is a place for learning, and that learning exists all over the network, also between junctions. Such a composition implies that there are various kinds of actor communities with various backgrounds taking part in the learning process. It also implies:
  - (i) a permanent situation, in which the regional actors of education and the actors of industry can learn from each other (in the network the actors of education can learn from each other and the actors of industry can learn from each other as well);
  - (ii) a mode of action which understands every learning event as an interaction and co-operation event between various regional educational communities and various expertise communities in industry;
  - (iii) integration of different types and forms of vocational education and training, and integration of general education and vocational education (integrated education);
  - (iv) co-operation and co-ordinated management of education, learning, competencies, and skills.
- (3) The frame of reference we use also implies new focuses and domains for the research of competencies and skills. Most interesting is the *logistics of knowledge* in the network of education and industries. It is easy to assume that the logistics of knowledge is at the core of the management of knowledge and competencies on regional and even wider levels. Research on the logistics of knowledge studies the mobility of workers, knowledge and skills. It is also interested in the structure and function of the network of education and industries.

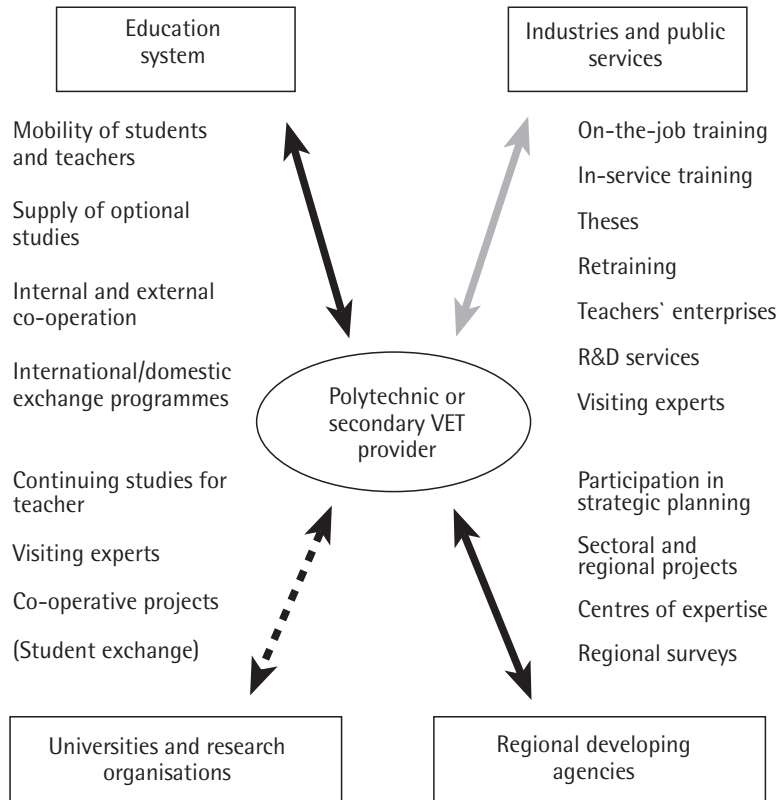


Figure 3. A framework for network analysis of VET institutions. Actors and forms of interaction.

## Data collection

The research data consist of statistical data as well as of planning and implementation material from the educational institutions and interviews. We used the statistical materials of Statistics Finland and the AMKOTA database. Statistics Finland offers information about employment, unemployment, and the work placements of graduates. The AMKOTA database, which is maintained by the Ministry of Education, provides information about the activities of polytechnics by study field and polytechnic (e.g. number of applicants, those selected and the drop-outs in the polytechnics, theses carried out in co-operation with working life).

We chose five fields of education for more thorough research: education in the fields of natural resources, electronics, logistics, social services, and design. Researchers conducted 45 theme interviews with the representatives of these fields during the February 2000 – September 2000: 16 interviews were made in secondary VET schools and 29 in polytechnics (17 interviews with leaders of degree programmes and 12 with students). Student interviews were carried out in groups of three, altogether 35 students (see Appendix 1). All interviews deal with the following theme areas: the development of the educational institution, the internal co-operation and development of the educational institution, working life relations, research and development projects with internal and external partners, students' placements in working life and the status of the educational institution as a regional actor (see Appendix 2). The interviews were analysed with help of the Atlas/ti programme which is a workbench for qualitative analysis. Atlas/ti offers tools to extract, compare and explore meaningful pieces of certain theme areas from extensive data (see an example of one possibility of Atlas/ti analysis in Appendix 3).

# 3

## THEORETICAL BRIDGES BETWEEN ECONOMY, FORMAL AND INFORMAL LEARNING

Before it is possible to produce know-how at school or at work, a conceptualisation of its nature and contributory factors is required. This chapter looks at the fundamental concepts and components of know-how, and does so from the perspective which has levelled criticism at the inability of the conventional, institution-centred vocational training, largely divorced from the working community, to respond to the changing demands of knowledge work in the global learning economy. The school-centred model assumes that experts with a theoretical command of the profession can produce operational know-how in the novices they have to train, in other words, offload their own knowledge and skills to beginners. Here we consider more versatile modes of learning. (See Raivola 2000a.)

### Qualification

The tradition in positivistic science and industrial work based on a rigid division of labour perceives the worker's know-how as a list of skills which can always be noted and even measured objectively, i.e. independently of who is measuring and in what situation. All that has been disputed is whether the features of qualification appertain to the worker or the work. If they appertain to the individual, his/her battery of skills, then the various components can be ascertained through tests and observations. Indeed, such elements in the work process as consecutive work

stages, speed of accomplishing tasks and precision, co-ordination, etc., are easily observed. Meticulous task analysis will show if they are a characteristic relevant to the work, the know-how required by a given profession. To discriminate between two uses, we have begun to talk of workers' characteristics as qualifications, and characteristics appertaining to the work as qualification requirements. Whichever approach is taken, it represents technical functionalism, the combining of what the work requires and what the worker is able to do. It is believed that it is possible to derive from the work the capabilities required, produce them in advance through education and practical training and then match up the best trained workers with the most demanding tasks (the match of work and worker). In this view, success in education offers the best prognosis for success at work. Because not all the tasks in various contexts emerging at work can be anticipated and practised, the thinking places great faith in the importance of the transfer effect: a command of professional skills demonstrated in simulated condition in the educational institution and in real but randomly selected situations in the practical training can be transferred to any new work context whatsoever. Functionalistic thinking also rests on the theory of human capital, which uses the length or success of studies as an indicator of the amount of investment made in the worker. The economics of education has unambiguously perceived the amount of education (in terms of academic years or levels) as activity which will increase the individual's and the organisation's productivity. The quality and content of education have seldom appeared as explanatory factors for the productivity of work. (Raivola & Vuorensyrjä 1998.)

Yet there have been more and more complaints that the gap between formal education and practical know-how is becoming wider and wider. What is learned at school does not translate into know-how for working life. The researchers have identified numerous discrepancies between the school's conception of knowledge and the formation of knowledge and every-day learning. The connection between school achievements measured in terms of grades and points and work achievements measured in earnings has become dubious, to say the least, once other factors with bearing are held constant: working experience, field of production, professional title, cultural traditions, gender, economic state of society, demand for and supply of labour, social networks, age, race, religion, etc. Likewise, it has been noted that those classified as unsuccessful at school cope with practical tasks requiring a comparable degree of cognitive ability when these have relevance for those accomplishing them. Sternberg (1990) and co-workers have indeed isolated a practical intelligence factor which does not correlate with the dimensions of traditional measures of intelligence.

When over 4 000 American companies were asked on what bases they selected their workers, the result was the following summary of responses as means on a five-point scale (Stasz & Brewer 1999):

Applicant's characteristic	Order
attitude	4.6
communication skills	4.2
previous work experience	4.0
recommendations from current employers	3.4
previous employer recommendation	3.4
industry-based credentials	3.2
years of completed schooling	2.9
score on tests	2.5
academic performance	2.5
reputation of applicant's school	2.4
teacher recommendations	2.1

**Table 4. Factors with bearing on recruitment of workers.**

(Source: Stasz & Brewer (1999).)

Employers clearly have little faith in direct school indicators on the suitability of workers. Thus there is a suspicion of formal qualifications. (It must be noted, however, that the factors at the top of the list are not independent of school.) Evaluation of the productivity of personnel training has led to the same nonplussed state. Assessments by inferiors, peers and superiors after training regarding the work achievements of the recipient of training (Behavioural Observation Scale) have not been able to demonstrate improved achievements in work. It would appear that the concept of qualification and the educational activity it occasions are becoming inadequate. Qualification has been taken to be the mastery of predefined technical and practical rules and modes of operation, technical skills. The content of the concept has remained static and prescriptive, closed and to be defined in advance. It largely reflects the backward functional and hierarchical division of labour. Perhaps what is most problematic is that qualification has been understood as a socially isolated characteristic of the individual. Moreover, it has been derived from the concept of profession or occupation, which itself is becoming inadequate as a concept to describe varying work positions. We have been burying the concept of qualification alongside the paradigm of positivistic science.

There has been a desire to replace these with a powerful model of interactivity which consistently links the social and physical context of work, worker and his/her work role, work object and tasks. In this model, context is not only a tautological background factor but exerts active influence on activity and on shaping it. The other essential difference from qualification thinking is that the individual's dormant skills are not yet know-how. Skills are to be socially validated in the community of practice and in problem-solving situations. The next section presents a brief description of the components of this model (see Kirschner & Van Vilsteren 1997).

Whether we use qualification or competence as a concept for the required know-how, the problem remains that the referent of the concept varies. Ellström (1997) illustrates this with the following Figure 4.

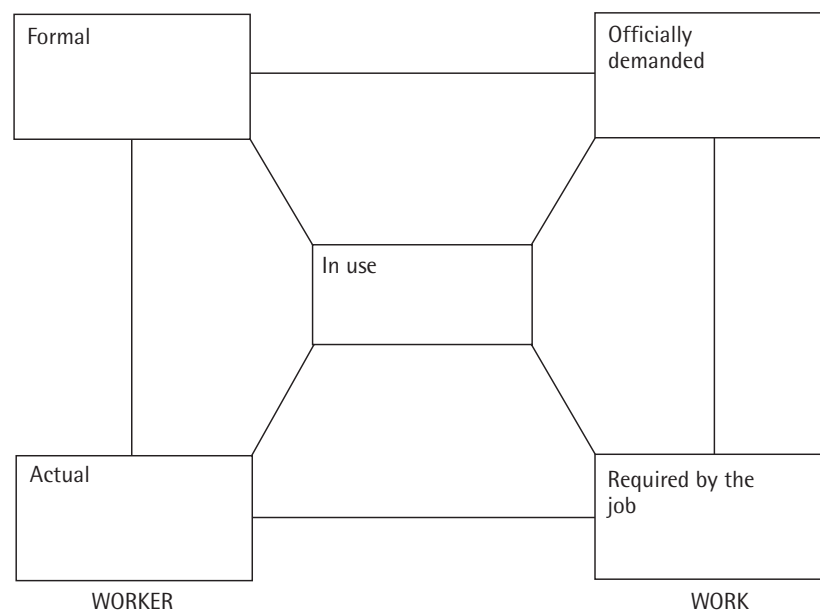


Figure 4. Perspectives on qualification. (Source: Ellström 1997.)

Formal qualification can be seen in the curriculum and on the degree certificate; actual success in achievements at work. The bases for recruitment and selection are frequently official qualification requirements. This is the way in regulated professions in which the precisely defined formal qualification frequently constitutes the condition for being judged competent. The know-how the job demands may be utterly different from the qualifications produced by education. A person with the education of a design engineer may take up a post of a managing director, a teacher or a salesman in which it is the work itself which teaches the worker what to do. Personnel management is seldom interested in the know-how in use and thus leaves a great part of the individual's capacity unexploited, or then keeps people in the wrong jobs where they are compelled to work beyond their capacity.

## Knowledge

Information is a set of data devoid of thought. It can be compiled into information and data banks, but if such compiling has nothing to do with its end, the bank becomes a warehouse from which it will later be difficult to retrieve what is needed. The strength of information units lies in the fact that they can be given different representational forms, they can be coded for different systems and communicated in different channels. Because information lends itself to coding and storing, it may also be accumulated and retrieved. Information stores or, indeed, *department* stores produce different kinds of *specialist* stores capable of catering for the specific information needs of the customer.

When pieces of information are put together and into a context, they can be assigned a meaning, sense, and so we have knowledge. Information has been linked to the individual's mental models. The assigning of meaning is a process in which the person who knows constructs a social world to sustain himself and other actors. This is identity building, a definition of the self and the world. It is a retrospective savouring of experience, for today takes its significance from yesterday, which is reinterpreted in light of today's knowledge. Knowing activates and constructs environment. The individual is a part of his context. Knowledge is a social, shared interpretation; it is information harnessed for use. Knowledge undergoes constant reconstruction and review. This is no static condition, the referent of nouns, (knowledge); it is a process, the referent of verbs (to know), a flow with its interruptions, turbulence and changes of direction. It is reinterpretation, renunciation of the old. Knowledge is a stock concept (as is human capital); learning is a flow concept. Knowledge is more than a mere true belief corresponding to reality, as philosophy would have us believe, it is an interpretation arrived at on the basis of clues picked out of entities endowing observations with sense. The context provides the necessary clues but also the frame of interpretation for them. The definition of knowledge is not precision but credibility, probability and sufficiency for its intended use. Thus knowledge is constructive, social and pragmatic (Weick 1995).

Cognitive psychology and philosophy have numerous labels to slap on concepts of knowledge: 'knowing that', declarative knowledge, conceptual knowledge, propositional knowledge, verbal knowledge, substantive knowledge, explicit knowledge. More often than not what we have is demonstrable 'what' knowledge. 'Why' knowledge comprises causal relations, mastery over norms and rules, while 'how' knowledge comes from rules of thumb and working habits. Thus what we know is a question of the representation, presentation and interpretation in a certain area of consciousness of facts, principles for operation, theories and values. The OECD (2000a, 1–6) report on knowledge management differentiates seven types of institutionalised work-related knowledge: 1) official discourse (cf. Ellström), 2) diversified, isolated and hierarchical scientific knowledge (concepts and



structures), 3) organisational and bureaucratic knowledge (systems), 4) network knowledge (social and technical), 5) technical know-how knowledge (substantial, expertise, learning to learn), 6) labour market knowledge (to get and keep a job), and 7) problem solving knowledge.

Obviously, the quality and object of knowledge vary from case to case, it is content-specific, but the factor they have in common is that they can be learned, committed to memory and regurgitated for use. Knowledge can also be learned "in one fell swoop" and it can be stored (remembered) in the form in which it was acquired. Yet not even the acquisition of a vast amount of knowledge means that it can be applied forthwith, i.e. that it can be invoked in a problem-solving situation. What is also necessary is the skill to handle knowledge. Thus a large store of knowledge is a necessary but insufficient condition for expertise. Tuomi (1999, 294) proposes the following aspects of knowledge as resources, restrictions and results and links the functions of knowledge to these properties.

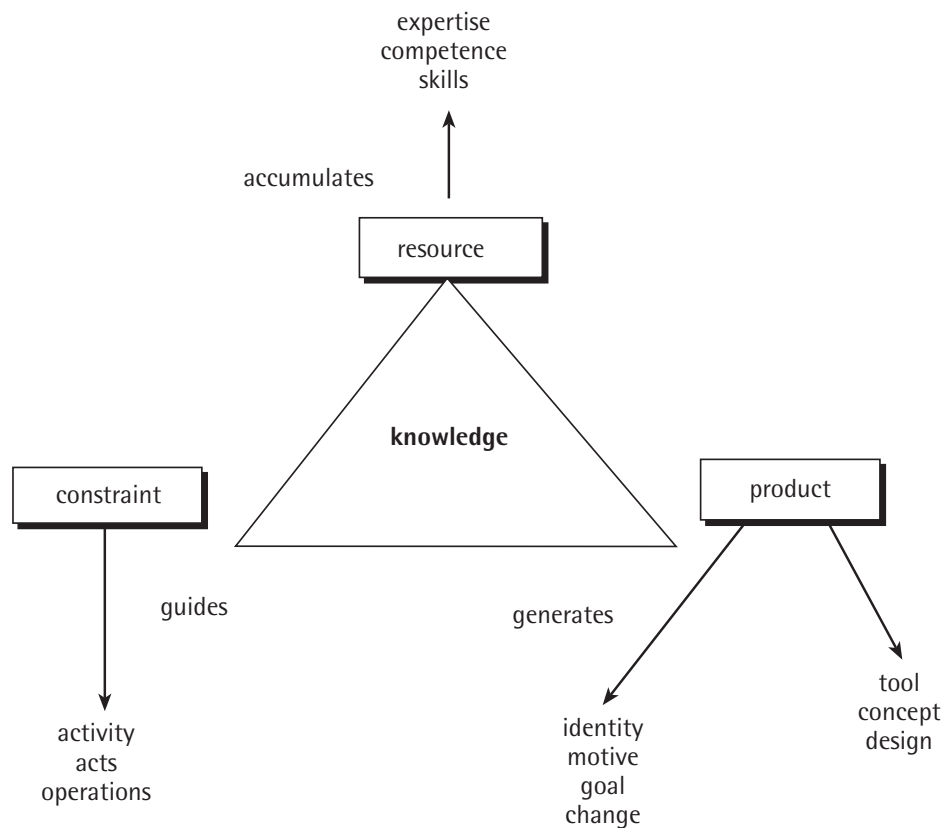


Figure 5. Three perspectives on knowledge. (Source: Tuomi 1999.)

It is commonly argued that the problem with school knowledge is the lack of transfer or transposition. The conversion of information about another person's practice into one person's know-how, that is, the conversion of abstract information into applicable procedural knowledge is the very essence of transfer. The OECD (2000b,75–76) report uses the concept of knowledge transposition of knowledge disseminated from one place (school) to another (workplace). This is an essential differentiation, because it implies the importance of networking as a key to successful schooling. The new media make possible the efficient sharing of codified knowledge, but it can become de-contextualised and thus difficult to transfer or transpose. Knowledge has to be situated, and tacit knowledge requires people to meet.

## Cognitive skills

Knowledge can either operate or be operated. In economic activity knowledge may be used as a tool or it may be taken as an object or a product. Various names have been applied to operating knowledge: procedural knowledge, mental processes, knowing how, intellectual skills, strategic knowledge, cognitive strategies, problem-solving skills (the structure of those skills), syntactic knowledge. What is common to the application of the concept is that we are concerned with mental processes of the highest order: knowledge is built up and shaped or applied to problem-solving. Cognitive skills are difficult to identify and hence also difficult to measure; they do not leave immediate traces. The only way is indirect and interpretative: an action situation must be constructed and conclusions drawn on the basis of the end result of activities or the process at that time as to what and to what extent cognitive skills have been used. Thus the decision-makers must of necessity have a precise advance conception or a theory, regarding the relation between surface and latent behaviour.

Building up cognitive skills is time-consuming, and demands practice and situations in which those skills can be refined, accelerated, trimmed and, if necessary, changed. Therefore, a great amount of feedback is indispensable to the development of skills. The feedback may come from the external results of activities, but also from internal action processes. This we refer to as reflecting or cognitive mentoring.

Thus knowledge can be mentally processed. The objective is to create new assemblies of the acquired knowledge and apply this new knowledge to old structures. The result of such operations, to use the modern term, is virtual products, new constructs of knowing which, for example were arranged as early as the 1950s by Benjamin Bloom into a hierarchical taxonomy (remembering, analysis, synthesis, evaluation). As a product of these operations the new knowledge is added to the existing knowledge, reshaping prior knowledge, if necessary, on a

higher conceptual plane (cf. concept hierarchies). New relations of the particles of knowledge come into being, particles which were never connected before and now connected, new derivatives are realised, contradictions are found and connections spring up between different domains of knowledge.

Thus knowledge can also be used as a tool with which to react to external reality. Then the operation has external criteria, perceptible traces in reality. In implementing his plan the actor navigates back and forth between action and reflection, doing and thinking. This is therefore procedural knowledge, categorised by Bloom as the application of knowledge. The outcome of the operation is frequently empirical information, which can be encoded and thus communicated outside the temporal and spatial context. This is then explicit knowledge to be passed on to others.

## Competence

Competence shares a common etymology with competitiveness, which the EU's Joint Research Centre defines as an ability to maintain and develop economic activities in order to generate wealth, employment and a sustainable quality of life for its citizens (IPTS 2000, 82). The logic goes that the learning system has to produce effective competencies in order to make the economic system competitive. Thus from the school's point of view knowledge can be seen as an input to competitive economic activity in the shape of individual or organisational competencies. But knowledge itself does not contribute to economic growth. It has to be incorporated into the production of goods and services. On the other hand, from the firm's point of view knowledge is also an output (cf. Tuomi), that is creation of new knowledge in the form of innovation – knowledge that is in demand by clients and consumers.

The new theories of learning react with caution to the extensive transfer effect which has earlier been invoked to justify the teaching of disciplined mathematics or dead but extremely logical languages. For example, we cannot teach general problem-solving skills; problem solving must be linked to some specific field of knowledge (content) and purpose for the solution. Learning is thus situational, as indeed is the application of learning. In addition to declarative, procedural and strategic knowledge there is a need for situational knowledge. The problem-solver must therefore use his substantial knowledge and cognitive skills in the analysis and interpretation of the messages conveyed by the environment. Competence is more than skilful action and skills which are an application of knowing-that and knowing-how. Competence further requires strategic and situational knowledge about when and in what combinations knowledge is applied and when it is advisable not to apply it. The competent actor is capable of a creative approach to

unexpected and unforeseen situations. He can break away from former behavioural models, unlearning them, if necessary. An organic part of competence is also mastery over the social context, as skills are seldom applied alone and in isolation. Competence can be discerned only in the setting of the activities of collective work or a collective working environment. The concept of competence is close to that of skillful action, whose additional attributes, however, include the confidence of the worker in his own abilities, which entails the willingness to take risks and the will (motivation, attitude, values) to use his own competence. There is a strong component of the emotional and the social in competence. The central concept emerging is work and actor environment with shared values, attitudes to clients and the employer, the way of perceiving aspects of work and the working environment and common identity. In such communities, know-how is collective, cumulative and spreads without guidebooks and manuals. In order to amplify the preceding division, we now need a new division into explicit and implicit, or latent knowledge.

Knowledge is a potential accumulating over time and enabling a certain kind of expertise. Tried and tested, it is seen as competence, and in intense use it appears as expertise. Knowledge is also structured in a manner which defines individual actions and functions to be more efficient and more appropriate than others. As a product, knowledge can be bought and sold, and used to overcome existing limitations, that is, as innovation. It is on the basis of knowledge that objectives are set and by using knowledge that they are achieved. Knowledge creates the identity of the individual and directs motivation. From shared knowledge it is possible to shape the competence of an enterprise.

## Tacit knowledge

The concept of tacit knowledge became familiar for the first time in the 1940s when coined by Polanyi. When we perceive something, the object of our interest is central and stands out focal and clear, but, in order to stand out and have meaning, it needs a background. Polanyi stresses this background, the importance of peripheral knowledge in interpretation. This is a condition and requirement for focused knowledge, which is set against a background. Thus there can be no explicit knowledge without marginal background knowledge. This way the two types of knowledge cannot be distinguished, and, for example, studied separately. In the mastery of tacit knowledge the heart of the matter is that the meaning structure of the object changes in such a way that something of the tacit knowledge in the background becomes focal and can be utilised, rendered explicit or articulated (Tuomi 1999).

Polanyi's fundamental idea is that true invention cannot be directed by formal rules and algorithms. All knowledge is constantly both shared and public and also personal, because knowledge is invariably accompanied by the feelings and attitudes of the person knowing it. Therefore, tacit knowledge underlies all knowledge, because explicit and articulated knowledge merges with the individual's unique experiences. Thus there are two dimensions to knowledge, focused knowledge, namely the object of knowing and tacit, namely the processing of that object. These are mutually complementary, symbiotic and strongly situation bound. Tacit knowledge is a process aimed at activity, not a defined state. It is also in a state of perpetual change and constitutes a filter through which new knowledge is assimilated. New experiences are digested by means of the concepts which the individual has at his disposal and which he has inherited from other users of the same culture.

Socially disseminated cultural knowledge is passed on through tradition and language from one generation to the next and from one generation of originators to the next. They select, store and use accumulated knowledge efficiently in the culture in which the tradition originated. Personal knowledge is therefore not a subjective opinion. It is a way conditioned by the culture of perceiving one's own reality. Tradition hands down modes of action, rules, norms and values across time and continually recreates social order. Tradition has no written rules, no objective or centre of power. It transfers and continues regardless of organisational boundaries.

Polanyi was particularly interested in how to transfer knowing as a process from one person to another. He arrived at three means of knowledge transfer: identification, imitation and learning by doing. Learning from tradition entails exposure and submission to authority. But authority is no longer determined by seniority but rather by the skills of the master and experience in the matter to be learned (see Sveiby 1999).

Explicit knowledge is declarative 'knowledge that' or clearcut normative procedural 'do this' knowledge. As it is general knowledge, it can be easily encoded, packaged and thus inexpensively mediated and taught from person to person, stored, and reused. It can be compiled and shaped, combined and separated. It is a public commodity and difficult to protect. It can be bought, stolen and copied. For example, in the case of readymade products, it is possible to crack the manufacturing code and so capture the knowledge used in the manufacture. In point of fact, explicit knowledge in coded form has always reverted to information, signs without significance. In problem-solving situations, when it is reused in verbal reports, books of directions, instructions for use, computer files, paper archives, tape recordings, video films, mathematical formulae, drawings, etc., the information acquires content and significance, the code is decoded back into explicit knowledge.

It is just this acquisition of knowledge, screening, selecting, spreading and applying of knowledge that the knowledge management of companies has concentrated on. From this perspective, the enterprise exists as a storage space for information which helps to co-ordinate the activities of separate individuals. The

main forms recently have been methods for seeking out benchmarking and best practices in addition to the company's own production of research and development.

Tacit knowledge, despite its apparent simplicity, is complex (for example, if you had to describe how to learn to ride a bicycle), difficult to encode and eludes the grasps of conventional teaching. It is embedded in know-how. The cognitivists speak of local knowledge and of theories of use. The educationalists have long used the concept of hidden curriculum, which is very close to the tacit knowledge dominating at school. Schools and teachers have unspoken expectations of their pupils as to how the school game should be played. Not all those at school, especially immigrants and the children of uneducated parents and pupils oriented outside the school, are aware of how this game should be played. School is not going well, but nobody knows what is amiss. The rules of the school game are neither verbalised or taught; it is only assumed that everyone understands them and everyone will comply.

Sternberg & Okagaki (1990) have shown that this tacit knowledge about school is necessary for success in the school environment, and is frequently a better prognosis than traditional tests on school achievement for later success. In their development programme, they have also come to the positive conclusion that the tacit knowledge of school can be taught. It comprises three components: 1) self-knowledge and self-directedness (individualistic versus collective culture; reflective ability, cognitive skills), 2) mastery of task (procedural and situational knowledge) and 3) the rules for working with others (social knowledge: the meaning of roles and those who occupy them for one's own life; monochronic and polychronic conception of time). Since tacit knowledge is embedded in social processes, it can be shared and raised to consciousness only through shared experiences which operate socially. It can only be learned in such a way that it is used, in practical action, as an application of practical intelligence. Sternberg & Okagaki have applied their method in school classes, but there is nothing to prevent it from being used in personnel training and adult education, to further develop the working atmosphere, for example.

Numerous researchers take the view that expert skill is based on unarticulated know-how, knowing in action. It can subsequently be reflected on, yet it is still not the application of theoretical knowledge to problem-solving. Since it is present in the activity itself attempts to describe it can only produce constructs and name tags. The result is a symbolic form of activity which began through tacit knowledge.

Sternberg (1998) perceives three stages in the acquisition of tacit knowledge. In selective coding it is a matter of distinguishing between information with relevance and meaning and the irrelevant. (Compare developing skills in listening comprehension of a foreign language when words begin to be distinguished from the flow of speech.) There is the risk of an information overflow if the listener cannot or dares not make the critical distinction between what is more and less important. Now the problem is that making the distinction requires prior knowledge. With the increase of knowledge the Mattheus effect comes into play. Those rich in knowledge get richer and those poor in knowledge get poorer. Second, one should

be capable of selective combination: what is to be picked out of what information entity, combined, and construed so that it acquires sense and meaning. Finally, in selective comparison, new information is added to existing information (adaptation and accommodation). Tacit knowledge is thus not a battery of knowledge and skills for it has a clear structure. It is use knowledge and it has a kind of production system, a hierarchical chain of 'if-so' hypotheses which in problem situations are refined in an order already learned (e.g. how an individual with 'test wisdom' responds in a multiple-choice test). This system, however, is very context-bound (e.g. the modes of behaviour in different cultures and the misunderstandings they cause). Likewise, the tacit knowledge of an organisation is always organisation-specific; born, shared, and used in that organisation. It is shared experience.

Spender (see Lei & Hit 1996) proposes a fourfold tacit knowledge: scientific, that of which the individual is conscious, collective, and automatic. Scientific knowledge is shared, abstract, and mobile. Once encoded, it becomes explicit knowledge, but in its assimilation tacit knowledge is frequently used. In this sense, cognitive strategies can be understood as tacit knowledge. It also forms a filter for new knowledge in which experiences are digested as understood through those concepts which the individual already controls. Automatic knowledge is individual-centred and is not questioned. It may also turn out to lack purpose and be obsolete, thereby becoming an incubus for the activities of the individual or the organisation. Resistance to change is frequently socially shared tacit knowledge which has worked without problems and which must therefore be defended. In the process of change, this has to be unlearned. The problem is only that outsiders fail to recognise it by traditional methods and thus cannot support its unlearning. The person concerned may also be aware of his tacit knowledge. This is the situation when someone solving a problem is able to analyse the stages in what he is doing and to accomplish a sort of mental advance performance (cf. the sportsman's mental training). What we have here is reflection and the application of cognitive skills. Collective knowledge is cultural knowledge, values and evaluations of both the individual's wider growth culture and his specific enterprise culture, tabus and norms, role images and behavioural models. This has been acquired by living a certain form of life in a lengthy acculturation process. We encounter problems with collective or cultural tacit knowledge whenever we are faced with strange (work) cultures (Sternberg 1998). The most problematic aspect in Spender's division is scientific knowledge, which has traditionally been perceived as open, testable, and propositional. Polanyi, who coined the concept of tacit knowledge, stressed its juxtaposition to explicit scientific knowledge. If we want to include it in the family of tacit knowledge, we must perceive scientific knowledge as an application or in such a form in which the individual has assimilated scientific facts or hypotheses. (Cf. the so-called naive theories.)

## The acquisition of competence or tacit knowledge

In their book *The Knowledge-Creating Company*, the Japanese Nonaka & Takeuchi (1995) gave the concept of tacit knowledge a wider use in enterprises and other organisations. It was their message that the company cannot prosper by relying solely on innovations coming from outside. The company must create these itself, and genius is not needed. What is needed is knowledge and constructed knowledge should be shared in the organisation and set to produce. Organisation-specific tacit knowledge is an important part of this knowledge, which rests not only with management but also with middle management and the teams of workers. Management creates the visions, but the ideas are to be made practical and transformed into products in the production process. Whereas in other places there is a desire to dispense with middle management (cf. the debate on the education of technicians in Finland), the Japanese enterprise builds its efficiency on them. Middle management serves as a transformer and synthesising station for socialised knowledge coming upwards and for explicit knowledge coming downwards. There is also unused knowledge within the organisation, but it is distributed throughout the organisation. It does not rest solely with the experts. A person is a member of many discursive communities from which he draws the tools of his thinking and sense for his own experiences. Knowledge comes from many sources and makes its way to many destinations (Dixon 1999).

Efficiency and innovativeness are collective, not individual. Thus the identity of the community of actors should be strengthened in all possible ways. Tacit knowledge is not mere cognitive skills. It is emotional, physical and corporal, frequently in the fingertips. It is common experiences, beliefs, shared secrets, and modes of communication adopted. Ideal communication occurs through the "breath of ah-un" method. One person looks at another and grunts "ah", to which the other responds "un", and each understands the other perfectly (cf. an elderly married couple).

On the individual level, skills do not develop without practice. On-the-job learning, like any kind of learning, is cumulative. Long-term accomplishments, contemplating them and monitoring amendments made through internal feedback set up a connection to co-ordinated "eye, brain and hand" activity, know-how (cf. the television commercials on Finnish TV for coffee in which the main protagonists are skilled craftsmen). But know-how always demands social validation or external feedback from the community of actors which the know-how of the individual forms a part of. However, development should not be taken to be mere socialisation into the profession by a senior colleague, a one-way master-apprentice relation. In order to initiate and above all to further develop know-how, there must be genuine dialogue in which both parties learn and are able to transcend the dominating practices.



Thus know-how and modes of operation are constructed in communities of practice embedded in the organisational setting. The organisation as well has a mode of operation above the individual, its own mental models by means of which phenomena and events are classified and the context and the world construed. A model which breaks up time, seeks cause and effects and causality is also important, a model which makes forecasts and plans possible. But the Japanese place special emphasis on behaviour which builds and maintains identity, common beliefs, norms and activity, what is pivotal in the organisation, different from others and enduring (Tuomi 1999, 244–245).

In an interview granted to the publication *Fortune* (Sherman 1996), Takeuchi described the construction of cohesion in the Japanese work culture. This involves group discussions every morning, and corresponding shared evening sessions. Saki and beer are consumed freely and people let off steam and air grievances. The following morning workers bow to their superior, who will ask if people had a good time, declaring that he himself was so drunk that he remembers nothing. Each party is well aware that this is not true, but the ritual is accepted in the culturally learned manner. It is also customary to go to a hotel or recreation centre for talks (*gasshuku*) or to bathe or ski. The purpose is to create a human and egalitarian atmosphere among the members of the community. Design teams work in cramped conditions or in open-plan offices in a manner which Takeuchi terms the rugby method: when a problem emerges everyone, sales, production, quality control, design make a scrum. The difference from the western relay race in which the baton is passed from one to the next is obvious. When the team has done its job, each one returns to his place in the hierarchy of the enterprise. The purpose of social intercourse is to create conditions in which tacit knowledge can become institutionalised as a part of the enterprise's organisational memory.

Obviously no enterprise can itself produce all the knowledge it needs nor can all knowledge be tacit. Nonaka & Takeuchi (1995) present the workings of interaction between explicit and implicit knowledge.

Their theory is based on four processes of transformation of knowledge: externalisation of knowledge, socialisation of knowledge, internalisation of knowledge and combination of knowledge. *Externalisation* refers to the transformation of tacit knowledge into explicit, conceptual knowledge. There it is possible to conceptualise the individual's know-how or intuitive understanding in human interaction and dialogue in such a way that this originally tacit knowledge or know-how becomes technological knowledge codified in conceptual forms for the use of the entire organisation. The breakdown and conceptual conquest of tacit knowledge begins as a general description of the target phenomenon or objective and through analogous or metaphorical breakdown in the optimal case lead to the formation of a model, that is to the formation of a completely new, systematic concept and system of concepts (see Table 5) Metaphors are important, and much more than mere figures of speech. They are a core element in the cultural cognition process, in which strange and abstract concepts and connected to the conceptual system of a familiar phenomenon. They do not exist in isolation

but constitute entities, families of metaphors with which individual expressions unite. (e.g. hatred is liquid heating up in a container: let the steam out, cool it, things are beginning to boil, etc.)

	Into tacit knowledge	Into explicit knowledge
From tacit knowledge	Socialisation	Externalisation
From explicit knowledge	Internalisation	Combination

**Table 5. Types of transformation of knowledge.** (Source: Nonaka & Takeuchi 1995.)

*Socialisation* refers to the transformation of tacit knowledge into the tacit knowledge of more than one person. Socialisation refers to sharing experiences beyond individuals, by means of dialogue and observation and living together, and it enables the actual sharing of tacit knowledge (of technical skills and mental models). Information which is conceptualised apart from emotional ties and contextual interest connections does not literally mean anything to its hearers. The type of information transformation is in the research on client relations and client needs. In order to be able to embody in the end product the aesthetic, ethical and evaluative views of the customer, the producer must, before this, be able to thoroughly understand that view. Shared experience is one of main requirements of the understanding described. Socialisation does not occur by order or in a moment. When shared understanding is sought, an apparent inefficiency must be tolerated: overlap, repetition, uncertainty, and noise in the system. Redundancy should not be repelled at all costs.

*Internalisation* refers to the transformation of conceptual and taught knowledge into tacit knowledge. Assimilation of knowledge and know-how, in other words, means the transformation of coded and codified knowledge and know-how (such as expressed norms, knowledge from handbooks and manuals, models and theories) into internalised knowledge and know-how. In other words, with experience, the directions of a handbook could develop practical skill and know-how. The knowledge transformation process of internalisation is very important, for example in the *benchmarking* process, when an operational practice identified by the workgroup as a good one is transferred for use by other groups and the entire organisation and/or other organisations.

*Combination* refers to the transformation of conceptual knowledge into (new) conceptual knowledge. Combining, grouping and arranging conceptual knowledge in a different way from before may lead to new conceptual knowledge. This involves unlearning and refining of the relevancy constructs.

The merit of Nonaka & Takeuchi lies in the clear modelling of learning in the organisation. It is one among many, but what is new is just this great emphasis

placed on tacit knowledge and social knowledge. However, before becoming a member of a working community, a worker already has long learning experience in formal education which uses a tacit knowledge of its own, the knowledge of succeeding in school (consciousness and exploitation of the hidden curriculum). Does such knowledge help or hinder him in adapting to working life? Are the rules of the school game valid at work? Another problem is how explicit knowledge is taught and learned so that learning at school can be applied outside school. What are the pedagogical arrangements to lay the foundations for competence? How should we support the emergence of a student's knowledge structures and the development and recognition of his cognitive skills? How are we to construct a stepping stone to mastery of technical professional skills? How are we to bring into the school that social world of work and everyday problems in which pupils must apply their learning after school? And above all: how are we to integrate these various components of acquisition of know-how into a functioning whole, a curriculum for teaching and learning? The main objective of vocational education must continue to be the teaching of cognitive, technical and social skills. Despite all innovations, we must concur with the research finding of Kierchner & Van Vilsteren (1997) that effective learning continues to progress along a chain which appears to be extremely regressive and behaviouristic: orientation-practical training-utilisation of feedback. However, the simple basic model disintegrates badly when we see that the various didactical and learning theories mean very different things at different parts of the model and differ in the manner in which the parts should be linked together.

In know-how we are concerned with putting knowledge to use. Spinello (1998) mentions a chain of knowledge whose links are internal and external awareness and responsiveness.

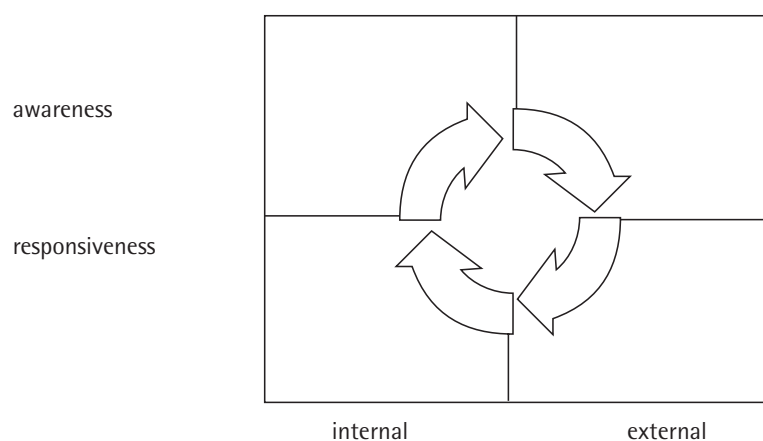


Figure 6. Value chain. (Source: Spinello 1998.)

External consciousness refers to the absorbing of information from outside the organisation and its transformation into usable knowledge. It is essential to eliminate those filters which obstruct the passing of information. Rational decision-making has always commenced from a careful analysis of the environment. In internal consciousness we perceive the connection between the opportunities opening up outside and our own resources (cf. before, knowledge as a restriction and a resource). The internally conscious organisation is aware of what it has and from these premises it is able to define its development need. Consciousness presupposes a free flow of knowledge and professional knowledge management free from functionalistic limits.

Internal sensitivity of activity refers to the ability of the enterprise to organise as a resource in order to respond to the needs of the market, and even the ability to forecast future markets. Knowledge is transformed into action. External sensitivity to activity is necessary in order to put a good product on the market. Know-how is needed in marketing, knowledge of distribution channels and customers' needs and after-sales service for the customer. In the age of the internet the problem has been the speed of all the actions necessary, which Spinello (ibid.) refers to as Coca Cola philosophy: load, fire, aim. Customers must be included in the production process as the design stage and a system of feedback in real time must be built up.

## Social capital

From the concept of social capital comes a new perspective on knowledge and its utilisation. The point of departure is simple: it is only social capital which creates the preconditions for the accumulation of human capital and its exploitation. The research of knowledge creation in companies has turned the researchers' interest into the social essence of the company's success. The most advanced research approaches the companies' organisations as socially determined knowledge systems. In this kind of research, the focus area has included the role of organisation in creation and transfer of tacit knowledge (Nonaka & Takeuchi 1995; Spender 1996; Kogut & Zander 1996), the organisational structuring, co-ordination and communication of the individual and functional expertise (Kogut & Zander 1992; Conner & Prahalad 1996) and the organisations and social communities as themselves (Kogut & Zander 1992, 1996).

Janine Nahapiet and Sumantra Ghoshal have found that, although we now have insight into organisations as knowledge systems, we still lack a coherent explanatory theory. They offer a theory rooted to the concept of social capital to this kind of aggregating perspective. The authors define social capital as "the sum of the actual and potential resources embedded within, available through, and

derived from the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal 1998, 243). The theory constructs an explanation model of interaction between intellectual and social capital.

In its approach, Nahapiet and Ghoshal's theory owes a lot to Pierre Bourdieu (1986, 1993) and Robert D. Putnam (1995, see also 1999). In their starting point, the authors adopt Pierre Bourdieu's broad definition of social capital as "collectively owned capital, a 'credential' which entitles [the members of the network] to credit, in the various senses of the word" (Bourdieu 1986, 249). This implies the idea that social capital is embedded rather within human relations in networks than in individual human actors; social capital is an entity in and of human interaction, not an entity in and of human inter actors. Nahapiet and Ghoshal's theory detaches three dimensions of social capital. They are the structural, the relational, and the cognitive dimensions.

From the point of view of knowledge creation and intellectual capital, the structural dimension of social capital perceives the connections between social or individual actors. The theoretical approach is interested in the tightness of social ties between actors, the configuration of the networks and the morphology of linkages. In general, the structural dimension of social capital conducts research to organisation studies in the field of enterprises and within the enterprises. The concept of the relational dimension of social capital focuses the research interest into relations between human actors. The phenomena of trust and trustworthiness, norms and sanctions, obligations and expectations, and identity and identification are in the centre of discussion. The cognitive dimension of social capital refers to such social phenomena as collective or shared representations, interpretations, and systems of meaning among actors (Nahapiet & Ghoshal 1998, 224).

From the point of Bourdieu view, broadly, the dissociation to relational and cognitive dimension is problematic. In the dissociation, the distinction into practical and intellectual worlds of human existence is inbuilt. According to the practical theory of sociology, the entities of cognitive dimension perpetually produce the entities of relational dimension, and vice versa. The relations between human actors – and especially the common action based on these relations – construct common representations, interpretations and systems of meanings, to which trust, norms, obligations, for example, belong and on which they and the change in them is based. Accordingly, the action based on the relations between actors renews and creates relations between actors. From this perspective, the relational and cognitive dimensions of social capital are 'an accumulated oneness' concerning the social action of actors, or 'agents', as Bourdieu (1985) enunciates it.

Correspondingly, the dissociation to structural dimension, on the one hand, and to relational and the cognitive dimensions on the other, is not trouble-free, especially when Nahapiet and Ghoshal strongly lean on Bourdieu's sociological theory on symbolic capitals. In the dissociation, strong signs of the dichotomy can be found between structure and actor. One can even say that through the division into dimensions Nahapiet and Ghoshal smuggle the dichotomies of old sociology into the new theory on social capital. According to Scott Lash (1995 [1994], 213),

Bourdieu's "practical logic" leads us far beyond the dichotomy of structure and actor. However, we are not able to see the vision if we are confined to only some of the concepts of this system. The concept of social capital can be understood only in affiliation to the concept of habitus. The structuring of habitus does not assume "rules" or structures, instead of them "habits" and "predisposition" are needed. The habitus is as far from the "action". The theory of action speaks the language of the "action unit"; the habitus speaks the language of the activities presently going on. The measurable wholeness of social capital exists in the social entity called habitus, carried by social agents, and we can, on the one side, describe habitus (and social capital) as a condensation of social relations (Bourdieu 1977; Bourdieu & Wacquant 1992).

Nahapiet and Ghoshal are interested in the role of social capital in the creation of intellectual capital. The latter they define as the knowledge and knowing capability of a social collective. Nahapiet and Ghoshal divide the concept of knowledge in two pairs by type and level: tacit and explicit knowledge, on the one hand, and collective and individual knowledge on the other. By cross-tabulation of these two pairs they construct the four dimensions of intellectual capital (Nahapiet & Ghoshal 1998, 246):

LEVEL OF KNOWLEDGE TYPE OF KNOWLEDGE	Collective (Social) knowledge	Individual knowledge
Explicit knowledge	Objectivated	Conscious
Tacit knowledge	Collective	Automatic

**Table 6. The types of knowledge. (Source: Spender 1996; Nahapiet & Ghoshal 1998.)**

According to the authors, the concept of social capital is "in the centre in explaining the institutional dynamics, innovation and value creation" (Nahapiet & Ghoshal 1998, 245). New intellectual capital – this concerns all dimensions of intellectual capital – is created through combination and exchange of existing intellectual recourses. Combination and exchange of knowledge is a complex social process. In the process, a great part of the knowledge is accommodated into the social; in certain social circumstances, in co-operative action and in social relations. In any case, four preconditions exist which affect the situation of intellectual recourses.

They also affect the action in combination and exchange of knowledge. There must be access to parties for combining and exchanging intellectual capital. In other words, there must be a social space for knowledge creation, a social field or a network. Also, a positive anticipation of the value obtained through combination and exchange of intellectual capital is needed. The actors must have a "common illusion" of the benefits attainable by taking part in the game. Third, the actors and the organisation must be motivated for action and, fourth, there must be enough combination capability in the network.

According to Nahapiet and Ghoshal, social capital generates intellectual capital through these conditions. For example, the cognitive dimension of social capital affects the combination capacity of the company. If an organisation lacks shared codes and language, one can expect that there is also a defective capability to combine different types of knowledge (Nahapiet & Ghoshal 1998, 250–253).

Contrary to Nahapiet and Ghoshal, Cooke and Wills (1999) are critical of Bourdieu's theory of social capital. According to them, Bourdieu's "definitions are... vague, and operationally unclear" (ibid. 222). Considering social capital through literature, the authors find '*embeddedness*' to be one of its key elements. According to Granovetter (1985), the personal ties and networks of social relations between and among enterprises explain their economic performance and development. Portes (1998) and Woollock (1998) for their part note that strong ties can lock enterprises into a situation of blocked development process. Cooke and Wills resolve the collision by dividing the '*embeddedness*' into two dimensions of '*integration*' and '*synergy*'. By the former they mean, for example, community benefits without costs and by the latter, for example, good links through networks to governing bodies.

An important corollary to embeddedness is '*autonomy*' (see e.g. Ferrucci 1996), which, according to Cooke and Wills, is the other key element of social capital. The concept of autonomy refers to networks beyond the regionally rooted community of actors. The level of autonomy shows the enterprises' capability of benefiting from external sources, in their learning, for example. The concept of autonomy involves the dimensions of '*integrity*' and '*linkage*'. Both concepts refer to networks, the former to community (e.g. professional) networks and the latter to networks outside the community (Cooke & Wills 1999, 223).

All in all, social capital – or '*proximity capital*' as Crevoisier (1997) calls it – is the origin and expression of successful network interactions. For innovation they are the means of collective learning, something that is enhanced in '*learning regions*' (Florida 1995). Social capital facilitates low-cost or even cost-free transactions, efficient information channels and exploitable information or '*knowledge capital*' for innovation.

## On-the-job learning

In order to accomplish professional tasks, basic skills (technical and frequently used) that are needed are produced by the educational institution and on-the-job learning together. On the other hand, to cope with situations which arise less frequently, peripheral skills are needed; not everything can be anticipated at school. These must be acquired by experience and doing. Vocational training is generally arranged in a narrowly functionalist manner, that is to adapt workers to the formation of each job and the world of division of labour. It has now, however, become apparent that functionally organised education is inevitably lagging behind the development in the working environment. In planning education it is necessary to ask what competences are required to mould the working environments in the desired direction and to facilitate the adaptation of the world of work to the societal development. Product development, the creation of new technology and organisational change will not succeed by 'more of the same' in education, but by 'something new' in education which produces key competences. On-the-job learning alone does not afford sufficient opportunities. Experience must be conceptualised, and that entails institution-centred working.

Thus on-the-job learning is concerned with at what point institution-centred learning and work-centred learning dimensions are planned and also how task-specific the education is. Education can then be divided into types as follows:

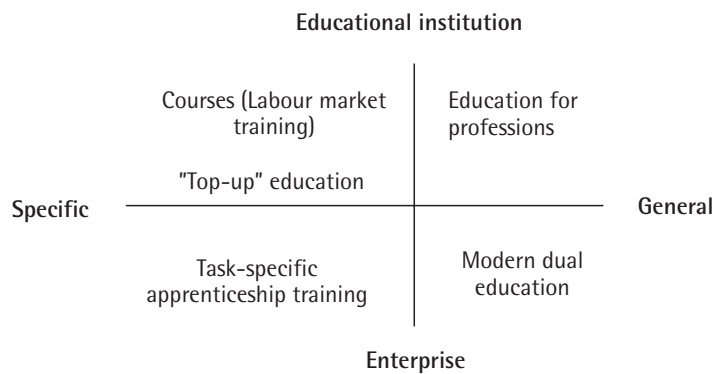


Figure 7. Main types of vocational training. (Raivola 2000a.)

Task-specific education is mostly shaped through practical training into becoming a worker. Responsibility and productivity expectations are increased apace with growth of experience. The role of the educational institution is minor. Formal qualification is achieved by demonstration. Modern dual education is oriented more towards an occupational area than to a certain occupation. During this



period, the student's occupational objective becomes clear. On-the-job learning is many-sided and broad traineeship in which the skills to learn are acquired, likewise problem-solving skills and social work community know-how. The co-operation between the educational institution and the enterprise is close. As a pedagogical innovation, as what is now sought, none of these models will work without development.

Official education policy in Finland, too, is beginning to have faith in learning by doing and in learning by copying what others do (problem learning or model learning). On-the-job learning and problem-based learning create a real learning environment, but they in no way guarantee watertight competence and acquisition of know-how. Kierchner & Van Vilsteren (1997) point out the following problems:

1. If the learner does not know exactly what he is to learn; in other words, what he should observe in his own and others' actions, he will not see what he is assumed to see. Observation is theoretically bound; the observer's prior knowledge of the object determines what he sees in the new situation (cf. schemas).
2. School has always simplified reality, offered pre-membership benefits of it, easily digestible morsels. Reality is complex and frequently chaotic when the novice sinks beneath the abundance of detail without identifying the existing structures and models.
3. A trainee approaching a work or problem situation as an outsider only sees the external signs of activity, the surface behaviour and the preceding and simultaneous factors in that contextual relation. Because the social and mental models which form the foundation are not identified and not emotionally sensed, naïve causal assumptions are made and simple universal models, which do not work in the new situation. School mathematics has been a good example of a black box which gets stuck between the task assigned by the teacher and the solution presented in a demonstration.
4. The practical problem connected to the learning environment is that the situations and learning experiences for which there is room in the traineeship constitute only a small part of the tasks which will present themselves in the future job. Formal education only deals with a sample of reality. Building up experience demands an extensive substantial store of knowledge (declarative knowledge), its application in different situations (procedural and situational knowledge) and the validation of the individual's own know-how in the community of actors (social knowledge). Expertise comes from experience.

In the school legislation, on-the-job learning has been promoted into a core methodology and organisational challenge. A half-year on-the-job learning period at all educational levels must not only mean extended practical training. It demands

completely new pedagogical solutions, a new kind of know-how on the part of both those working in the educational institutions and those involved in training at the workplaces. The preparations for the change have been inadequate, causing problems with startup and frustration. This matter should be seen as the most serious challenge for vocational training. Now we have the opportunity to create a system which would enable students to really get inside the organisational culture of the workplace and absorb the tacit knowledge and development of know-how shared by the community of practice. The experienced worker must take the responsibility for teaching the novices, but he should also be equipped with the capabilities and opportunities for his supervisory task. It is frequently necessary to remodel the physical, technical and social working environment in order to set up an efficient learning environment. Even for the worker experienced in his field learning is part of the work process (cf. the concept 'learning organisation') but, for the enterprise, constant learning of new things is productive activity (cf. learning economy).

# 4 EDUCATIONAL REFORM AND POST-REFORM POLICY GOALS

The Finnish vocational education system was reformed in the 1990s. The reform has followed a few main tendencies. The structure of vocational education has been harmonised, and the responsibility has been moved to the local authorities. VET providers have been organised regionally and are assumed to improve their relations with industries. In general an essential argument has been that of raising the standard of education.

The establishment of the polytechnics has been described as the biggest reform of the educational system ever (Lehtisalo & Raivola 1999). The reform and its aims have mostly been argued in public by the needs of working life and the international competitiveness of Finnish industry. At the very beginning of the process, the implementation was targeted to serve constitutional, still relevant principles. It is necessary to go back to the end of the 1980s. Looking at the history of the nascent polytechnics could make some of the contemporary features of the system and policy intentions more understandable.

The Finnish education system was in crisis. One of the biggest problems for educational planners was the rising number of matriculants. As previously shown, a greater proportion of school-leavers continued in general upper secondary schools, which have traditionally been a path to higher education. Even if university education had been expanded, there were not enough study places and the most advantaged students were selected by the principle of *numerus clausus*. The past reform of upper secondary education was incapable of solving this problem. In addition, the vocational education system seemed too hierarchical and it consisted of hundreds of small sectoral institutions. The status of vocational colleges varied, and international comparison considered this a difficult problem. Also, the administration of Finnish vocational education and training (VET) was centralised in the National Board of Vocational Education and the flexibility of an individual VET provider was quite limited. It could be said that the establishment of the polytechnic system and the whole VET reform as well were largely determined by the aspects described. (Lampinen & Savola 1995; Lehtisalo & Raivola 1999.)

Not only was the VET system centrally administrated but it has also been very institution-centred, and co-operation with industry and other policy makers has been fairly formal on the local level. In the past decades the system worked adequately; all those trained were employed and the qualification requirements were not repeatedly changed. The increasing role of knowledge as a factor of production and the rapid change of the industrial and occupational structure has challenged the educational system in recent years. In the 1990s the education system was restructured and the connection between education and working life became one of the main questions.

The following figure concentrates on the main features of educational reform. The influences and challenges came from many sources; EU membership pushed our system to harmonise its structure. Changing industrial structure needed new kinds of competencies, and new concepts of learning and knowledge challenged formal education. Recovery from the depression in the beginning of the 1990s and the discussion of the role of the national state as a service provider could also be mentioned as factors behind the reform.

As defined in the research question, this study does not further analyse the background of the reform or the policy process before the reform. The main interest is how the contemporary educational system can respond to the challenges of the learning society, but it is necessary to remember the development history of Finnish VET and the contradictory expectations, directed towards education system.

The reform is analysed on three levels: institutional, cultural and practical. These levels, which could also be described as system, organisation and action level, are tools for empirical investigation. In addition they are tools for analysing the nature of the policy-based reform in public organisation. As the downward pointing arrows in the figure show, the reform was started at the top by governmental policy-making and flowed slowly to the practical level.

The best-known institutional reform is the establishment of the polytechnics (in Finnish ammattikorkeakoulu, AMK institution), but at the same time the network of upper secondary VET has gone through the same process. A great number of single field institutions have merged into multi-disciplinary institutions, the autonomy of the institutes has been increased; providers are more guided by results on a contract-basis; and the state-owned institutes have transferred to the municipalities. It could be said that institutional reform is mostly guided by legislation and central administration. On the local level the former VET colleges and authorities have organised the new structures by themselves.

One of the main issues of cultural reform is a reform of the curriculum structure. The curriculum directs the processes of the educational institution. The other question of institutional culture is a form of internal and external co-operation. The aim of the reform could in essence be that VET should provide highly competent labour force for the learning society. The institutional reform and new culture of the VET organisation could support the system but the main factor is the practical

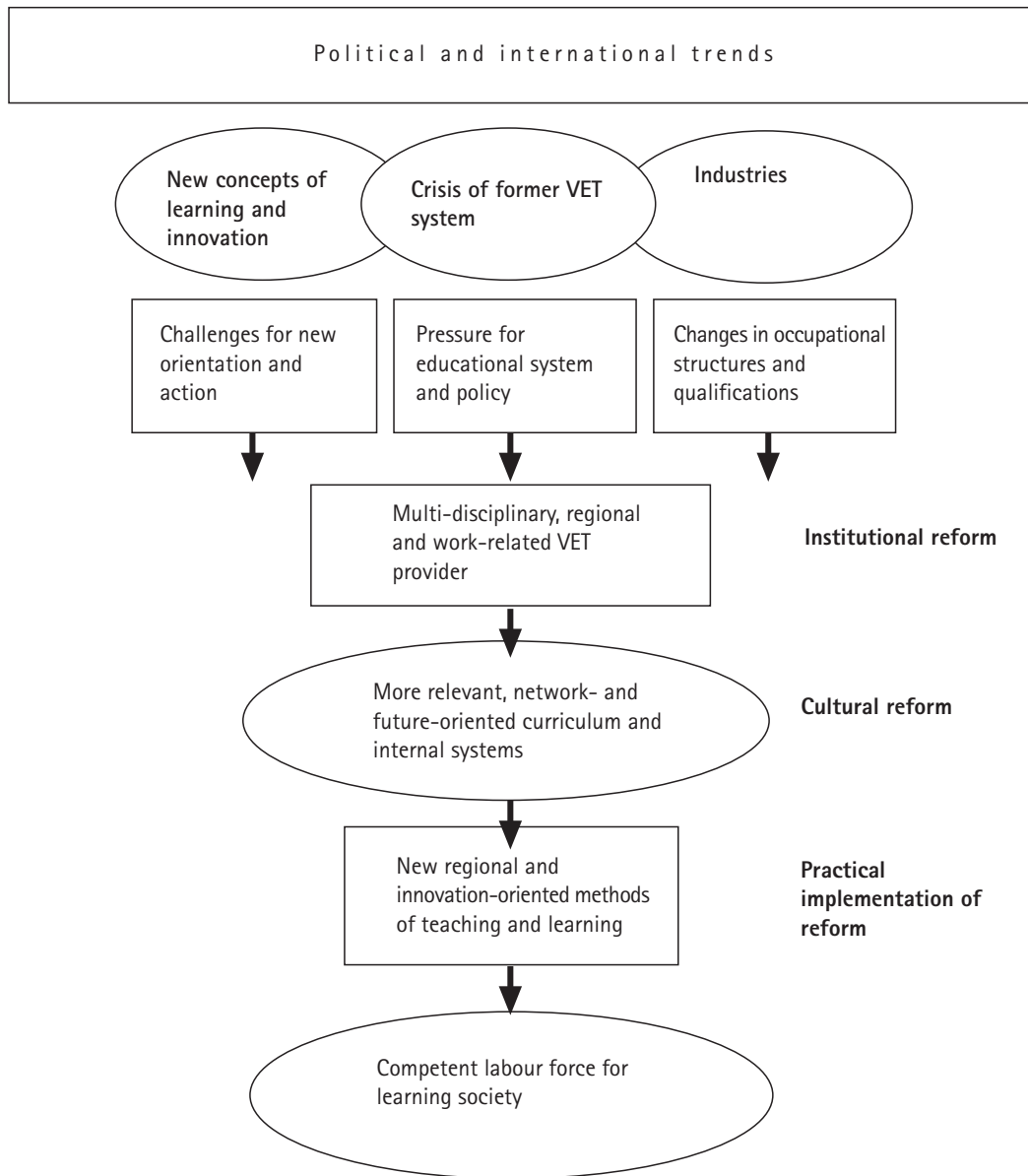


Figure 8. The Finnish VET reform in the 1990s.

implementation of the learning process. The success of the reformed VET will be worked out in every day practice.

In general the VET reform has been used as a policy instrument to respond to the challenges of the learning society. The centralised VET system was not capable of developing itself. As the reform was an instrument, there were several tools to promote and secure the goals of selected policy guidelines. The number and nature of tools as well as the measures varied during the 1990s. Besides these practical emphasises, there have been a few main principles which have steered the process. The main aim has been:

1. Raising standards of education.

The next four aspects have been the guiding principles of the VET reform:

2. Decentralisation and strengthening of VET providers' autonomy.
3. Curriculum reform and open learning environment.
4. Contribution to regional development.
5. Improvement of relations to industry.

## Raising the standard of education

One of the main tendencies of Finnish educational policy has been to improve the level of education throughout the whole population. The expansion of upper secondary general education is one phase of this process as well as the decision to offer continuing education for all school-leavers. This has been a part of equality policy but at the same time it has been a part of industrial policy. The effect can be seen in the statistics: from the 1970s onwards the educational level of the labour force in fact rose to a completely new level. The number of highly educated persons more than doubled and the share of the labour force with less than an upper secondary education was halved in a good 25 years (Statistics Finland 1999a).

The VET reform has been strongly argued for as a tool for raising the standard of education (Salminen 2001, 53). The goal of raising the level of education is to be achieved by the following:

- Former VET colleges (tertiary VET) upgraded to the level of higher education. The polytechnics are defined as a non-university sector of the dual higher education system.
- Upper secondary VET should give eligibility for further studies.

- The supply of higher education will cover around 2/3 of the age cohort and upper secondary education will be offered to the whole age group.
- The length of the education will increase in all forms of VET.
- The level of academic qualifications of the VET teachers will be raised.
- Occupational and degree-oriented adult education will be emphasised.

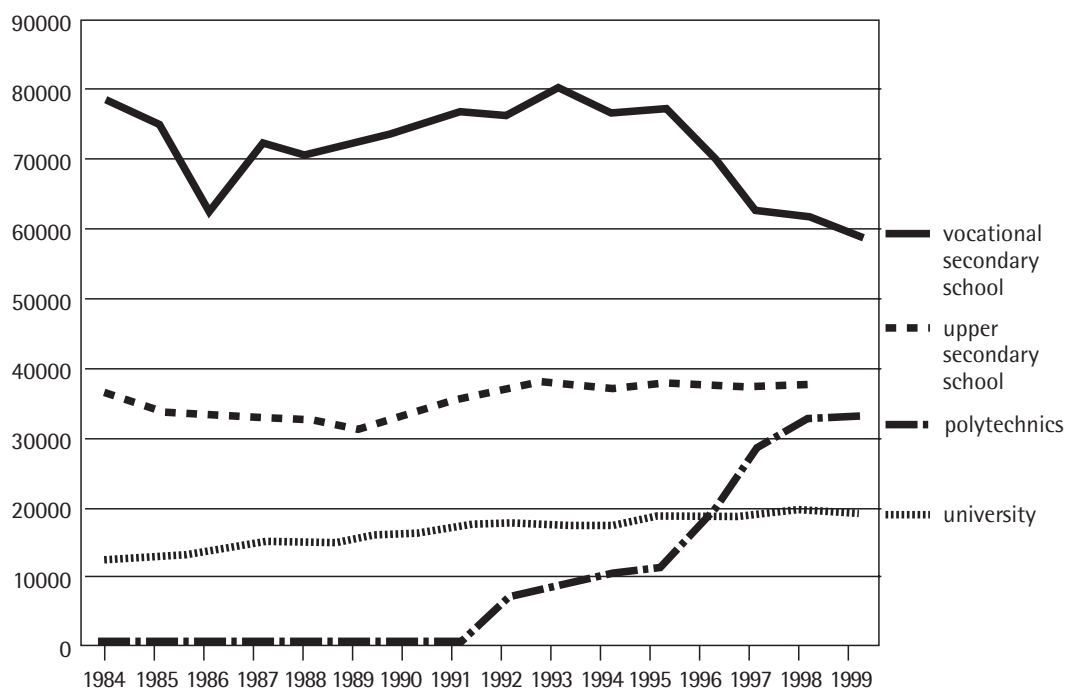


Figure 9. Number of entrants to upper secondary and higher education in Finland 1984–1999.

(Sources: National Board of Education, KOTA database, AMKOTA database, Tilastokeskus 1985–2000.)

The figure indicates that the volume of polytechnic education has increased rapidly. In 2000 there were more than 33 000 entrants to the polytechnics and more than 19 000 to the universities, the total enrolment in higher education is about 52 000. At the same time the number of upper secondary VET entrants is

falling; in 1995 there were about 80 000 and in 2000 there were 53 000 entrants to upper secondary VET (Opetusministeriö 1999). The volume of institutional or formal education is clearly demonstrated when it is compared to the age cohort of school-leavers, which is around 64 000.

Adult education has played an important role in adjusting the qualifications of the adult population to meet the needs of the industrial change. In the last ten years vocational adult education has been regarded as one of the priority areas in the development of education. The share of the different kinds of adult VET is two thirds of all adult education and the greatest expansion has taken place in VET schools and adult VET centres. Adult education is also growing constantly in the polytechnics. Training leading to degrees is being organised for adults, they also organise a considerable amount of continuing and supplementary education, 'open polytechnic' studies have begun and the first experiments of further polytechnic degree will start in 2001.

## **Decentralisation and strengthening of VET providers' autonomy**

The new legislation on basic education, vocational education, vocational adult education and the administration of the educational system came into force in 2000. The reformed legislation on the universities, the polytechnic system and the sectoral educational committees are parts of the overall reform. A common characteristic of these changes has been a general relaxation of state control and an increase of local decision-making powers. The education providers' opportunity to decide on how education is arranged is essentially increased. Control will focus on the effectiveness, quality and evaluation of education. The Ministry of Education and each VET provider have concluded an agreement on target outcome to determine the objectives, intakes, and funding. The two-tiered administration and increased responsibilities of the local authorities are also ways to improve co-ordination between local industry and VET institutions or polytechnics. The state has assigned ownership of its VET institutes to the local authorities. At the moment almost all VET institutions are either municipal or private.



## Curriculum reform and open learning environment

Curriculum reform has always been a tool to update training qualifications. Until the 1990s the basis of the curriculum was subjects and courses; all the students expected to follow the same schedule. On both levels, upper secondary and polytechnic, the curriculum reform followed the same guidelines. It unified the structure of the sectoral curricula; the structure of the individual study programme is similar in each sector. Modularization has been another principle; it increases flexibility in studies. The aim of modularization is to give a student an opportunity to select optional modules from other programmes or even other institutions.

The upper secondary VET curriculum system was reformed in 1995. The aim of the reform was to make VET more flexible and sensitive to adapt to rapid changes in industry and society. The new curriculum system consists of national core curricula and the educational institutions' curricula. The new system gives the VET institutions loose frames to develop their functions according to local needs and the preferences of the students. In 2001 the duration of all these programmes is three years and all of them include a period of on-the-job learning of 20 Finnish credits.

The polytechnic reform itself is also a major curriculum reform; the structure and content of the degree programmes were reviewed. Students were to be given greater choice to compose individual study programmes. The frame of polytechnic degree programmes is governed by the legislation. Each polytechnic defines its own degree programmes, which consist of basic studies, professional studies, optional studies, on-the-job training and a diploma project. On-the-job training (minimum 20 Finnish credits) is a compulsory part of the polytechnic studies as well as the thesis project, which is carried out in connection with some companies.

An aim of the reform was to make the degree system simpler. The polytechnics and upper secondary VET education are arranged in seven fields of education. The fields are natural resources, technology and transport, hotel, catering and home economics, business and administration, health and social services, culture and humanities and teaching. On both levels, the present system is quite the same. In the case of the polytechnics each degree programme carries 140, 160 or 180 Finnish credits. The degree programmes lead to polytechnic degrees. To complete the degree takes 3.5–4.5 years of full-time study. The Ministry of Education confirms the degree programmes but the polytechnics construct the curriculum themselves. The fairly liberal degree modification policy increased the number of degree programmes up to 300 with 800 specialization lines. The wide supply of alternatives confused applicants and labour markets, and therefore the system was reorganised in 2001. Currently there are 9 polytechnic degrees with 45 degree titles. An applicant has to choose one degree programme out of 151 alternatives (see Figure 10). Typical titles are nurse (AMK) and engineer (AMK), for example.

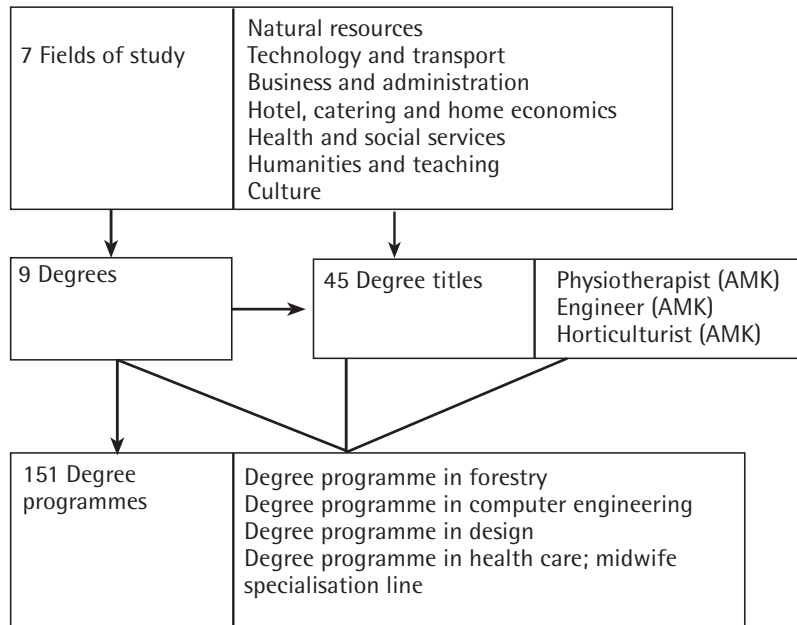


Figure 10. The organisation of polytechnic studies.

## Contribution to regional development

The idea of merging VET institutions into multi-disciplinary units is to enhance their role in regional development. There were many expectations that these regionally organised institutes should be more flexible to react to the regional development and the industrial change. Polytechnics especially are expected to produce new study programmes based on their own system for monitoring and forecasting training needs. The contribution of VET providers should be based on the needs of local business and industry.

An argument for the Finnish dual model of higher education is that universities bear the main responsibility for scientific research and training, whereas polytechnics mainly focus on providing more practical education. The polytechnics' role in supporting regional and national business and industry entails active participation and investment in R&D. The other policy argument has emphasised that the polytechnics are targeted more to serve the SME sector. By the year 2000, the two-sector system of higher education was fully developed; 31 polytechnics covered the country and more than 250 institutions of the former vocational system had been integrated into them. Upper secondary VET was merged into larger multi-

disciplinary units, in order to be able to offer a wider range of training effectively. Local authorities and governments were closely integrated in to the administration of the VET institutions, in most cases the board of the institute includes representatives of the local councils.

## **Improvement of industrial relations**

Traditionally Finnish educational planning and policy-making has been organised quite in a corporative way. The sectors of industry have been incorporated into the public educational administration. Social partners have been involved in the planning of education level and their indirect impact has also been significant. Typical features of Finnish VET are that it takes place mostly in an educational institution; apprenticeship training has covered less than 10% of the intake and the share of private or industrial-owned training is low in Finland.

The sectoral representatives are still important actors to link industry and the education system. New Sectoral Education Committees replaced the Educational Advisory Committee and NBE's Sectoral Advisory Boards in 1997. These organs follow industrial and occupational change and make recommendations for the developing of education. Regionally the sectors are involved in the board of the employment and economic development centres and educational institutions.

After decentralisation and institutional merging the new orientation of VET emphasises direct co-operation between institutions and companies. One main principle of the polytechnic reform was closer co-operation with regional working life, especially SMEs, and developing polytechnics as active partners of the regional knowledge infrastructure. The half-year on-the-job training period will be obligatory in every upper secondary VET programme; this governmental decision is aimed to link studies to working life and contemporary technology. The goal is to increase the share of apprenticeships to 20% of the initial VET within a few years. A preliminary step towards this goal is an extensive training scheme for apprentice trainers.

## **Finnish educational policy at the beginning of the 21st century**

In recent years educational policy has come closer to other national policies. The education system is considered a part of the national innovation system. Educational reforms and measures are aimed at supporting the national industrial and technology policy. Education is highly valued in all policy areas. The present

government programme stated: "Finland is gradually developing into an information society in which knowledge and expertise are a part of the culture and also one of the key factors in production." (Government Programme 1999.)

The programme of Prime Minister Paavo Lipponen's second government

The government sets some more concrete objectives for educational policy:

- The action to improve the status of vocational education will be launched.
- Periods of on-the-job learning will be implemented in co-operation with the various parties in working life.
- Skill tests will be developed for vocational education at the upper secondary level to ensure quality of expertise.
- Vocational apprenticeship schemes will be expanded.
- Adult education will be emphasised to guarantee new skills and professional mobility.
- Polytechnics will concentrate on raising the quality of education that they provide and on strengthening their own profile and regional effectiveness.

The government adopts a plan for the development of education and university research every fourth year. The plan covers the whole education system. It is prepared in close co-operation with interest groups like political parties, labour market and industrial organisations, educational and researches institutions.

*"In the Finnish information society, knowledge and know-how form part of civilisation and constitute the most important production factor. Civilisation means both the individual's aspiration to self-improvement and the community's intellectual capital. A person is civilised when he or she has assimilated a reasonable part of the cultural heritage of her community and is able to manage her own life. The individual's intellectual activity enhances and renews the community's cultural heritage. Thus aspiration to civilisation and civilisation as a heritage are two different sides of the same coin. An all-around education comprises cognitive abilities, ethical and aesthetic appreciation, a highly developed emotional life, observation and communication skills, the basic qualifications needed in work, and an ability to operate as a member of society."* (Ministry of Education 2000, Education and research 1999–2004 Development Plan.)

The development plan underlines the need to take citizens' rights and opportunities into account in all education and training. Achieving the objectives set for the performance of the education system, for regional access to education and training, for equal opportunity and for educational content requires public input into education and research. The education system will meet the adult population's need for knowledge and education, and it will raise the employment

rate. In addition to citizens' rights the government emphasises education as a promotor of the information society:

*"Knowledge and know-how form the basis of economic competitiveness and the welfare of society as a whole. Finland's success is based on high-standard education and research, innovative know-how and the utilisation of modern information and communications technology (ICT)."*

The Ministry of Education set up a working group to prepare a proposal for a national strategy for education, training and research on the information society for 2000–2004 (Ministry of Education 1995). The group members were representatives of the key companies or public organisations. The strategy stresses that educational establishments and universities should function as innovation centres. Educational institutions will continue to be important places in which to meet and study. They should be increasingly open to serve the educational needs of all age groups. They will be innovative centres of learning where teachers collaborate with students in developing new pedagogical applications. Educational establishments will have greater responsibility for preventing social exclusion. The use of networks for tutoring and support will become more frequent. Students will be especially supported in the transition phase between different educational levels.

In the strategy the challenges, needs, opportunities and measures are summarised in a table (Table 7). In the first column most of the features of contemporary society are described as challenges to people and societal institutions. The second column indicates the needs of the organisation and society. The third column presents some measures or opportunities to manage challenges, or to respond to the identified needs.

Most of the objectives of the VET reform are still adequate. Contemporary policy measures of the Ministry of Education as well as regional VET providers include the same targets for development; contribution to regional activities, functional on-the-job learning system and industrial relation, up-to-date work-based curriculum, effective institutional network, and flexible and responsive learning environment.

At the beginning of the 21<sup>st</sup> century a new aspect is policy integration. The educational system is perceived as an entity on the macro level. Education is argued for as an essential part of the information or learning society. Education is no longer a closed system; it cannot isolate itself. It is more and more integrated into technology, labour and social policy.

Another new aspect is the strategic role of the individual provider. On the level of region education is seen as an essential part of knowledge infrastructure. Most of the VET providers have modified their own strategies. The other regional agents expect that the educational institutions will make their contribution to the development network. The education establishment should improve their roles as knowledge centres; they will also transfer and even produce innovations, not only produce basic qualified labour force.

CHALLENGES/THREATS	NEEDS	OPPORTUNITIES/MEASURES
international crises and environmental crises	global responsibility, solidarity and sustainable development	<ul style="list-style-type: none"> <li>• ethically sustainable moral code for the information society</li> <li>• sensitivity to react to crisis</li> <li>• distribution of educational skills</li> <li>• adopting skills in accordance with sustainable development on all levels</li> </ul>
globalisation, stiffening competition and scope of challenges	successful competition (nation, enterprises, individuals)	<ul style="list-style-type: none"> <li>• top-ranking research and education</li> <li>• collaboration between private and public sector in particular</li> <li>• international collaboration</li> </ul>
in addition to the former, the internationalisation of educational markets	finding national and international synergy, safeguarding national information and teaching material production	<ul style="list-style-type: none"> <li>• participation in networks</li> <li>• coordination of national competence</li> <li>• raising educational quality through development of research and methodology</li> <li>• development of educational technology and educational services</li> </ul>
rapid renewal of branch structure and work contents	development of basic general education and occupational skills, and the motivation to acquire these	<ul style="list-style-type: none"> <li>• development of educational system, contents, services and professional competence of teachers</li> </ul>
the challenge of information society development to top-ranking skills and know-how	securing the supply of employees with top-ranking skills and know-how	<ul style="list-style-type: none"> <li>• increasing the efficiency of information and content industry</li> <li>• centre of excellence policy</li> </ul>
supporting mobile and flexible work and study	services independent of place	<ul style="list-style-type: none"> <li>• new wireless solutions</li> </ul>
convergence of communication techniques	pedagogical and business innovations	<ul style="list-style-type: none"> <li>• new business activities</li> <li>• virtual studies</li> </ul>
the ever more rapid cycle of innovations in information and communication technologies	strategic planning at all levels	<ul style="list-style-type: none"> <li>• new products and services</li> <li>• lower prices</li> </ul>
the rapid renewal of information and information becoming out-dated rapidly	learning to learn, knowledge management, information acquisition and management, opportunities to rapidly update contents	<ul style="list-style-type: none"> <li>• cooperation, networking, digitising of material, learning how to manage information more efficiently</li> </ul>
complex problems and information as a central production factor	the constant need to revise activities and skills in organisations and working communities	<ul style="list-style-type: none"> <li>• multi-field expert collaboration</li> <li>• combining work and studies</li> <li>• network competence</li> </ul>
ageing population and social exclusion; regional inequality	maintenance of the integrity of the nation, safeguarding equal opportunities	<ul style="list-style-type: none"> <li>• study opportunities for everyone</li> <li>• improving the availability of information society services</li> <li>• securing educational services</li> </ul>
public sector financing crisis	increasing efficiency, cost savings, increase in tax income, redirecting funding, development of new collaboration models	<ul style="list-style-type: none"> <li>• upgrading contents and methods</li> <li>• open and distance learning</li> <li>• job-specific training</li> <li>• increasing the efficiency of monitoring and evaluation</li> <li>• removing structural obstacles (work conditions, standards, statutes, etc.)</li> <li>• new cost models</li> </ul>

(Source: Ministry of Education (1995) Education, Training and Research in the Information Society, National strategy for 2000–2004, Helsinki.)

**Table 7. Challenges, needs and opportunities of education, training and research.**

# 5

## FINNISH POLYTECHNICS – A REFORM FROM WHICH MUCH IS EXPECTED

### International development of higher education

The Finnish polytechnic reform follows the European tendency of expansion of education. Also, the characteristics of the national development seem to proceed in principle by the same phases. The volume of university education has been increasing since the 1960s, the polytechnic reform was launched in the late 1980s and implemented in 1990s. The discussion about the role of public funding as well as the re-shaping of the orientation of education is closely linked to the international influence and change in the economy.

The European wide study, *Two Decades of Reform in Higher Education in Europe: 1980 onwards* (Eurydice 2000), reports that all European countries have seen a massive increase in the size of the higher education sector since World War II. This has been reflected both in the increase in the number and diversity of higher education institutions and in the increase in the number of applicants for places in higher education.

The OECD report, *Education at a Glance 2000* (OECD 2000c) looks at the progress of tertiary education in the period of 1990s. The comparative survey indicates that the number of students enrolled in tertiary programmes grew more than 20 percent between 1990 and 1997 in all but five OECD countries, and in eight countries more than 50 percent. Today, an average of four out of ten young people are likely, during their lives, to enter tertiary programmes which lead to the equivalent of a Bachelor's degree or above. In some countries, this proportion is as high as one person in two. On average across OECD countries, a 17-year-old can expect to receive 2.3 years of tertiary education, most of which will be full-time.

The study on the higher education reform (Eurydice 2000) states that the increased demand for places in higher education during the 1960s and 1970s was also a consequence of raised social expectations after the war as a greater proportion of the age group achieved the qualifications needed for entry to university. Since 1980, changes in the European labour market, particularly the move away from heavy industry towards more service-based employment, have reinforced the demand for higher-level training to improve employment prospects in most European countries. Despite the decrease in the number of school-leavers the demand for higher education has continued to increase in most countries as young people and adults choose to obtain further qualifications before entering a very competitive job market.

Labour market changes also appear to have become increasingly important, leading to the creation of more vocationally-oriented higher education courses for both young people and adults and stimulating closer links between business and the higher education institutions. In most countries this was reflected in the restructuring of higher education during the 1980s by upgrading specialist-training colleges to higher education level and by expanding the non-university sector to provide more technically-based higher education.

Another major influence on the higher education systems of the European countries during the period covered by the study has been the economic recession and the resulting restrictions on public spending. Since European higher education systems are substantially publicly financed, most have experienced real decreases in funding which have been exacerbated by the simultaneous increase in the demand for student places. This has stimulated changes in the systems for allocating public funds, with a move towards the awarding of contracts based on competitive bidding by institutions. In some countries, institutions have also been encouraged to look for funds from alternative sources such as regional governments or industry, or to look abroad for students and research funds. The market-oriented policy has affected the steering and management of higher education institutions. Management has had to become more professional and capable of planning and delivering a marketable service. The development has been reinforced by reforms in many countries giving institutions increased autonomy.

The statement of Viviane Reding, the Commissioner Education and Culture emphasises that education is a complex societal institution. It is not only a policy instrument for improving economy; the individual aspirations and cultural reproduction should be recognised in educational planning.

*"Higher education has long been recognised as an instrument of cultural, social and economic advancement for societies and for their individual members. During the latter half of the 20th century, a rising proportion of the European population from mixed socio-economic backgrounds asserted their right to higher education to acquire new skills or to improve them throughout adult life. This met with the full support of the educational authorities, which viewed such a development as a catalyst for cultural and economic prosperity. It is important*



*to remember that, across the European Union, the number of students has more than doubled in the last twenty years. They now number more than twelve million. This surge in demand forced European countries to review their educational offer in relation to availability, relevance, quality, cost and efficiency." (Eurydice 2000.)*

## **Strategy and objectives of the polytechnic reform**

The polytechnic reform was a national project (Lampinen 1998; Salminen 2001), the debate was argued and mostly national premises structured the model. An essential statement of the reasons for establishing polytechnic education was derived from the need for a highly trained expert workforce in the labour market. It is underlined by the doctrine adopted that the polytechnics should be more professionally and practically oriented than the academic universities. The governmental decision of 1993 defined the main character of the coming education system: "Higher education will consist of two kinds of institutes; practically oriented polytechnics (non-university sector), and science and art universities (university sector)."

In addition to the reform, which was a national project, and the Finnish model of the dual higher education system, the formulation of the Finnish polytechnic system has been influenced by the education systems of other countries. As regards the degree system, the Finnish polytechnics mainly resemble Dutch and German institutions. An important Finnish feature is that in this dual system, polytechnics differ from universities not only in terms of degrees, but also in administration, job structures, ownership and financing. A fairly radical objective of the reform was that openings in higher education would be offered to 2/3 of the age group. (Opetusministeriö 1993.)

In the first phase, several temporary polytechnics started operations in 1991, and by 2000, the polytechnic network was in permanent operation. Most of the old post-secondary and higher level vocational education were incorporated into the polytechnic sector. The process of building up the polytechnic system has been mostly guided by the Ministry of Education. The first years were a time for experiments, and then in the late 1990s, the temporary institutes had to earn their permanent licences through national evaluation based on the national policy criteria. (Lampinen 1995; Ministry of Education 1998; Salminen 2001.) The results of these experiments did not have much effect on the processes because of rapid ideological commitment to the selected model. The main policy lines for the development of the macro system were a dual higher education system with three consecutive steps. At the end of the 1990s, a lot of economic and human resources were directed to the development of the polytechnic sector.

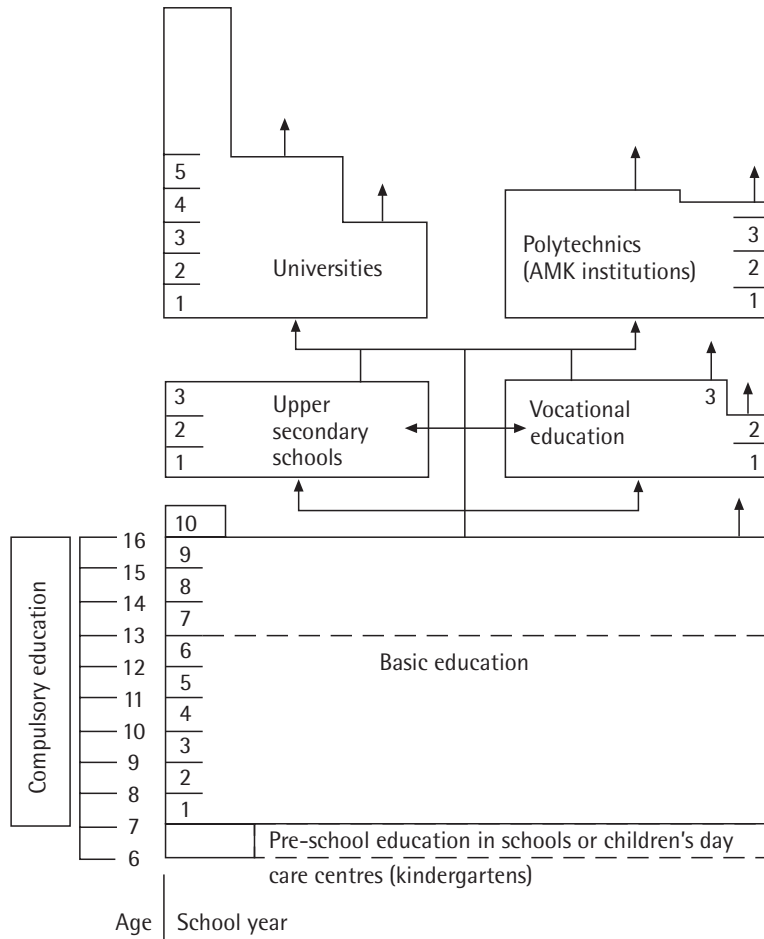


Figure 11. Finnish education system. (Source: National Board of Education.)

An essential instrument for steering the development of the reform was a two-phase licencing system. The experimental phase and the licencing system were a new method and apparently used only in the Finnish reform. The evaluation of the standard and quality of activities and achievements in development accredited the temporary polytechnics on a permanent basis. The relevance of evaluation was questioned, however, when it seemed to be evident that every institute would get its licence for political reasons. The contemporary steering instruments of the polytechnics are the agreements with the Ministry of Education and its decisions on the degree programmes of each polytechnic.

The general objectives and principles are expressed in the publication *Higher Education Policy in Finland* by the Ministry of Education. These seven guidelines stress the same aspects as the mentioned before as European mainstream. The polytechnic education was to raise the standard of education by new system of

degrees. The new system is expected to respond to the needs of industries and regional development. It should make vocational education more attractive. The bigger units should be more efficient and, it is assumed, produce some synergy benefits. Decentralisation and regionalisation should enhance the role of the polytechnic as an independent and responsive actor.

**The general objectives of the polytechnic reform are summed up as follows:**

1. *To raise the standard of education.* The polytechnics will raise the standard of education. Polytechnic degrees will be made part of the higher education degree system. In contrast to university degrees, polytechnic qualifications will have the vocational and practical emphasis.
2. *To react to changing needs for expertise and skills.* The reform must find new study programmes to fill in gaps in competence left by the old vocational education system and universities. Students should be given greater choice to fashion individual study programmes.
3. *To make vocational education more attractive.* The reform should provide a competitive alternative for young people with good general education and an interest in higher education.
4. *To improve the international compatibility of vocational education.* The reform should lift higher vocational education into a higher sphere, comprising a non-university sector on a par with the university sector.
5. *To make the vocational educational system more functional.* The reform should provide the occasion to set up larger, more effective units with stronger material and intellectual resources. In fact, most of the new polytechnics will be multidisciplinary consortia formed by combining several institutions. Polytechnics should be set up to rationalise the educational network, while utilising the synergy benefits of mergers and safeguarding the regional availability and impact of education.
6. *To decentralise the administration of educational system.* The reform should transfer authority to the operational units, reducing normative administration and other central control.
7. *To reinforce the regional impact of vocational education.* The polytechnics should assume their proper role in developing regional infrastructure by providing educational services as well as services and development supporting industry and business.

(Source: Ministry of Education 1998.)

## The post-reform system of higher education

The main part of the structural reform of higher vocational education was completed in August 2000, when the polytechnic network started to operate on a permanent basis. At the moment the number of regional multidisciplinary polytechnics is thirty-one (31) and in addition there are police and rescue polytechnics. The former VET colleges have been combined to form polytechnics. A new degree system has been set up and extensive training programmes for the teachers have been launched. The polytechnics award professionally oriented higher education degrees, which take 3.5 or 4 years. The entry requirements are either an upper secondary school certificate or a vocational diploma. At present about 70% of all entrants are matriculated students and 30% vocational school qualified. The new polytechnics have undergone rapid growth in student numbers. When the experiment started in 1992 there were some 6 700 new entrants in the experimental polytechnics, while the total intake in 2000 was over 33 000. In 2000 the total number of students was 114 000.

Besides the polytechnics, Finland has twenty (20) universities – ten multi-faculty institutions, six specialist institutions and four art academies, plus a college for national defence – all of them state-run and engaged in both education and research. Thus the higher education network consists of fifty-two institutions with plenty of out centres located around the country.

As mentioned, the growth tendency of Finnish higher education is no exception in the face of international development. But looking at the Finnish system in the perspective of the OECD statistics, reveals the special features of the Finnish system. As Table 8 shows, the enrolment does not vary a lot in the age group 15–19 in selected industrial countries. The age group 20–29 is more dispersed, the Nordic countries are on their own level, and Finland is a real training society in this sense. In the Finnish case, the most important explanation for the highest rate is the expansion of polytechnic education.

In addition to the high proportion of tertiary education, the length of studies is also very long in Finland. The OECD indicators show that the number of expected years spent in tertiary education for all 17-year-olds is rising rapidly as a whole. The country mean of expected years in full-time programmes is 2.0 years while in Finland it is 3.8; the highest value of all and the only one other country over the point of three years is Korea. Behind this world record is that the Finnish system is based on the idea of full-time study and long-term degree-oriented programmes. In fact the real rotation time is much higher than the educational norms expected.

In the present Finnish educational debate the rate of drop-out and the length of the studies are in focus. The university sector has been especially criticised. In universities the survival rate is 75 percent and the dropout rate is around 15 percent over a ten-year follow-up of the true cohort. In many countries, these key figures present a very different situation. *“On average across OECD countries,*

OECD countries	Students aged:			
	Ending age of compulsory education	15–19 as a percentage of the population	20–29 as a percentage of the population	30–39 as a percentage of the population
Austria	15	76.2	17.4	3.4
Belgium (Fl.)	18	86.1	19.5	4.3
Czech Republic	15	74.9	13.2	0.8
Denmark	16	80.1	27.9	5.5
Finland	16	82.1	33.1	7.6
France	16	87.8	19.1	1.9
Germany	18	88.3	21.7	3.0
Greece	14.5	77.6	18.4	n
Ireland	15	80.7	15.5	2.2
Italy	14	69.8	16.8	1.7
Korea	14	78.6	20.9	1.1
Netherlands	18	86.0	22.0	3.5
Norway	16	86.4	26.5	5.2
Sweden	16	86.1	30.4	13.3
United Kingdom	16	69.5	18.1	8.8
United States	17	74.2	21.4	5.6
Country mean	16	76.3	20.4	4.4

**Table 8. Enrolment rates by age, full-time, and part-time students in some OECD countries (1998).** (Source: OECD Education Database.)

*about a third of all entrants leave tertiary education without completing a degree – but this varies greatly between countries: in some countries only a minority of entrants complete the course; in others almost all do.*"(OECD 2000c.)

No follow-up statistical information on an age cohort regarding completed polytechnic studies is available. It is widely known that the polytechnics were worried about the small number of completed degrees; the Ministry of Education has set a goal for the polytechnics to improve the pass rate. The government has set the goal that 80 percent of the polytechnic students will graduate in the normative time at least in 2004. According to the table below, the number of students has grown much faster than the number of completed degrees; during the years 1991–1997, there were 83 000 entrants who completed 44 000 degrees in the period 1994–2000. The polytechnic studies are planned to be completed in a normative schedule; according to the numbers a slightly more than half of the students have achieved that goal. The official rate of dropout is around 10 percent. This contradiction needs more investigation.

Year	Number of first-year students	Number of polytechnic students	Number of complete degrees
1991	148	148	
1992	6 611	6 915	
1993	8 320	14 478	
1994	10 116	23 601	128
1995	10 908	31 072	1 924
1996	19 157	44 339	4 828
1997	28 110	58 590	6 049
1998	32 723	78 087	6 955
1999	33 087	96 508	9 896
2000	33 046	114 000	14 153

**Table 9. Development of number of students and degrees in the Finnish Polytechnics 1991–1999.** (Source: Statistic Finland 1999, Amkota database 2000.)

The age cohort is currently around 64 000; the education system offered entrance at upper secondary level to 94 000, and on the higher level, to 50 000 new students (see Table 10). Related to the age cohort, the supply seems to be excessive. As mentioned before the supply is based on governmental policy to secure further studies for all school-leavers and higher education for two thirds of the age group. In addition there are number of places reserved for adult students. In the effective development plan, the line is formulated as follows:

*"The point of departure in the quantification of educational provision will be to cater for the knowledge and know-how needs of the population as a whole, to ensure a balanced regional development and to respond to the need for change in society and working life. A rapid response will be given to the educational needs arising from the ageing of the population and the workforce."* (Ministry of Education 1999.)

General Upper Secondary Schools	39 900	Upper sec.ed.
Upper Secondary Vocational Schools	57 400	
Polytechnics	30 800	Higher education
Universities	19 400	

**Table 10. Supply of education in upper secondary and higher education in Finland 1999.** (Source: National Board of Education 2000, KOTA database 2000.)

The quantification of the educational supply has traditionally been a problematic task for the administration. Many conflicting interests exist in society; the interpretation of demographic factors, regional development, and industrial change are not sufficiently known for future needs for labour force. Not even the internal factors of the education system are known. On the European and national levels, scientific anticipation methods have been developed to forecast changes in occupational structure and demand for education (ROA 1995; Työministeriö 1998). Based on these, the National Board of Education developed a calculation model to assist in forecasting working life and educational needs (Autio et al. 1999). The estimated educational needs are compared to the real number of entrants in Table 11. A calculation of differences between estimated needs and new students is also provided.

Educational sector	Estimated annual demand for 2001–2005		Number of entrants		Relation between entrance and estimated demand	
	Upper secondary VET	Polytechnic	Upper Secondary VET 1998	Polytechnic 2000	Upper secondary VET	Polytechnic
Natural resources	3 350	970	3 597	1 149	107%	118%
Technology and transport	22 880	9 190	20 659	10 288	90%	112%
Business and administration	8 300	7 600	10 174	9 401	123%	124%
Hotel catering and home economics	8 350	1 450	8 303	1 907	99%	132%
Social and health care	8 450	6 250	9 028	7 260	107%	116%
Culture	2 570	1 800	2 547	2 303	99%	128%
Humanities and teaching	530	720	527	762	99%	106%
Total	54 430	27 980	54 935	33 070	101%	118%

**Table 11. Estimates of educational needs for 2001, annual entrance of upper secondary VET and polytechnic; relations between supply and demand in education.**

(Sources: National Board of Education, AMKOTA database, Autio et al. 1999.)

A main finding concerns the rate of enrolment; related to the estimated demand, the intake of students to the polytechnics is excessive and the upper secondary VET provision is in balance in this sense. In fact the total number of secondary VET supply is 57 300, which means that many of providers suffer from a lack of students, especially in the fields of metal industries and construction. A comparison between the supply of polytechnic education (Table 12 ) and the number of entrants shows that there are more beginners in polytechnics than has been agreed upon with the Ministry. In fact, the rate of overloading has diminished; in 1997, it was 136 percent and 118 percent in 2000.

Traditionally the Ministry of Education has managed the supply of education. The policy of decentralisation does not mean a lot in this sense. The autonomy space of the VET providers to make their own strategic decisions or to respond to the needs of the environment is still quite limited. The Ministry defines the number of students per educational sector and allocates the volume to the individual institute. The estimation of the annual enrolment is based more or less on the anticipated demand for labour force. The supply of the polytechnics is more industrial and business-oriented than the universities. As Figure 12 demonstrates, the fields of technology (32%) and commercial studies (28%) dominate the supply, they present 60 percent of the whole polytechnic sector. The sectoral division between the university sector and the polytechnics is not totally comparable but in general the natural sciences and humanities, which cover near half of university enrolment, do not exist in the polytechnics in same sense at all.

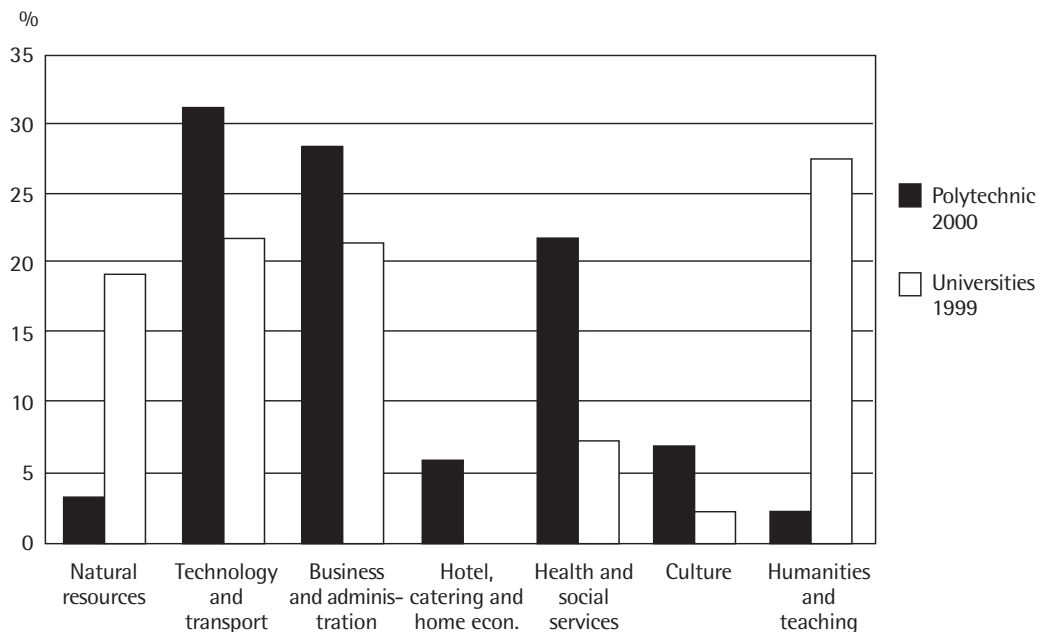


Figure 12. Proportion of new students by educational sector in Finnish polytechnics and universities.



Interests of young people and the ministry-steered supply do not match. Figure 13 indicates that the most popular sectors, culture and humanities, have up to ten times more applicants than the sector annual entrance. The number of students in engineering education has been radically increased in the late 1990s. As a consequence of the expansion in technical universities as well as in the polytechnics' engineering programmes this is the easiest sector to access, every second applicant gains admittance. Some peripheral polytechnics suffer from a lack of students in the technical sector.

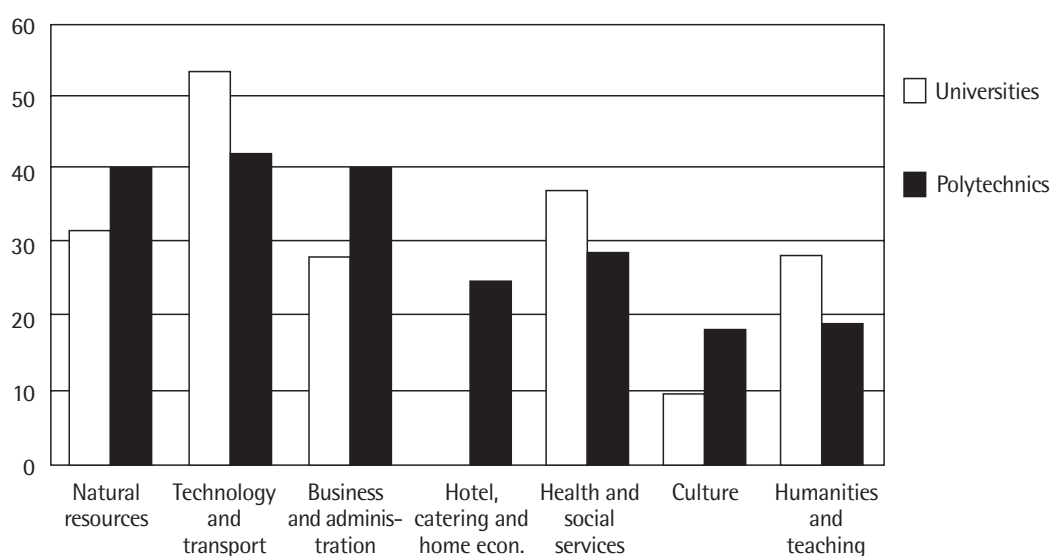


Figure 13. Number of entrants per 100 applicants in 1999.

Educational sector	Polytechnics	Universities
Natural resources	1 149	3 743
Technology and transport	10 288	4 248
Business and administration	9 401	4 151
Hotel catering and home econ.	1 907	0
Health and social services	7 260	1 432
Culture	2 303	462
Humanities and teaching	762	5 337
Total	33 070	19 373

Table 12. Number of entrants to Finnish higher education 1999.

(Sources: AMKOTA database, KOTA database.)

The demand for educated labour force is the third aspect concerning the demand and supply of higher education. It seems that paradoxically placement of graduates in the most popular sectors on the labour market is worst in the group of the higher educated. The statistical follow-up shows that a complete technical degree is a key to the labour market. In general the unemployment rate of the higher educated is lower than that of the less educated and after five years most of them have entered the labour force.

The establishment of the polytechnic system has shifted the emphasis of funding. Direct public expenditure, as a percentage of GDP for tertiary education (1997) by OECD statistics was the highest of all countries in Finland at 1.7 percent, when the country mean was 1.0. The problem is, however, that per capita funding is among the lowest in the OECD countries. The balance of national funding changed in the period 1990–1996. An index of the change in public and private expenditure on education between 1990 and 1996 (1990=100) shows that funding of primary and secondary education has decreased (90) and tertiary education has received more financial resources (126) (OECD 2000c). In principle, the funding of polytechnics is based on per capita accounting and in the university sector the funding is allocated per institution on the basis of the number of master's and doctor's degrees. The number of students in both sectors of higher education increased rapidly in the 1990s. The polytechnics' funding follows the changes quite linearly. Meanwhile, the university sector has not been successful in negotiations with the Ministry; the sector has had to operate with relatively meagre resources.

## **Polytechnics in action – features of re-structured higher VET**

In addition to structural reform, the polytechnic system aimed at the qualitative development of higher VET. The doctrine of the reform emphasised that the consortium structure would provide flexibility in devising interdisciplinary degree programmes and learning. New polytechnics were to evolve methods of study and education-workplace interaction. Work practice was to be a key ingredient in all the polytechnic studies and the student's final project was usually to be concerned with work-related problems. As the scheme of the VET reform in Chapter Four shows, the progress can be divided into three levels; reforms of the system, organisational culture and practices implemented. The study investigates and analyses all these levels. The main dimensions of analyses are defined in the framework of the empirical study in Chapter Two. The next sub-chapters concentrate on the essential findings based on the interviews and documents.

## Curriculum reform – a way to improve the quality of learning

The main aim of the polytechnic reform is to educate a new type of expert with a marked working life orientation. A key instrument of the steering of the learning process is a curriculum. This notes the fields of the future competence and the logic of the learning process. The curriculum should also be a basis of interaction between the business environment and the polytechnic. On the rhetorical level and in the official documents curriculum reform is accorded high priority. The polytechnics have launched modernised programmes for traditional occupations and some new interdisciplinary programmes, which should take advantage of the synergy benefits of merged institutions.

The polytechnic reform induced several changes to curricula. The old nationwide curriculum was abandoned. The new legislation defines only the degrees and their structure. According to the Polytechnic Statute 256/1995 each degree programme consists of basic studies, professional studies, optional studies, practical training and a thesis writing project. In 2001, there were programmes in seven fields of education, 9 different degrees and 151 degree programmes. In addition, every polytechnic is allowed to offer specialisation lines. The degree programmes required 140, 160 or 180 Finnish credits. According to the European Credit Transfer System (ECTS) 20 Finnish credits corresponds to 30 ECTS credits. The polytechnics can decide about the contents of degree programmes and the titles of the degree programmes themselves. The Ministry of Education confirms the annual student places, titles of the degrees and degree programmes.

The objective of the curriculum reform was to systematise and raise the standard of the education and on the other hand increase students' freedom of choice. All reformed polytechnic curricula include a 10–20 Finnish credit component of studies common to all students, more optional studies, and a thesis writing project which is more extensive and demanding than earlier. The purpose is to offer extensive study modules and avoid small courses. The aim has also been to add study modules which are carried out in co-operation with working life.

The polytechnics utilise their multi-disciplinary resources by supplying the studies common to all students. These studies usually consist of language and communication skills courses, basic courses on information technology and courses that prepare students for work placement. Common studies are compulsory for all students.

The flexibility and multi-disciplinarity of the polytechnics studies have been strengthened by increasing the amount of optional studies. Curricula in all polytechnics include 10 Finnish credits of optional studies. Students can collect these courses and study modules from the different units of the polytechnics or other educational institutions. Students have exercised their freedom of choice very little, however. According to our interviews the majority of the optional courses are still chosen from the student's own educational unit.

The thesis carries 10 Finnish credits in all polytechnics. Earlier, before the polytechnic reform the thesis carried 5–6 weeks of study depending on the field of education. Not every field required a thesis at all. According to the leaders of the polytechnic degree programmes the thesis is now more extensive, more functional, problem-based and working life oriented than before. The thesis need not be a purely theoretical work, but nor may it be solely a project. The aim is to connect both sectors. Two degree programme leaders illustrate the situation in the following way:

*The aim is that the thesis should be more functional and clearly based on the needs of working life. Theses should be more practical than they were earlier. The objective is also that with help of the thesis the practices of the working life should be improved in some way. Purely theoretical theses are not acceptable.*

*Maybe they are broader and more problem-based. Summaries and direct quotations are not acceptable. The problems and the solutions must be based on scientific work.*

The interviews showed that the pedagogical practices of thesis writing are currently under development. The first theses have just been written, so the general tradition has not yet taken shape. Working-life relevance is the main aim in all fields of education, however. In the technology sector (electronics and logistics) the theses are often studies commissioned by local enterprises. In the field of social and health care the partners in co-operation are representatives of the public and third sectors. Depending on the field of study the thesis may be development work, a software project, a cost-effectiveness analysis, market research, a collection or a traditional literary thesis. It seems that co-operation with working life is best accomplished not only in practical training but also in thesis writing. Nevertheless, the students on the newest degree programmes, especially, thought that the unestablished practices are problematic because teachers are also uncertain about the forms and contents of the thesis. Apart from education in the social care sector the students need more guidance in thesis writing.

*I think that it depends on the teacher supervising the thesis writing. I am quite disappointed, however, because you have to glean the information about what should be done in different phases of the thesis writing. It depends on the teacher how much information you get.*

In addition to thesis writing and practical training there are nowadays other study modules which are carried out in co-operation with the representatives of working life. The best established practices are in the social and health care sector. Students participate in projects which are carried out with local authorities, comprehensive schools and third sector organizations. Students have planned and led childrens' clubs, carried out security surveys, participated in orphan child and

single mother projects. The utilisation of project work has also been started in other fields of education. In principle project work is done in small groups. In the field of logistics students have planned logistics chains or organised internal production or storage. Design students have designed aids for the disabled and pieces of furniture. In the field of natural resources a typical way of carrying out project work is to participate in EU projects as assistants, trainees or theses writers.

Most of the students with experiences in project working have been very satisfied with the project working periods. The general view was that the projects have been hard work but very educative and students have learnt a lot, especially co-operative skills. Project work calls for a lot of independence for students. The increasing amount of project work concerns some students who have experiences of poorly organised projects and non-functional project teams. There has also been group work where only a couple of students were involved in a project.

One important objective of the curriculum reform was also to create wide study modules. Nevertheless the majority of the studies still consists of small courses carrying 2–3 Finnish credits. It is usual for the compulsory studies of one degree programme to be composed of over 40 study periods.

## **Synergy benefit of multi-disciplinarity**

The polytechnics were created from the former post-secondary and higher vocational level institutes. One important aim of the merging of the institutes was to achieve educational synergy. The polytechnics aimed to respond to changing challenges by creating new working life oriented degree programmes, for example (Opetusministeriö 1999; Jaatinen 1995, 9–10).

According to Jaatinen (1995, 10) the important question of multi-disciplinary polytechnics is whether the units concentrate on emphasising the differences between units or if the objective is to find their common community. If unit-specific specialisation is emphasised before the community has been formed the consequences will be isolation and the synergy benefit of multi-disciplinarity will be not achieved.

Multi-disciplinarity can be utilised in several ways in polytechnics. One important objective was to create new degree programmes linking different fields of education. This has been the goal in the Häme Polytechnic, for example, where the degree programme in product development and product design was formed by combining mechanical engineering and design in hard materials. In the Pirkanmaa Polytechnic the degree programme in marketing agricultural industry consists of education in the fields of commerce and natural resources.

Our interviews suggest that at the moment the polytechnics are creating forms of internal co-operation. Naturally, there are more established traditions in old polytechnics than in younger polytechnics. One important hindrance to co-operation is long distances between units.

Even if the forms of co-operation are not yet established, most of the degree programme leaders interviewed believe that it will be possible to find the synergy and that it will benefit the partners. The representatives of the social and health care sector especially found multi-disciplinarity useful. They thought that the social and technology sector could co-operate in planning aids for the disabled, for example. On the other hand the knowledge of social care and the administration and commerce sectors could be combined in questions which relate to co-operation of enterprises and human resources. Critical points were also expressed. The teachers in the technology sector especially felt that the achievement of synergy is difficult inside the polytechnic because the starting points and objectives are so diverse in different fields of education. One teacher described the situation in the following way.

*The main problems here in the multi-disciplinary polytechnic are the different viewpoints, starting points and objectives. If you compare, for example, the education in the field of social and health care or music to the technology sector, hard technology, they are so far away from each other. There are a lot of matters which it is not possible to adjust, but maybe it is possible to find some synergy benefits.*

The utilisation of multi-disciplinarity appears most clearly in the teachers' work. Teachers have participated together in management groups, different curriculum and quality teams and planned international activities together. Instead, the students' view of multi-disciplinary co-operation was much more narrow. Usually, the polytechnics' common studies are the most typical form of co-operation from the students' viewpoint.

The polytechnics' basic challenge is to offer degree programmes which are many-sided and which respond to the needs of working life. The utilisation of multi-disciplinary teaching is theoretically possible and recommended by choosing optional studies from different units and other educational institutes. In practice the students move very little between different units. The reasons are partly the student's own interests, but it depends greatly on the organisational problems of education, such as long distances, overlapping timetables and lack of information. The following example illustrates the situation from the viewpoint of one electronics student, but other students have similar experiences, too.

*In principal we have the right to choose optional studies from this school or the health care institution or the business school but arranging the courses to our timetable is very troublesome, it does not work. I hope the options to take optional studies from other units or educational institutes will be improved in future.*

The teachers move between units more often than students. General subjects particularly are taught by the same teachers in different units. Other teachers

move mainly inside the unit. The co-operation inside the unit between neighbouring degree programmes seems to be more active than the mobility between different units and fields of education. It is usual in the technology sector especially to co-operate more closely with the other units of technology in different polytechnics than with the different fields of education in one's own polytechnic.

## Regional role of polytechnics

In the European perspective the regions are in a key role as providers of development. An important argument of the polytechnic system is more focused regional development and co-operation with small and medium-sized companies (Opetusministeriö 1999, 6–7). The former VET system consists of isolated sectoral institutions, which produced educational services by unified policy. They did not have any special regional orientation. Their role was to transfer knowledge and to produce new labour force. The Finnish polytechnic network covers the whole country; former VET colleges have merged into regional establishments. In fact the polytechnic network is wider than 31 units, on the basis of the former system there are activities about in 60 towns and the number of separate locations is more than a hundred. The administrators of the educational institutes are mainly municipalities and federations of municipalities.

Engaging in the regional networks and development work is carried out in several ways. Many degree programme leaders find that the regional centres of expertise are important co-operation channels. Main regional actors like towns, polytechnics, universities, associations and enterprises participate in the activities of the centres of expertise. Kymenlaakso Polytechnic participates in the activities of the centre of expertise of south-east Finland, where one field of expertise is logistics and Russian know-how.

Some polytechnics take also part in regional activities via projects. The representatives of the natural resources sector especially have engaged in different EU projects together with provincial federations, municipalities, environment centres and enterprises in the field. The projects have dealt with the polytechnics' role as the developer of environmental care and the demands of population centres of different size for environmental care, for example. Important co-operation partners in the social care sector are in addition to the public sector the associations of the local third sector.

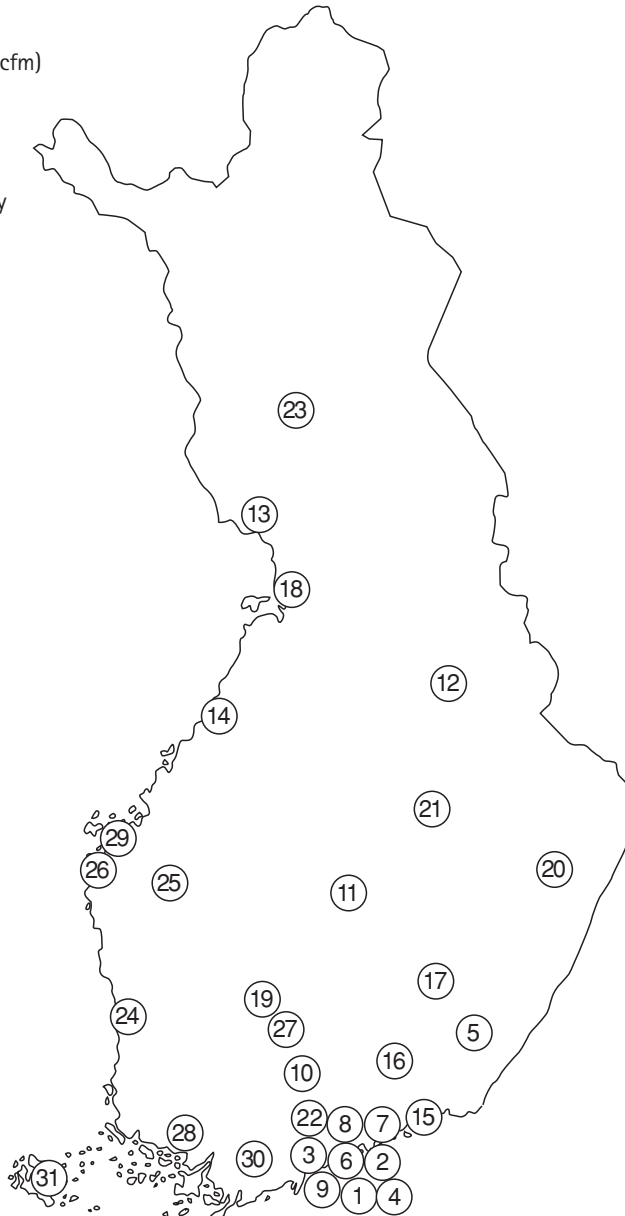
Some degree programmes, especially in the technology sector, have taken the needs of the local enterprises into consideration in the curriculum planning process. The training and thesis writing places are also significant communication channels to regional actors. In students' opinions these places and visiting lecturers and visits to enterprises and public organisations are often the only contacts to the regional actors.

At the moment, forms of co-operation between polytechnics and local business life are underway. Our interviews showed, however, that it will be important to

### Polytechnics in 2001.

(Source: <http://www.arene.fi/suomi/index.cfm>)

1. Arcada Polytechnic
2. Diaconia Polytechnic
3. Espoo-Vantaa Institute of Technology
4. Espoo-Vantaa Polytechnic
5. South Karelia Polytechnic
6. Haaga Institute Polytechnic
7. Helsinki Business Polytechnic
8. Helsinki Polytechnic
9. Humanities Polytechnic
10. Häme Polytechnic
11. Jyväskylä Polytechnic
12. Kajaani Polytechnic
13. Kemi-Tornio Polytechnic
14. Central Ostrabothnia Polytechnic
15. Kymenlaakso Polytechnic
16. Lahti Polytechnic
17. Mikkeli Polytechnic
18. Oulu Polytechnic
19. Pirkanmaa Polytechnic
20. North Karelia Polytechnic
21. Pohjois-Savo Polytechnic
22. Police College
23. Rovaniemi Polytechnic
24. Satakunta Polytechnic
25. Seinäjoki Polytechnic
26. Swedish Polytechnic
27. Tampere Polytechnic
28. Turku Polytechnic
29. Vaasa Polytechnic
30. Sydväst Polytechnic
31. Åland Polytechnic



increase the networks between education and regional actors because the polytechnics seem to be still quite unknown phenomena to employers. The employers cannot take full advantage of the possibilities of the polytechnics. It is very usual that students have to explain to the employers what they are going to be when they graduate.



In addition to the polytechnics' regional importance, some degree programmes also have nationwide significance. Such fields are logistics and design, for example. When determining the material flows from Northern Finland to China, logistics is needed throughout. The logistician can influence the production of his province best from abroad. The trend of local and nationwide degree programmes is also seen in recruitment of students. Most of the polytechnic students come from the neighbouring area but rare specialisation lines which are available only in a few polytechnics (e.g. creative therapies, social services for disabled persons) or the degree programmes with a significant nationwide status (Institute of Design in Lahti Polytechnic) attract students from different parts of the country.

The regional role of the polytechnic can be defined by the flow of students. Figure 14 indicates that there are different strategic roles between regions and polytechnics. The institutes located in the upper right field got the students from their own region and the graduates also find their job in the same region. The opposite role is played by the polytechnics in the lower left corner, they recruit students from outside their established region and most of the students leave the region after completing their studies.

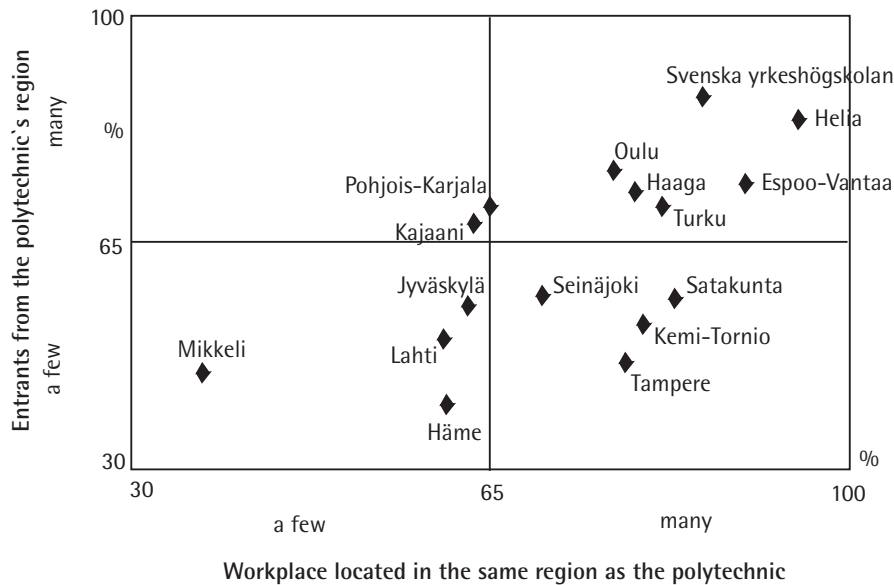


Figure 14. Position of polytechnics by regional entrants and regional labour market position.

Figure 15 shows that there are also big differences between the polytechnics depending on the location and popularity of the polytechnic. The polytechnics in the right upper field are the most popular and they recruit local students, who find their jobs in their home area. The combination of easy access and wide share of the recruitment from other regions is in the lower left corner.

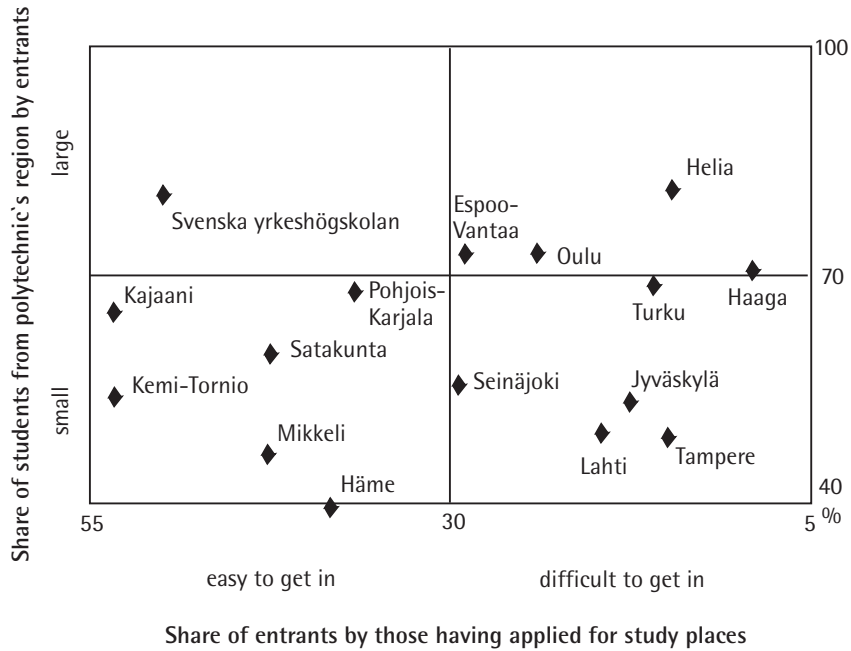


Figure 15. Position of polytechnics by popularity and regional recruitment. (Source: Statistics Finland.)

## The networks between polytechnics, industries and public services

One main goal of the polytechnic reform was to increase the co-operation between education and working life. This is carried out by improving the curricula: Practical training periods have been developed and working life connections of the theses have been increased, for example. Educational institutions and degree programmes have also integrated other study modules as projects carried out in co-operation with industry. Relations to industry have been activated by inviting representatives of working life to give lectures on their special fields. Teachers are also encouraged to participate in in-service training and take a leave of absence and work for a period of time outside the polytechnics. The polytechnics want to activate their R&D services, too.

It seems that the goal of improving co-operation between polytechnics and working life is best achieved during the practical training periods and thesis writing. Practical training is often the most important way for students to get contacts to the employers. In polytechnics, most degree programmes include 20

Finnish credits (12 months) of practical training apart from the social service sector, where the training periods amount to 30 Finnish credits. The main rule is that students find their training places themselves. In some study fields, especially in the social care sector, there are, however, quite wide basic networks of employers available, which are taken advantage of when practical training places are sought. In the social care sector practical training consists of several modules. These modules may relate to childrens' or young people's environment, working in a multi-professional institutional or non-institutional care team or administrative working environment in the social care sector. In the technology sector the practical training is usually carried out in two parts; one part during the semester and the other during the summer holiday. Some technological degree programmes also include so-called production-oriented specialisation lines which emphasise on-the-job learning and contain a lot of practical training.

Most students have been very satisfied with their practical training periods, but they hope, however, that the polytechnics would co-operate even more actively with working life. The polytechnic degrees so far seem to be rather unknown phenomena in industrial life. It is common that students have to explain to the employers about their studies in polytechnics and what they are going to be when they graduate. The employers have adopted a favourable attitude towards the polytechnic students and the polytechnic degrees, however.

The thesis carries 10 Finnish credits in all study fields. In practice the goals are defined quite freely, even though the aim is that the thesis is carried out in co-operation with working life. This aim is fulfilled in different ways in different fields of education. As we can see in Figure 16 the technology and natural resources sectors have been most active in doing theses in co-operation with industrial life. In the social service sector less than 50% of theses are written with representatives of working life<sup>1</sup>. Stenvall (1999, 6) proposes that the thesis may be a literature report, product or exhibition. It is common that a student's training place is the same as the company for which she/ he writes the thesis.

In the technology sector, most of the students prepare their theses for companies and the companies pay them. Students find the companies themselves via former training places or by contacting new enterprises. The companies can also find students via the business services departments of polytechnics. In the field of logistics theses have been cost estimates of transportations or the plans for distributional routes, for example. In the field of electronics a typical thesis is a device which is ordered by a company. Students have also carried out software projects relating to mobile phones or communicators.

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<sup>1</sup> According to the Amkota database a thesis written in co-operation with working life means that one of the following criteria is fulfilled: 1) the representatives of the working life pay the polytechnics or student for the thesis, 2) the representative of working life has been nominated as the supervisor of the thesis, 3) from the beginning the goal of the work community has been to utilise the results of the thesis in their own activity and this has been agreed in writing.

In the field of social services the thesis is often a literature study and the data is collected by interviews. It is common that the topics and research problems are planned together with employers in the public and third sectors but usually there are no resources to hire students. These are seldom specifically commissioned studies. The typical partners in co-operation are federations of municipalities and towns (comprehensive schools, home help services or care of the mentally handicapped).

Students of design usually write their theses as a form of collection for the companies or other clients. The goal is that theses are commercialised but students also write theses for their own use. In the field of natural resources, theses are often written in collaboration with rural advisory centres, environment centres or advanced farms. These have included development tasks, market research and product development.

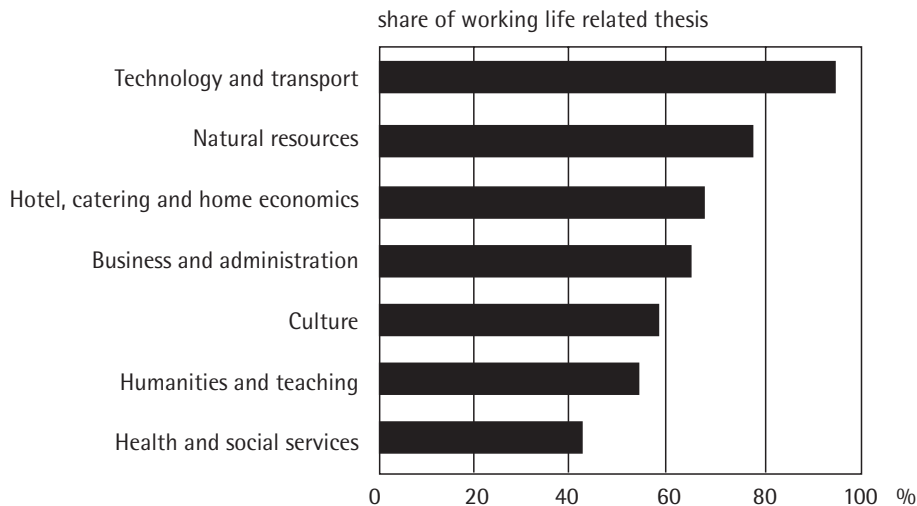


Figure 16. Share of theses carried out in co-operation with working life in polytechnics in 2000 by study field. (Source: AMKOTA database 2000.)

In addition to practical training and thesis writing periods the degree programmes have increased working life connections with the help of various projects. According to Korhonen and Mäkinen (1995, 21) a project study means a form of study in which students find solutions to a current and real problem during a certain period of time in teams, pairs or alone. It is typical that the project study is carried out in collaboration with companies, communities or other educational institutions. Degree programmes, however, have made individual solutions regarding the partners in co-operation, finance possibilities and the participation of the students in projects. At best students are hands-on assistants, they accomplish surveys and independent parts of the project. It is very usual that

practical training and thesis writing periods are connected to some project. In less favourable situations the whole project activity is in charge of teachers and students do not know anything about projects, or the students have to do projects without any guidance. Depending on the degree programmes teachers have different estimations about the amount of project study. One representative in the field of natural resources stated that the amount is at the present as much as 20%.

The project activities are carried out in different ways in different fields of education. In the natural resources sector the regional development projects, which are financed by the European Union (e.g. ESF, Interreg programmes), are typical. The partners in collaboration are regional councils, towns, nearby municipalities, environment centres and the enterprises in the field. The themes of the projects have been the demands of the population centres for environmental care, the training of the personnel in the enterprises, processing of foodstuffs and product development of rural tourism. Apart from the in-service training of the personnel, students have also participated in projects in many polytechnics.

Lahti Polytechnic has carried out multi-disciplinary dynamo projects which are co-operation projects of the students of technology, business economics and social and health care. The projects are based on the assignments of local companies and they are carried out by second year students. One day in the week for half a year has been reserved for this. An exhibition of end products is arranged in spring. The end products have been various designed items and equipment, costumes and furnishing. The representatives of the polytechnics consider dynamo projects to be good even though the projects do not completely function in a short period of time. Some firms have also been uncertain about giving demanding jobs to second year students. The most successful projects have been the bilateral projects of the firms and the Institute of Design.

The students of social care have participated in community projects in co-operation with the representatives of public and third sectors. The purpose of the projects is that students spend one day a week for 1–1.5 years on working life projects. It is also usual that students participate in voluntary work in the third sector.

There is also an aim to arrange co-operative projects with local industries in the technical sector. Students have done exercises which have been commissioned by local companies from the business service department or students have acquired the exercise tasks from the companies themselves.

On the national level, the Team Academy (Tiimiakatemia), a unit of the Jyväskylä Polytechnic, is known for its innovative methods which focus on developing working life relations and bringing studying and entrepreneurship closer to each other, for example the straight on-the-job learning method has been developed and applied in the Team Academy. All education is carried out in teams and projects, which means that students work on the projects independently in teams of 3–8 students. During the years 1993–1999, over 800 projects were carried out in the Team Academy (Huttula 2000). It has also gained several recognitions for its work. In 2000, the Team Academy was chosen as the centre of quality in polytechnic education.

The research and development activities of the polytechnics are freely defined in law. According to this (L 255/1995) polytechnics are able, within their educational function, to carry out the research and development work which advances their teaching activities and supports working life. Research and development activities are important to the polytechnics because the developing and updating of the vocational teaching needs knowledge about working life. The polytechnics' R&D activities may be education, applied research or product development (Tulkki 1993).

Not all polytechnic degree programmes/units have their own R&D services yet, but most of them are actively planning to have these services. It is quite common that the degree programmes have joint R&D services within the health and social services unit or the technology and transportation unit, for example. Service departments and product development laboratories are usual, especially near to technology units. Via the R&D units firms can order thesis writers and practical trainees to carry out projects. Some polytechnics, Jyväskylä for example, have established a common R&D unit for the entire polytechnic (JAMK services). The turnover of this unit was FIM 32.7 million in 1999 and there were about 3 500 persons who participated in the educational services arranged by JAMK (<http://www.jypoly.fi/internet/palvelut.nsf>).

Our interviews show that at the moment the most common form of R&D services is the in-service training which is offered to adult students. Polytechnics have offered both degree-oriented in-service training (e.g. engineer degree, expert salesman degree) and short courses. The teachers are in charge of arranging in-service training, the students rarely participate in these activities. In the field of natural resources the themes have varied from forest certification to map infos. Some polytechnics' R&D services also include projects with local industries, consultation, marketing research and construction planning.

One of the most important channels of co-operation is the polytechnics' teachers' relations and contacts to the representatives of working life. Almost without exception the polytechnics' degree programme leaders' views of industrial relations were more diverse than students' experiences of co-operation. Teachers especially emphasise the significance of informal networks. They have informal networks involving firms and organisations of the public and third sectors and research organisations via their previous workplaces, their own enterprises and organisational activities. More formal relations to business life have been created in connection with polytechnic boards, consultative committee and research and development activities.

Teachers' co-operation forms vary slightly by field of education. In the technology sector especially it seems to be quite usual to recruit teachers from business life. Teachers' own enterprises are most typical in the natural resources and the design sector. Teachers of design have their own offices and freelance activities and teachers of natural resources have farms of their own and other business interests. In the field of natural resources student careers as entrepreneurs after graduation are more typical than in the other fields of education (see Figure 17). The share of entrepreneurs increases over time after the students have

completed their degrees. In the field of natural resources the share of entrepreneurs was 8.2 % one year after graduation and 18.1% two years after graduation. After three years the share of entrepreneurs was almost 20%.

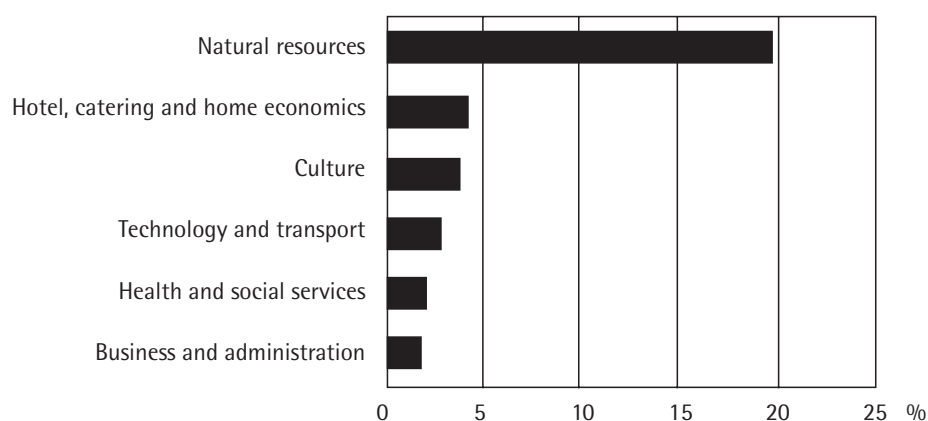


Figure 17. Share of entrepreneurs 3–4 years after the graduation by study field.  
(Source: AMKOTA database 2000.)

The teachers in social care sector participate actively in the activities of the third sector. The third sector is considered to be an important forum of co-operation between practical actors in social care, the polytechnics and universities. In the social care sector teachers have also utilised the possibility for their own on-the-job periods and international teacher exchange. Teachers take leave of absence and work for a period of time outside the polytechnics. They have worked in employment and social service agencies and the Probation and After-Care Association and participated in international and multi-cultural work development co-operation abroad.

Important forms of participation also include regional centres of expertise because the main actors of the region like towns, polytechnics, universities, organisations and enterprises participate in the activities of the regional centres of expertise. The regional centre of expertise project in the field of the social sector is active in North Karelia, for example. The significance of social service education is emphasised there because it is the only education provider in the field in the region. According to the representatives of the polytechnics the importance of polytechnics or certain degree programmes increases in the regional networks if there is no university level teaching and research available in the field.

Teachers also utilise their informal and formal contacts when they invite visiting lecturers from industry, universities and research institutes. Some companies also arrange recruitment meetings at schools, especially for students of electronics and logistics. Most students have visited companies and they also consider meeting visiting experts to be important and hope to have more opportunities to meet them.

## Debatable higher standard

The transition to the new polytechnic system has demanded changes in both structure and content of education. The aim has been to improve the standard of education by lengthening the duration, focusing on new pedagogical solutions, increasing the teachers' level of education and developing education towards the needs of the working life in national and international co-operation.

The duration of polytechnic education has been extended by half a year to one and a half years. In the field of the business and administration the three-year *merkonomi* education has changed to the 3.5 year *tradenomi* education, for example. Education has also been lengthened by half a year in the fields of natural resources and social care.

The polytechnic reform has clearly brought about changes in teaching activities. The teaching activities have been reformed by increasing the amount of optional studies, emphasizing and raising the standard of students' independent and project-based working and developing the practices of training and thesis writing.

All polytechnic degrees include 10 Finnish credits of optional studies. The aim is that students can collect these studies from other educational institutes or universities and enhance their know-how. The aim has not been fulfilled, however. Most students still choose their optional studies from their own field of education and their own polytechnics. In addition to optional studies the degree programmes include a wide range of specialisation options (generally 2–3 per degree programme) or alternative vocational studies.

New pedagogical methods have been adopted in polytechnic education. The amount of traditional lectures has been diminished and the focus is more on team and project working, which improve students problem-solving skills. The teachers emphasise the multi-disciplinary and research-based approach of polytechnic teaching with the constructivist conception of learning in the background.

According to two degree programme leaders:

*Polytechnic teaching differs essentially from earlier teaching methods. The aim is now wider, multi-disciplinary teaching. Students have the option to choose different courses and complete very varied degrees.*

*Projects have increased enormously, project working and working in the field. Secondly, there are more independent study tasks and the tasks are wider and higher in standard.*



The pedagogical objective of developing the practices of training and thesis writing periods has been partly achieved. Some of the teachers think that the practices of the training periods have not changed at all compared to earlier times. There are, however, many teachers who aim to intensify the counselling in training periods, and systematise the training contracts practices and communication between the polytechnics and the training place. The teachers in the technology sector have the most critical attitudes towards developing the counselling of training periods. They think that increasing counselling only bureaucratises the practices.

One teacher illustrated the situation in the following way:

*Now we are going to try supervised training. It seems that this has now succeeded better than in the previous year. We are going to interview all workplaces and make training agreements. I understand that there is a good idea behind that but I do not completely understand. These students are quite good, I think and nowadays employers cannot keep lazy employees. Our students (in the field of technology) have worked on good projects during their training periods, they have not been hired just to use a copying machine.*

The development objectives of the theses writing period concentrate on the one hand on pedagogical demands and on the other hand on relevance of theses to working life. A working life connection is the aim of the theses in all fields of education but the methods of implementation vary. In the field of technology as many as 95–100 % of theses are carried out in co-operation with working life. In the other fields of education the connection is not so straightforward. In the social care sector, it is usual that the topics and problem settings are based on the experiences from training periods but the theses are not actual commissioned studies. The teachers' pedagogical role and supervision in the theses writing process is emphasised more in social care than in the technology sector.

In principal, students like the idea of connecting study modules, for example, the thesis writing period, to projects in working life and hope for even more practical study periods. Because the practices are taking shape all the time many students think that they have been guinea pigs for the new methods, however. Different methods have been tried in a situation where nobody knows accurately what the content of the study module should be. In thesis writing periods teachers have also been uncertain about the contentual demands of thesis writing. Students need more guidance for practical training periods and thesis writing, too. The students in the technology field especially hope for guidance in the thesis writing process and aid in finding training places. Students mention, however, that the situation is getting better and the younger age groups are more satisfied.

In addition to the development of teaching and education practices the polytechnic reform also requires raising of the teachers' education level. Both lecturers and head teachers are required to have three years of work experience and post-graduate education. The master's degree is required for lecturers while

head teachers have to complete the licentiate or doctor's degree. In 1999 the share of head teachers who had completed a licentiate or doctor's degree was largest in the fields of natural resources, social care sector and technology and transport sector (see Table 13).

Field of study	Full-time teachers completed post-graduate education (%)	Full-time teachers completed post-graduate education (N)	Full-time teachers, in total	Head teachers completed post-graduate education (%)	Head teachers completed post-graduate education (N)	Head teachers, in total
Natural resources	9 %	19	202	52 %	12	23
Technology and transport	23 %	329	1 417	46 %	208	448
Business and administration	8 %	86	1 106	37 %	41	111
Hotel-, catering and home economics	3 %	6	206	2 %	2	13
Health and social services	8 %	136	1 647	49 %	52	106
Culture	4 %	18	423	13 %	6	45
Humanities and teaching	15 %	33	221	33 %	19	57
Total	12 %	627	5 222	42 %	340	803

**Table 13. Share of all full-time polytechnic teachers and head teachers who have completed a licentiate's or doctor's degree in 1999.** (Source: Amkota statistics 1999.)

Many teachers feel that the qualification and other demands are very hard.

*I sometimes feel that teaching is a minor point; you should participate in different kinds of projects, international activities, development teams etc. Teachers also have to complete pedagogical studies (35 Finnish credits) and a licentiate thesis. It must inevitably show in the quality of your teaching.*

The polytechnics have also developed practices by increasing the amount of international co-operation. The aim of the international exchange has been fairly well achieved. In total 3 622 Finnish students were abroad for study or training (over 3 months) in 1999. There were most leavers from Vaasa polytechnic, Espoo-Vantaa Institute of Technology and Häme Polytechnic, over 200 leavers for each polytechnic (AMKOTA statistics 2000).

Our interviews also showed that studying and practising abroad is usual nowadays in all fields of education. The polytechnics support international exchange if students are interested in studying abroad. In some study fields there are even more interested students than it is possible to finance. Students' experiences from the periods abroad have mainly been very positive. Students also come from abroad to Finland. The emerging problems are mostly lack of teaching in English both abroad and in Finland. At the moment some polytechnics arrange degree programmes taught in English (e.g. a degree programme in social welfare, an information technology degree programme). Teachers also have the opportunity to participate in international teacher exchange. Teachers in the social care sector, especially, have engaged in multi-cultural work in England, Namibia and Zambia. The polytechnics have also participated in projects financed by the European Union (e.g. Leonardo) as the co-ordinators or partners. The most popular co-operation countries are Holland and the UK. Co-operation agreements have also been concluded with Germany, Austria and Estonia.

## Co-operation between universities and polytechnics

The universities and polytechnics form a parallel higher education system. The polytechnics aim to educate practical experts for the needs of working life while the universities concentrate on scientific research and teaching. The objective is that both sectors focus on their own strong areas but also aim at co-operation which helps both sectors.

At the moment there is not much co-operation between the polytechnics and universities. The practices vary between polytechnics and degree programmes. Individual degree programmes may have a close relationship to universities but in principal the organised forms of co-operation, arranging common courses for example, are still very insignificant. The forms of co-operation are seen more clearly in teachers' work than in students' lives.

One important co-operation channel between polytechnics and universities is the teachers' post-graduate education in universities. The polytechnic lecturers are required to complete the master's degree and the head teachers a licentiate's or doctor's degree. The number of degrees increased greatly; during the years 1996–2000 full-time teachers completed a total of 232 licentiate or doctoral degrees. During this five-year period the number of teachers with postgraduate degrees has increased 50 percent. Because the number of full-time teachers has currently increased by 1 274 teachers, the percentual share of teachers with post-graduate degrees of all full-time teachers has not greatly grown (see Table 14).

year	Full-time teachers with post-graduate degree	Share of teachers with post-graduate degree of all full-time teachers (%)	Full-time teachers in total
1996	463	11.4	4 056
1997	488	10.7	4 559
1998	561	11.0	5 096
1999	627	12.0	5 222
2000	695	13.0	5 330

**Table 14. Full-time teachers who have completed a licentiate or doctoral degree.**

(Source: AMKOTA statistics 1999.)

The head teachers have been most active in completing licentiate or doctoral degrees, which is surely a consequence of the legislation. In 1999, 42% of all head teachers had completed the licentiate or doctoral degree. Among the other full-time teachers' group only 12% had post-graduate degrees. There were most post-graduated head teachers in the fields of natural resources, social and health care sector and technology and transport.

The polytechnics and universities are competing educational channels for the students. According to the statistics movement between the two higher education systems is not very usual, however (see Table 15). About 1% of polytechnics students drop out of their studies because of starting study at a university.

	1998	1999
Natural resources	0.4	0.7
Technology and transport	0.6	0.8
Business and administration	1.2	1.2
Social and health care	0.9	0.9
Hotel, catering and home economics	0.7	0.7
Culture	0.7	0.7
Total	0.9	0.9

**Table 15. The share of students who have dropped out of polytechnics studies because of transferring to a university (%).** (Source: AMKOTA statistics 1999.)

After completing the polytechnic degree about 6–7% of students carry on studying. The share of students diminishes as more time elapses after their graduation (see Figure 18). According to the degree programme leaders interviewed the transfer to universities or other educational institutes usually happens at the beginning of the studies: the study place in a polytechnic is not accepted at all or studies are discontinued after the first academic year. One exception is the Institute of Design in Lahti Polytechnic, which has an agreement with the University of Art and Design. The University of Art and Design accredits studies from the Institute of Design up to 120 degrees. The students therefore do not leave the Institute until the final stage of their studies.

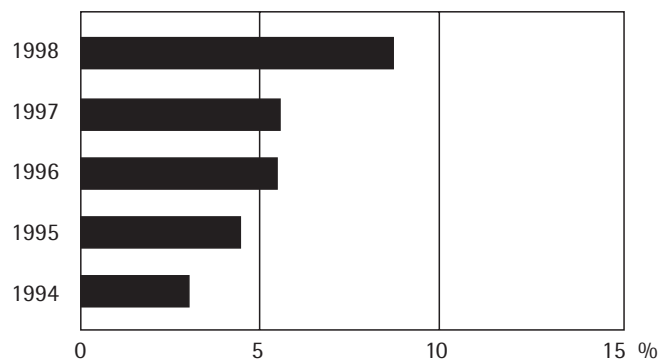


Figure 18. The share of polytechnics students who completed their degrees 1994–1998 and continued studying (situation at the end of year 1998). (Source: AMKOTA statistics 1999.)

According to our interviews polytechnic students may include university studies in their degrees but in practice it seems to be unusual and the utilisation depends greatly on the student's own activity. University students rarely participate in courses that are arranged by polytechnics. Some polytechnic degree programmes offer study modules (*approbatur* and *cum laude approbatur* levels) which are based on the requirements of the local universities. Some social care degree programmes also include *cum laude* modules in social policy or psychology in their degrees as the optional part.

It is not yet typical that polytechnics and universities arrange courses jointly. The practices vary between fields of education. In the field of technology a few degree programmes are planning to establish a joint professorship with a university. The objective is to offer students an opportunity to complete the Master of Science in Technology degree. The more usual way of co-operating is to use common resources. The technology students carry out laboratory work or other practice at the university or research institutes where the equipment is available, for example. Libraries, collections and the university study materials have also

been in common use. At the moment the use of visiting lecturers from the university is quite uncommon. It is more typical that the experts come from business life.

Informal contacts and organisational activities are important co-operation channels of universities and polytechnics. The polytechnic and university teachers collaborate in different associations, which usually act as the co-operative forum between polytechnic, university and the field. In the social care sector especially students have also participated in informal activities. The social care units of the university and polytechnic have arranged "Sosiaalipolitiikan päivät" (an event in social policy) in co-operation, for example. Polytechnics and universities also participate in the same national and international projects and the activities of the regional centres of expertise. It is typical that the organiser of these activities is a third party and there are also other participants such as the representatives of local administrators, business life and ministries.

## At the midpoint of the reform

The reform of Finnish post secondary education is at its midpoint. The former vocational education system has been closed down and new dual system of higher education is complete in function. The Finnish dual system is still an enigma. An architect of the Finnish reform, Osmo Lampinen, emphasised that the main doctrine of our system is dualism (Lampinen 1998). He warned of a dangerous academic drift, academic suction could lead to assimilation, which happened in the UK. There are two aspects of suction, first the polytechnic teaching and R&D activities could copy the university model and second the polytechnics could adopt university like ceremonies, names of departments, degree system or occupational structure. According to our study, it is quite easy to find many aspects indicating academic drift. The last debate concerns further degrees, the title of the degree and the equivalence to the master's degree. The status of the polytechnic degree and comparison with the university degrees as well as the path from one sector to the other is quite unclear. The roles and co-operation between higher education sectors are at the midpoint. It seems that for both sectors strengthening their own profile could be the best way to clarify their respective functions.

The system reform was based on the former VET network. Almost all former VET colleges were interested in assimilating to the polytechnics; it was a survival game. The current network has been built up by the old establishment without any notable cutting down. Thus the network is not able to utilise all the synergy benefits of the regional establishment; there are still a lot of practically isolated units all over the country. Another cause of the establishment process is that there

is no possibility for specialisation; the teachers of the small units are responsible for many subjects and they have to be some kind of generalists. In fact the polytechnic network is quite the same as the network of the former VET system. The effect of the reform has been felt mostly on the administrative level and in the central unit of the institutions. The developer teachers and responsibilities have been much integrated to the new establishment. The new system has been established but its role as well as the network is under construction on the macro level.

In addition the system level development, the re-construction of the institutional culture of an individual polytechnic is perceived as a major challenge. Päivi Jaatinen has studied the organisational culture in the multidisciplinary polytechnic (Jaatinen 1999); she has stated that the organisational cultures in the various fields of education vary. These cultures are based on assumptions, for example, of the identity and the role of the polytechnics and the tradition of the field. She argues that social services with humane values and technology attached to the past represented the extreme end among the fields of education. Our study also shows that the reform has meant conflicting processes in the polytechnics. Internal co-operation is characterised as an administrative form. In the best cases the polytechnics have constructed new forms which really integrate educational sectors and the industrial sector. It seems that the utilisation of multidisciplinary needs innovative structures and new pedagogical thinking. Internal development and renewing old teaching practices will be the next phase of the improvement.

The regional contribution of the polytechnics has increased over the years; it has been pushed forward by the licensing criterion. On the strategic level it is highly valued and the management of the polytechnics is integrated to the regional network. Institutes also participate in many projects, which is a way to commit a large group to regional activities. In many cases regional orientation did not affect the level of ordinary teachers or students. As described, there are active programmes or units which have adopted the regional orientation and who are involved in different kinds of projects.

Relations with industry is a key argument of the polytechnic reform and it seems to have been vindicated. The institutions have opened up and they promote their industrial orientation. There are still some weaknesses; the interaction between partners is still quite formal or in many cases the contacts are based only on personal relationship. The polytechnics are not targeting enough resources at improving the contacts in a wider sense. Finnish industry has no tradition of contributing to the training with real inputs. The forms and methods are adequate, but the integration of the studies, the methods of interaction and the development of both partners need more intensity.

# 6 | UPPER SECONDARY VOCATIONAL EDUCATION – AN UNDERESTIMATED WAY TO THE LABOUR MARKET

The legislation on schools (630/1998) which came into force at the beginning of 1999 stipulates that the length of vocational education after completion of comprehensive school shall be three years and requires that a period of half a year learning on the job be included in all education. The on-the-job learning period refers to a period carrying 20 Finnish credits and in keeping with the objectives of the curriculum to be carried out at a place of work. This differs from the traditional working practice of students in that it is planned and directed activity with the objective of combining theory, studies and practical work in a real working environment. Another addition to vocational education is the proof of achievement of the goals of vocational studies by demonstration. In such a demonstration the student proves his/her professional competence at both the theoretical and practical level.

It is also an objective to extend apprenticeship education beyond its present scope; the legislation on vocational education admits the possibility of taking a basic qualification either through an institutional education or in the form of apprenticeship learning. In practice apprenticeship learning in the 1990s has, however, constituted education specifying competence after the basic vocational qualification and also a form of adult education supporting active labour policy (Peltomäki & Silvennoinen 1998). Nevertheless, it is the intention of the Council of State and the Ministry of Education to extend apprenticeship education in the field of youth education. In 2000 there were 53 000 places to embark on basic vocational education, and every tenth of these was in apprenticeship learning.



Alongside the conventional teaching in the form of school and apprenticeship learning what are known as innovative workshops or workshop schools have consolidated their position as their own special form of vocational education. Their establishment in the last decade was precipitated by the support of the European Social Fund. In Finland the workshop schools have directed their efforts in youth education towards the support and education of those who for one reason or another do not or cannot adapt to so-called normal education or who are at risk of social exclusion. The establishment of workshop schools was accelerated by the realisation that the dropout rate from vocational education was rising. On the other hand such schools have been used for the activation of the long-term unemployed and for measures to promote employment. The workshop school is a new realisation of vocational education in which greater emphasis is laid on learning by doing and group work. The basis for activity is a personal curriculum tailored for each individual student and centred on the student's needs. The workshop schools operate in conjunction with regional working life and periods of on-the-job learning form part of their activities, too. Considerable effort is being devoted to the training of tutors operating at the locations of practice jobs in order to ensure a positive outcome. At the end of the 1990s student numbers in workshop schools actually exceeded the corresponding figures for places in apprenticeship learning. For this reason alone the significance of the workshop schools in the development of vocational education could become very considerable and their progress should therefore be carefully monitored. (Tulkki 1999.)

## **On-the-job learning aggregates the diverging field**

In general it would appear that vocational education in contemporary Finland is in a state not only of diversification and decentralisation, but also in a rut regarding diminishing quantitative development. This conception is indeed justified if we look no further than secondary vocational education; here student numbers are certainly falling. This is due not only to smaller age groups but also to the fact that in the Finnish education system as a whole the demand for education by families has been subordinated to make space for education in upper secondary school and professional higher education and university education. This is evidenced by the development of places in secondary vocational education in the latter half of the 1990s.

Year	Number of students	Number of starting places
1995	171 577	99 936
1996	166 009	71 684
1997	153 656	62 888
2000 (assessment)	122 000	53 000
Change1995-2000	- 49 577	- 46 936
Change1995-2000 (%)	- 28.9 %	- 47.0 %

**Table 16. Student numbers and starting places in vocational education 1995 – 2000.**

(Source: <http://www.edu.fi>)

At the end of the last decade the number of starting places in secondary vocational education diminished by almost half and the number of students by almost one third. Yet Finnish vocational education is not undergoing an overall trend. What is under way on the one hand is a shift in the emphasis in education in the direction of the polytechnics and on the other a skewing of the statistics or an illusion due to the establishment of the polytechnics. In 1999 over 20 000 students embarked on education intended for young people at the polytechnics. In the same year the total number of students in the polytechnics was around 64 000 (Amkota Database 2000). Allowing for the "genesis" of the polytechnics as those continuing the work of the vocational colleges and institutions it is possible to describe the development of student numbers in vocational education in the last five decades as is shown in Figure 19. The figure includes student numbers in vocational colleges up to 1990 and for 2000 the student numbers of polytechnics and vocational colleges added together. Seen in this way the growth in student numbers in vocational education has continued fairly steadily throughout the decades.

The objective of on-the-job learning carried out at secondary vocational colleges is that students acquire part of the professional skills required for their professional qualification at a job and also acquire the general capabilities for working life and lifelong learning. In order to accomplish the implementation educational institutions and units of working life collaborate in creating a curriculum. This stipulates which parts of the qualification are to be taken on the job and how counselling and evaluation are to be arranged. The curriculum determines the length of period of on-the-job learning and their place in the years of study. The curriculum further defines the objectives of the different periods and the evaluation criteria. The responsibility for the evaluation of on-the-job learning rests with the teacher responsible for the module in question and the counsellor at the workplace. In those cases in which on-the-job learning differs from the general plans of the

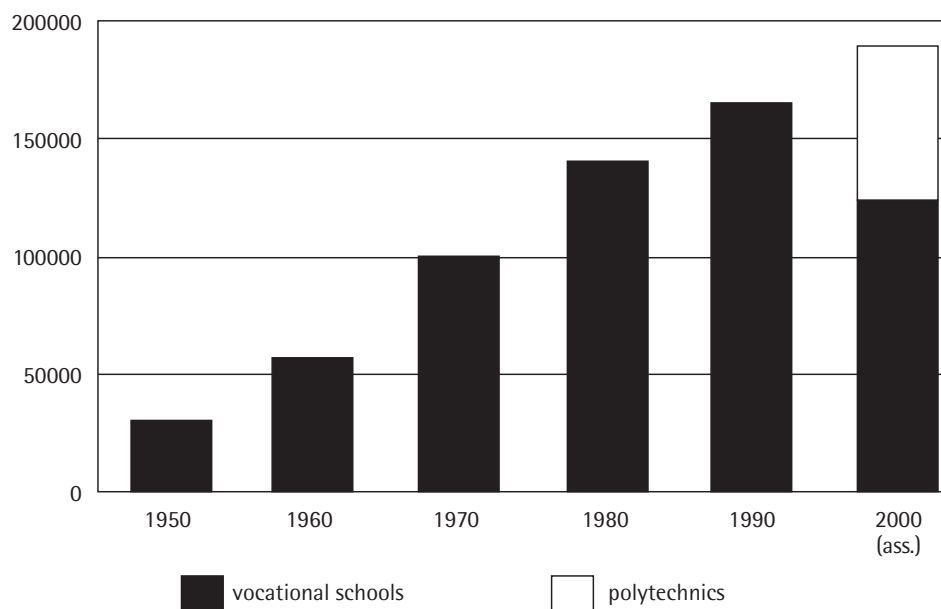


Figure 19. Student numbers in vocational education 1950–2000.

(Source: Klemelä 1999, 284, 348; Amkota 2000.)

educational institution students have the option of creating a personal on-the-job learning curriculum if necessary.

Implementation of periods of on-the-job learning is based on contracts between the educational institution and the employers. This is not a contract of employment but an arrangement between the educational institution and the employer for instructional purposes. For this reason the students are not generally paid a salary during the period but they continue to enjoy the social benefits for which students are eligible. In special cases, however, it is possible for the student and the employer to enter into an employment contract. The responsibility for the period rests primarily with the party arranging the education, the secondary vocational college or whoever maintains it.

The background to the legislation is the assumption of on-the-job learning as a process which not only produces skilled labour for business life but also constantly develops students in a more service-oriented direction. Each cycle of preparation for on-the-job learning and its implementation is also worth contemplating as a learning cycle. In that cycle all those participating in building up the new educational periods learn not only from their shortcomings and mistakes but also from each other and those engaged in comparable activities (e.g. Järvinen & et al. 2000).

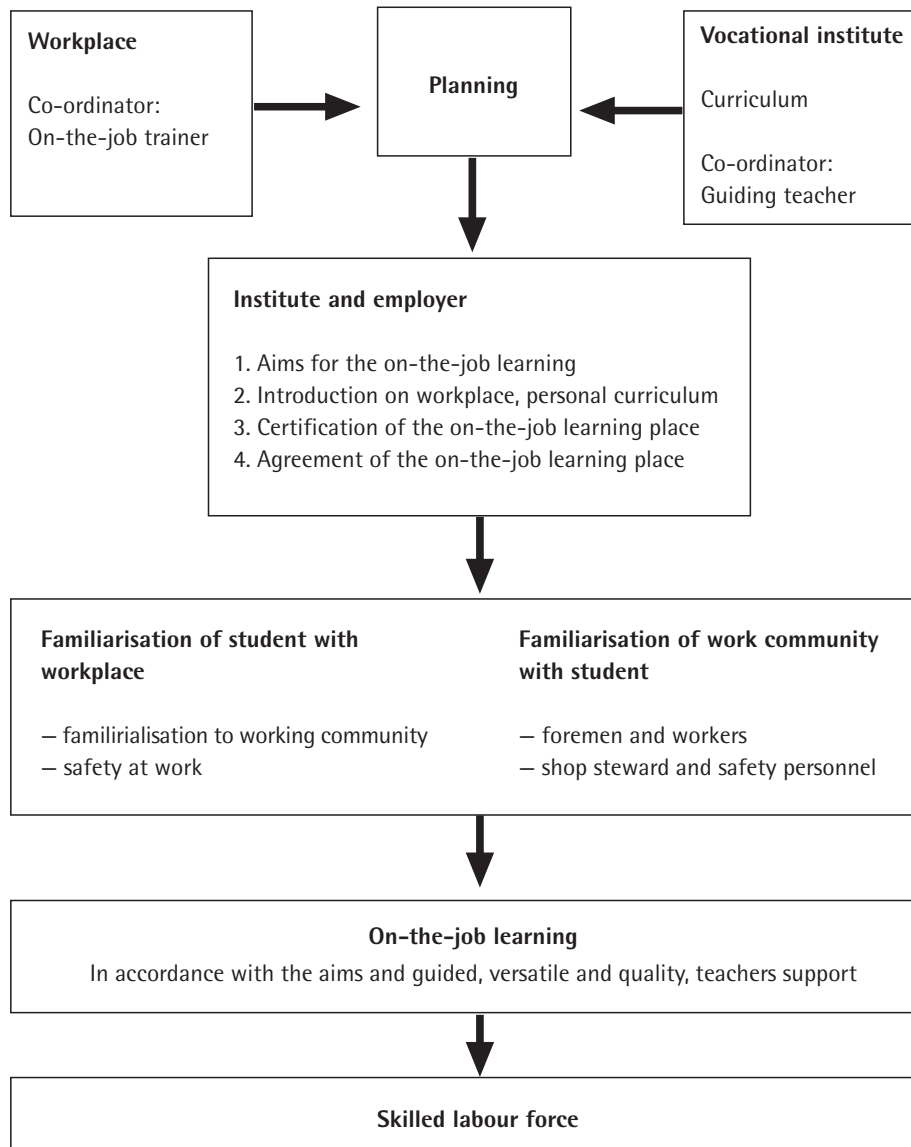


Figure 20. The process of on-the-job learning (see Sillanpää 1998).

All in all the startup of on-the-job learning and its establishment in vocational colleges will clearly serve to draw learning in colleges and learning through apprenticeship closer together. This in turn will enable Finnish vocational education to get onto the same starting line as the most common European development. For example, in Germany it has been shown that traditional apprenticeship training has produced expertise for traditional professional fields but works very badly in

those areas characterised by technological or organisational change. There solutions have been arrived at supporting learning at the workplace by utilising the expertise of educational institutions and teachers. In order to support on-the-job training teachers have been located at the workplaces whose function it is to train the apprenticeship learners and direct learning towards what are referred to as the professions of the future, to the creation of expertise and skills (Selka 1999, 166–173). Successful Finnish on-the-job learning can on the one hand open vistas for teachers in educational institution on the routine work and learning accomplished in the workplaces and also create and increase the teachers' contribution at the workplaces as resources to support knowhow. On the other hand it also opens up the prospects and resources of the educational world for use in the development work of working life. However, for these objectives to be achieved what is needed is not only regional networking of vocational education and working life but also an open and forward-looking attitude among actors.

A further dimension in the implementation of periods of on-the-job learning is the merging of vocational educational institutions, which in recent years has been an increasing trend. Whereas in earlier years it was sufficient to merge educational institutions within the same field or related fields, the 1990s have seen a tendency to create ever larger units. In many places virtually all the secondary vocational education has been concentrated into one multi-subject institution under the name of a vocational institute. In other places a slightly less ambitious amalgamation has sufficed and under the name of a service college or technology college.

Mergers have above all been intended to achieve savings (Järvinen 1998). Yet their importance to vocational education has been the subject of relatively little research. Large-scale mergers have been found to increase the internal activity of the educational institutions, but also to hamper external relations, for example collaboration with working life. After a merger the main attention is generally focussed on harmonisation of operations in the management of the institution, co-ordination and the creation of a common institutional culture. In merged institutions the teaching personnel frequently devotes a good part of its attention and activities to the safeguarding of benefits achieved and the defence of traditional ways of working. In many cases merged institutions are no more than administrative arrangements of umbrella organisations while the old institutions continue to operate in their traditional ways.

A further addition to the entity comes from the educational monopoly position which merged institutions assume in their areas. They do not need to compete, at least to the same extent, against other institutions in the same of related fields. Placements in working life of those qualified has traditionally been a competitive weapon, and co-operation with working life has always served to further this. It is quite possible that mergers have in point of fact reduced the necessity for institutions to exert themselves to improve their competitiveness since the regional counselling and regulatory mechanisms of a regionalised education system automatically furnish them with the necessary numbers of students.

That the startup of on-the-job learning periods should occur simultaneously with mergers of educational institutions is in no way the most fortunate of timing. If the attention of the schools and the teaching personnel is distracted by the problems arising from the merger there is always the danger that the innovation may be implemented at half strength. Thus we may be faced with a kind of paradox of 1990s educational reform: the theme of bringing education and working life closer together which dominated the decade will be completely turned around with the merging of institutions and rise in the level of education. Such a development is in no way inevitable. Periods of on-the-job learning themselves act in an opposite direction by opening up opportunities for intensifying co-operation between vocational education and working life. The teaching administration can also promote this last-named developmental trend by its own efforts by rewarding educational institutions which attach themselves to the regional business life networks and 'penalising' those which isolate themselves.

## **Theory and practice of on-the-job learning**

When contemplating the problem areas of new teaching arrangements, interviewees generally mentioned those practical administrative problems such as harmonisation of contract practices and contract forms and counselling fees. The arrangements for teachers' working hours were also raised. In many cases attention was drawn to the limited amount of time available in the face of new challenges. There was also concern about the capability of the companies to take educational responsibility for students and the implementation of a curriculum. According to one informant it was still debatable if the students "were really on the same line when it comes to evaluation or going into working life", since there are so many different workplaces and levels. By no means are all the actors in the field of education unreservedly convinced of the usefulness and fruitfulness of on-the-job learning from the perspective of teaching and students.

From the perspective of the individual student and teacher the new stretches in on-the-job learning do not appear to cause any theoretical or pedagogical problems. In the educational institutions the new arrangements are believed to be practical, functional and a challenge to the reorganisation of work. It is typical for the situation that in the discourse of the representatives of the schools the new periods of on-the-job learning are not felt to be part of the school, internalised projects. It is rather a question of something administratively "obligatory" imposed from outside and of getting used to it. What is behind this viewpoint and way of looking is no doubt the Finnish tradition for central leadership and school-centred tradition in doing things. Despite the reforms of the 1990s and the opportunities

they opened up for the educational institutions to be active parties in the regional developer network, the advantages actually gained from these are few and far between. This cautious progress in the adoption and internalisation of new ways of working partly explains the slowness to conceptualise – or theoretically rationalise – activities. At the level of the individual educational institution on-the-job learning has not become so ingrained a routine as to allow the emergence of an immediate need to enhance the view of the activity in the work of the teacher in the sense of "everyday pedagogy" (see Argyris & Schön 1978). No doubt this need and mode of operation will soon emerge, but not just yet.

At the workplaces there is abundant experience of trainees, and in jobs in the field of social and health care also experiences of pedagogically oriented work practice. However, on-the-job learning periods are nevertheless such an innovation that it is necessary for the workplaces to adopt new ways of doing things. The changes of the 1990s opened up opportunities for business life to engage in active co-operation with the educational institutions, but these opportunities have not yet been much utilised. The implementation of on-the-job learning will obviously transform the modes of co-operation between education and working life.

Considering the view of the French social psychologist Sergé Moscovici (1984; see also Farr & Moscovici 1984) it may be assumed that attitudes of the educational institutions and work communities to on-the-job learning will be divided into two components. On the one hand there will be change imposed from outside and on the other the way of looking at things based on everyday routines. Seen from the perspective of working life, the educational institutions and the teachers, the external factors are technical, scientific and administrative action and knowledge introduced into everyday work from outside and virtually as a compelling force. Starting up periods of on-the-job learning as part of secondary vocational qualifications would appear to be just such a "compulsion from outside". According to Moscovici there will be no mechanical submission to external influence. The new material will be taken as an object to be worked on, both at the individual level and at the level of the work community, and it will be changed into part of the everyday routines and everyday understanding (Snellman 1989; Tulkki 1993, 97–98). This process will indubitably come to enhance the conceptual contemplation of on-the-job learning both in the educational institutions and at the workplaces.

From the perspective of pragmatist theory the process could be described in such a way that the change in the legislation on schools is understood as such a change in the operating environment which compels changes in everyday routines. Change in ways of doing things, in turn, requires that views on everyday work and the way it is understood be reviewed and the corresponding learning of something new. Change in the operating environment, or in the present case in the curriculum connected to the period of on-the-job learning gives rise to uncertainty regarding the established practices of the educational institutions. A comparable change in the conditions of the environment will be experienced at the workplaces when thousands of teachers and students are seeking for placements in on-the-job

learning and when the on-the-job learners begin at their placements. This change occurring in conditions will in turn initiate new ways of doing things, work orientations and understanding, the doubt-believe cycle. Critical reflection on the established practices and understanding will begin and also the search for new and appropriate modes of working. At its best this process can lead to an improved self-understanding among teachers and work communities and among placement supervisors and work communities (e.g. Kilpinen 2000).

Despite the fundamental differences in theoretical perspectives described above, the conclusion to be drawn is the same: It will take time before periods of on-the-job learning entrench themselves as part of the everyday routine of vocational education. And it will take even more time before teachers and supervisors on the job are able to reflect on the ways in which periods of on-the-job learning are implemented. Both perspectives also require a distinction regarding the understanding and ways of operating regarding students' on-the-job learning and practice of the established perspectives in different educational fields.

## Different traditions

This practice has led to an earlier separation of working practice and studying done at school. In the technical disciplines the habit of making a closer connection between the thesis and the practice job and the practice has indeed changed the situation in the direction of integrated study (Hautala et al. 1995). Co-operation between the educational institutions and business life in these fields of study is not so based on relations forged in the arrangements for and implementation of students' practice at work. In these fields the boards, committees, service functions and various unofficial forms of co-operation have played a pivotal role in joint activity between education and working life.

Education in the field of social and health care has differed with regard to the understanding and practice procedures from other Finnish vocational education. Students' work practice, which in the curricula is referred to as practical studies, has been an integrated part of the curriculum. Periods were to be implemented in such a way that students would not only have the opportunity to get to know working life and working, but also to apply in practice what they had learned in theory and critical evaluation and also for evaluation of practical activity. In the field of social and health care students' practical periods were frequently linked to integrated learning tasks set by several teachers together, and students kept a learning diary and compiled a portfolio on their practical periods. For the educational field it was also typical to train practice place supervisors, in addition to which the teachers supported the supervisors during the practice period by making frequent visits to the workplaces. This method has served to create stable



and lasting relations between educational institutions in the field of social and health care and working life. The central position of students' practical periods as a basis for joint activity between education and working life is well evidenced by the fact that the advisory bodies of educational institutions in the field of social and health care are considered to be virtually organs for the organisation of practice (Järvinen 1993). It is only ten years since service activity in these educational institutions was initiated.

The field of business and administration constitutes a third entity. In this field quantity and arrangements for students' working practice have varied both regarding time and within the field. In the technical sense, when work practice has been part of the curriculum this has been implemented in the same way as education oriented towards industry and professions in the field of agriculture and forestry in the form of joint activity between students and employers. In the field of business and administration the co-operation relations between education and working life have been based mostly on matters other than students' work practice.

The field of business and administration in the practical operations of the educational institutions is organised as a part of more extensive education oriented towards service occupations, as the education for social and health care. Moreover, education in service fields exists to a considerable extent outside these two fields.

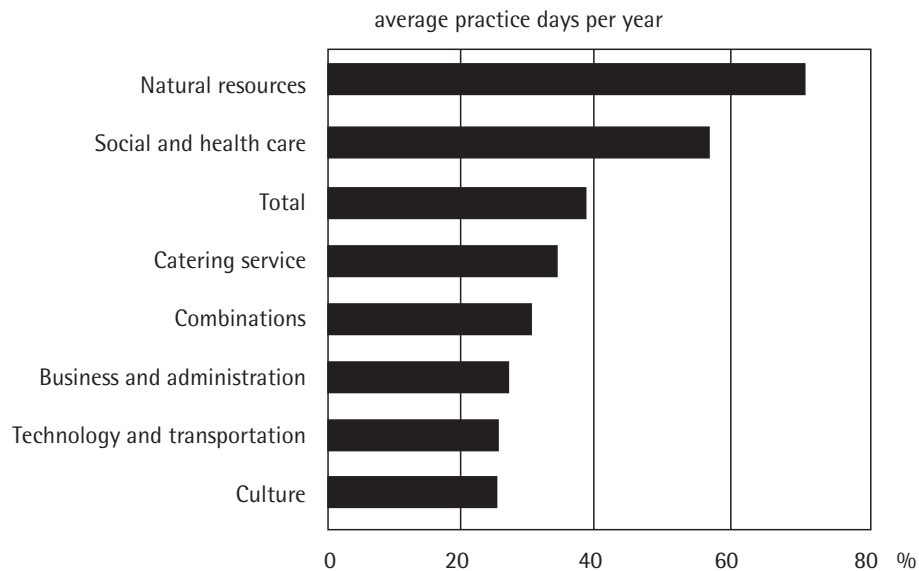


Figure 21. Average numbers of work practice days annually by field of education. (Lairio, Puukkari & Peltosalmi 1999, 97.)

In general it may be stated that students' practical training differ in other service activity areas. For example working in the field of hotel and restaurant education in the educational institution's practice restaurant or kitchen is an established form which is "filled out" by practice at a workplace. A fairly tight and stable co-operation network has come into being between education and business life and to a great extent this is built on the arranging of practice places for students.

There has been considerable variation in the number of days of practice in the change from one secondary vocational area of education to another. The largest number of days of work practice per year has been in the field of natural resources training students for professions in agriculture and forestry. Here the number of practice days per year has been as many as 70, which means some 14 Finnish credits. The next highest number of days of work practice was in the field of social and health care at 56, i.e. 11 Finnish credits. The number of work practice days per year in other educational fields varied between 25 and 30, which amounts to 5–6 Finnish credits. The lowest number of days of work practice was in the field of culture and in vocational education for technology and communications. (Lairio, Puukkari & Peltosalmi 1999, 96–98.)

The figure above is based on a questionnaire administered to counsellors in vocational colleges and the information contained in it may be considered problematic in parts, but still in the right direction. The overall picture is blurred by the class "combinations", which contains the responses of those counsellors who work in more than one educational field. This is the largest class in the data and accounts for slightly over one fourth of the data as a whole. Despite this shortcoming, the figure provides an essentially correct picture of the situation. The fields of natural resources and social and health care have preferred longer periods of work practice than others and these are reminiscent of on-the-job learning periods. It may also be justifiably assumed that periods of on-the-job learning would be "easier" for education and working life in these fields because experiences of this type are already in use in the field.

## **Experiences of the field of social and health care**

Whereas in 1990 a good fifth of the students of vocational colleges were in the field of social and health care (Klemelä 1999, 348), the share of corresponding starting places in 1999 in youth vocational basic education was 15% (Autio et al. 1999). In 1999 the share of starting places in social and health care in the polytechnics was much the same as a decade earlier. All in all the share of education in social and health care had fallen to 18%.

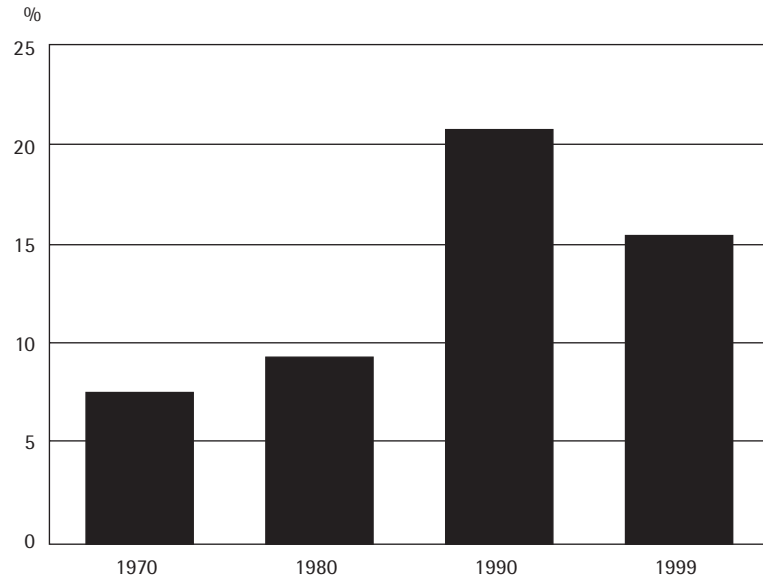


Figure 22. Share of starting places in social and health care of all starting places in Finnish vocational education 1970–1999.

No doubt the experiences in the field of social and health care of supervision and other integrated practice or practical studying closely related to practical teaching, as it was earlier called, are extensive (Tulkki 1995). Likewise practices in on-the-job learning and modes of operation in education in the field are more sophisticated compared to other fields. In teaching circles in social and health care there would appear to prevail a strong tendency to adhere to old established practices and on the other hand to require that administration and other fields of education be brought into line with these. Many interviewees working in the field or involved in intense co-operation with it did indeed emphasise the reluctance of teachers in the field of social and health care to innovate. The general view in teaching circles would appear to be that the innovation is only "the same stuff in a different bag". The prevailing attitude was described as follows by an interviewee.

*"Well the change...in social and health care in that sense it could have been worse...we've gone back to the old ways. That was because there's been a lot cut off teachers' salaries. Earlier a teacher would have a week for practical supervision, for example, which meant 10 – 15 hours per student. Now it's 5."*

According to the interviewees the disinclination for innovation in the field of social and health care – or the resistance to change – are also affected by

experiences of the polytechnic innovation and recent experiences on the labour market. The establishment of the polytechnics caused the disintegration of work communities which had been particularly uniform. In the educational tradition of the colleges in the field of social and health care the specialisation of teachers on secondary level and as secondary level educators was more an administrative move than a practical working reality. In the old type of institutions teachers were in the habit of working with several groups of students regardless of "differences in level". Shared activities among teachers were also extensive and the divisions occasioned by the shift to polytechnics were not recognised. The polytechnic reform broke up the tradition and the work communities and divided the teachers on the one hand into the acceptable ones of the polytechnics and on the other those who were assigned to secondary level vocational education.

Despite the fact that among the secondary level teachers there were and continue to be teachers heavily committed to that level of teaching, for many secondary level teachers in social and health care life after the polytechnic reform brought disappointment and frustration. In secondary vocational education the field of social and health care also lost a great deal of its "autonomy". Many formerly independent educational institutions were annexed to larger units with teachers in the field in practice assuming the position of the underdog defending their positions. Moreover, the recent quantitative cuts in education and the ensuing redundancies among teachers would appear to have exacerbated the attitudinal ambivalence and downright resistance to change where the attitude was previously more positive towards reform.

In many ways the 1990s were a period of upheavals, also in the field of social and health care. Within a period of ten years what had been markedly state-led crumbled and the focus of operations shifted to local level, the municipalities (Sipilä & Anttonen 2000). Operations were not only rendered administratively more independent, but also privatised, which has meant the dissolution of the previously one-dimensional field into something more multi-dimensional and fragmented. As a consequence of change and reform the share of expenditure on health care of the Finnish GNP fell to less than 7%, which is among the lowest in the EU.

Despite the change education in the field of social and health care has in general succeeded in sustaining firm and established relations to workplaces. Problems have been found, above all, in the introduction of the principles of accountability. Indeed there are problems, and many of them are due to the introduction of the principles of accountability and management by results. According to one informant the habit of demanding supervision fees for on-the-job learners of "fields in the area" as it has been habitual to call places for work practice and on-the-job learning, has undermined the opportunities for educational institutions to operate. Such demands have always been a legacy of the practices from the times of reform of the intermediate level in which the state transferred money from one pocket to another and at the same time motivated shared activity with education for jobs in social and health care.

Nevertheless it seems strange that the situation should be one in which a fee is paid to old people's homes on behalf of students in the field of social and health care, but not for a student of home economics studying and enrolled at the same educational institution and working in the kitchen of the same establishment.

Changes in the field of social and health care and education have shaken the prevailing shared activity between education and working life resting on the students' work practice. In a certain sense it would appear that at the same time as the field of social and health care is opening up, diversifying and specialising, there is a threat of the education becoming closed and narrow. The development is taken in this direction by the decrease in the leeway for schools to vary the curriculum, which in a reality coloured by cuts in education and redundancies of teachers is easily to be interpreted as a tool or opportunity for isolation. In an interesting way the representatives of education in the field of social and health care reported in the interviews observations such as "we are in a worse position than other fields of education..." or "there's no inspiration in the present situation..."

Nevertheless, it is not justifiable to describe the situation of the entire field so pessimistically. In those areas and in those educational institutions in which the teacher communities have participated in experiments with on-the-job learning periods, or have otherwise engaged in intense co-operation with the changed field of social and health care, and especially with its "new" actors, companies and so-called third sector communities, the view of the present state of education and the future is more optimistic than in the educational institutions acting as if under siege.

## **The fast tempo of the change in technical fields**

The view taken by professionals and in education for the technical fields would appear to be somewhat more positive regarding the opportunities opening up through on-the-job learning. Much of this has to do with the economic development of the latter half of the last decade, characterised as it was by a marked growth in exports. There has also been an increase in demand on the job markets for people with a technical education.

The greatest success has been for education in the field of electronics. Indeed, this success has been relative, as the table shows. In the field of informatics and telecommunications secondary vocational education since the end of the 1980s has had to relinquish its position to higher education. Until a couple of decades ago the dominant type of qualification of new workers in the field was a

qualification in secondary vocational education or a vocational school qualification as it was called in those days. In the 1990s the dominant type of qualification has been increasingly the higher level qualification. Secondary vocational education qualifications, however, would appear to retain their position in the so-called traditional electronics fields apart from the new IT industry.

The fast tempo of change in education the technical fields serves well to exemplify the increase in education in the field of IT. It is said that the field suffers from chronic labour shortage, which can be seen in the fact that at present 42% of those at work do not have a final qualification. Partly this is a matter of dropout from IT studies. A considerable proportion of IT students work in enterprises in the field already while they are studying. For example in 1996 half of the university students and 17% of secondary students were doing this. Working was particularly common among students over the age of 25. Of these 69% of university students and 42% of secondary students were at work (Statistics Finland 1999b, 68). In 1997 the IT field employed 112 000 people, whereas in 1993 the corresponding number was 88 000. The increase in employment over 5 years was an amazing 70% in production of goods.

This explosive growth has also affected education. While in 1985 the share of IT students of students in all levels of education was 2.7%, by 1997 it has already reached 8.1%. However, in the past decade the focus was on the polytechnics and universities. In 1997 the number of students beginning their studies in secondary vocational education was 1 900. The corresponding figure two years earlier was 2 700. This means that the number of IT students in vocational education fell by almost one third in two years. At the end of the decade the number of IT students in secondary vocational education was 30% of the total number of students in the field, whereas at the beginning of the decade it had been over one half. (Tulkki 2001, 19.)

The development in ADP (Automation Data Processing) education has been similar. In 1990 there were 1 150 starting places in secondary vocational institutions for students in this field. By 1997 the corresponding number was 79. In 1995 the combined number of starting places in IT and media in secondary vocational institutions was 3 600, but in 1997 it was 2 300. At the same time the corresponding numbers of places in the polytechnics and universities increased to 3 200, i.e. in practice it doubled (92%). The following figure illustrates the development of the situation regarding degrees taken.

At the end of the 1980s and still at the beginning of the next decade the focus was on secondary vocational education and on increasing the number of degrees taken was there. By the mid 1990s at the latest the emphasis changed to focus on university degrees. It is important to note that the weakening of the position of secondary vocational education in the IT field was in no way simply a consequence of educational planning and counselling. In the background of the development there are changes in the demand for educated people, which was at least as influential. For example in 1995, when the change really occurred, clear differences

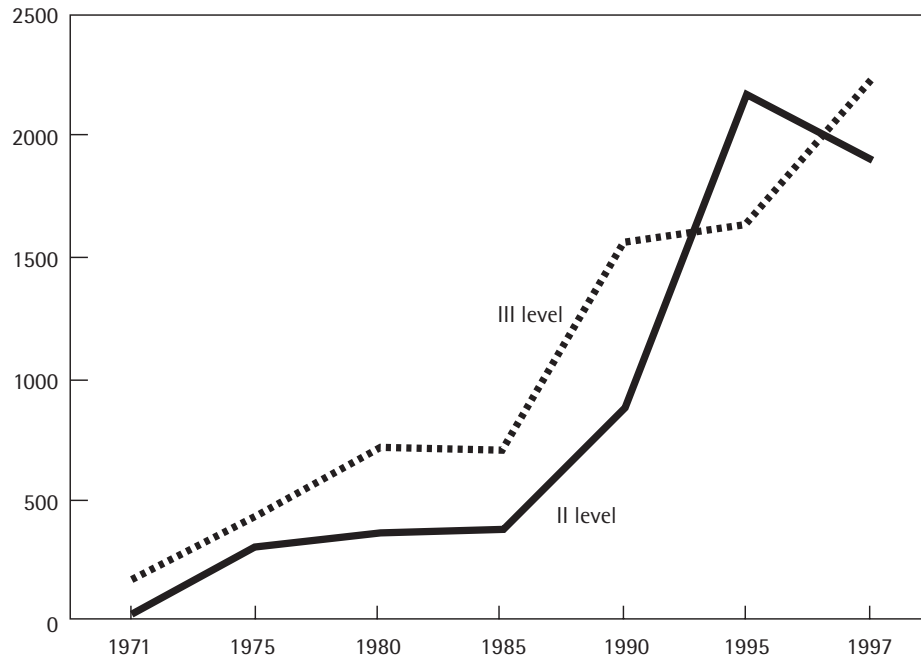


Figure 23. Degrees taken in Finland 1971–1997 in the IT field.

in emphases were discernible. At that time over 90% of engineers graduating in the IT field found jobs in their own speciality. The comparable figure for those completing secondary vocational education was 46%. (Tulkki 2001, 5.)

This information on the development in Finland challenged the view evinced in some studies (e.g. OECD 2000) that those completing secondary vocational education brought more value added to the enterprise. Clearly the approach in these is too general. In order to obtain a more precise picture it would be necessary to examine various fields of industry more carefully. In any case it seems highly unlikely that Finnish IT companies would give preference to university graduates over those with secondary vocational qualifications unless there were some degree of certainty that this would result in greater value added for the company. It may be that the degree of development and establishment of the technology has something to do with the level of education required in that developing technology. It requires more highly educated personnel than technology which is already well established and widespread.

The rapid development in electronics and the ensuing shortage of workforce and the fast change in the rhythm of knowhow have cumulatively promoted shared activities between education and economic life. According to one informant there has long been co-operation in the educational institutions with the companies. The present change is simply a matter of adapting the existing co-operation to suit the modes of operation required by on-the-job learning.

In this particular educational institution certain subcontracting work has long been done for industry. These jobs have included, for example, prototype series completed by students. On the other hand the college has also long been oriented to improving its learning environments by participating in the establishing and operating of development centres which serve industry and utilise automation techniques. Close co-operation ties have sprung up and become established between the educational institutions and actors in working life. Of course there are also counter examples. In those fields in which there has been no need for vocational educational institutions to compete against each other or other educational institutions things would appear to remain in a very "traditional" rut. Merging of institutions has contributed to these educational monopolies. In such cases contacts with economic life in the area are on a very shaky footing, including electronics.

*"Yes, well... at present there (the group preparing on-the-job learning) are nine members. Last summer, when the groups started there were a few more. And er... at present one, that is there are ten..."*

*Question: Now is there any representation at all of the economic life in this area?*

*Answer: Not at the moment...there is representation only from the colleges.*

*Question: Is there an intention of bringing in people from economic life?*

*Answer: Not really in that way... of course there is...it's been considered, but it hasn't got off the ground yet. Maybe in the future."*

Interviewees in the technological field felt that it was especially important that with the opportunities afforded by the new on-the-job learning periods not only students but also teachers should enhance and update their knowledge of working life. In certain cases the interviewees placed on-the-job learning periods in such an important position as an innovation that they proposed comparable methods for teachers.

What lies behind the initiative encouraging teachers to co-operate with working life is not only concern for the exemplary implementation of on-the-job learning periods but also experiences of working life and its rapid technological changes. The educational institutions have realised that without continuous and close co-operation with working life education is at risk of losing its relevance. Shared activity thus concerns a two-way process in which actors in education have a role in the transfer of workforce and knowledge to companies and actors in enterprises have a role above all in transferring the latest technological knowledge to educational institutions.

In the case of secondary vocational education the obvious partners according to the research are to be found in the circles of SMEs (Tulkki 1995). The natural partners for secondary vocational education, according to the research, are SMEs (Tulkki 1995). In the field of IT the interviewees especially stressed the importance of on-the-job learning.



The schools can in a way predict the direction or solution to the technological change. For this reason it is extremely important to transfer some of the learning to the workplaces, where students have the opportunity to work with the very latest technology, equipment and programmes. This view converges with observations made in several studies according to which employers consider the ability of educational institutions to produce the expertise required by the latest technology to be inadequate to say the least (e.g. Metsä-Tokila et al. 1998, 226–228; Tulkki 1993; Hyyppä & Tulkki 1996). Co-operation between educators and representatives of working life would appear to produce the common language and common understanding whose lack was so much deplored in studies from the beginning of the decade (e.g. Silvennoinen et al. 1994), and which is now considered to be a core element in the construction of regional innovative networks (Nahapiet & Ghostall 1998).

The polytechnic reform did not mean such a great upheaval in technical education in the field as it did, for example, in the field of social and health care. Technical education in Finland has traditionally been a four-tier system, whose uppermost tier comprises the universities of technology and those with master's degrees in engineering. Next come those with a bachelor's degree in engineering and the technical colleges which educate them, then the vocational institutes and finally the polytechnics. Those who are on the second lowest level are known as technicians and below them the fitters, mechanics etc and the vocational schools which train them. Despite the dramatic changes in education of the 1990s this system and structure persists more or less to this day (Tulkki 1996, 11–17). In addition to the polytechnic reform just mentioned the greatest changes have been the transfer of technician education from the technical colleges in connection with engineering education to secondary vocational education. The greatest change has been the abolition of technician education.

This permanency has had its effect on the style of work of the educational institutions and teachers. Teachers in the field of technology, unlike some other teachers, do not appear to direct their energies to defending the traditional modes of operation of their institutions in order to resist pressures for harmonisation. This is possible not only because such pressures are less urgent in the field of technology than elsewhere, but also because in many cases technical education is the source of these pressures. A strong position in secondary vocational education makes it possible to direct attention to the more essential aspects. Perhaps it is for this reason that technical colleges and teachers take a positive and enthusiastic attitude to shared activity and networking with regional working life. There is no critical assessment in the interview data on the essential nature of shared activities and networking, although there was indeed criticism of alternative lines of action.

## Towards diversity in vocational training

Although the new on-the-job learning periods are just taking off, one can estimate that they will – or perhaps will – change the mode of working in upper secondary vocational schools. At least from the late 1960s, the working style in VET schools in Finland has been very school-like and uniform. This working style has been argued for by the demand for equality; regardless of the differences in pupils' educational backgrounds, everyone should be taught in the same way. Also, teachers' willingness for congruent working and easier working conditions has promoted school-like and uniform VET training. Anyhow, these new on-the-job periods open up possibilities to change the course of development in the direction of diversity and practical learning. This kind of approach assumes the consideration of divergence in pupils' baselines and ability.

Based on international experiences one can see that the Finnish upper secondary vocational education is undergoing a process of diversification. The new approach, which contains the process of on-the-job learning, can promote apprenticeship education, school-based enterprises, workshop schools and other alternative forms besides traditional school-based education, which has also now changed its direction toward practical learning. The new approach does also consider it possible to organise different kinds of combination studies which cross the educational and institutional barriers both horizontally and vertically. This kind of an approach combines work against social exclusion with the enlarged production of skilled labour force. Education is taking its natural place as a producer of social inclusion.

On-the-job learning periods can open up ways to closer regional co-operation and interaction between vocational education and working life. Besides the industries taking their responsibility for training new skilled workers the new study modules can make it possible that teachers also enlarge their views on responsibility for the development of regional industries. In close co-operation and networking, the experiment of the actors in industries is better in the use for VET schools. Correspondingly industries, especially the regional small- and medium-sized enterprises, can benefit from the knowledge, linkages and experiments of the VET schools and teachers. Participation in the regional innovative networks of industries can be seen as a reasonable way for upper secondary vocational schools to take part in the innovation system. Their role may be seen as peripheral, but it is of great importance, particularly in developing the competitiveness of regional SMEs. In every-day training, close co-operation between VET schools and regional working life guarantees the topicality and adequacy of training.

On-the-job learning periods offer an opportunity to re-organise ageing workers' work. These workers are equipped with large work experience, that is, with huge reserves of codified and tacit knowledge considering everyday work done in workplaces. These knowledge reserves should be utilised from in new study modules. The older workers can be trained to become instructors of students in workplaces

by VET schools. These instructors co-operate closely with the guiding teachers in the implementation of on-the-job periods. Through training, they get experience of modern school-life and can be the key persons in linking the regional VET institutes and industries. On the other hand, such arrangements raise the appreciation of older workers and can prolong their time in working life.

The most fundamental question is the attraction of upper secondary education. Raising the appreciation of VET schools and institutes is not about advertising and image building. It is not about administrative orders in the present conditions of individual freedom of choice either. It is a question of employment opportunities. It is true that young people from upper secondary vocational education do not get jobs as easily as graduates from other educational routes. Perhaps the new on-the-job learning periods will open more gates to working life for VET students, for example by the extended recruiting process it offers for employers. However, upper secondary vocation education is the only education route which today can offer at least some kind of practical on-the-job education for young people under 19 years. The lack of practical work experience is a problem among new students in polytechnics, for example.

# 7 | THE ECONOMY AND CHALLENGES OF LEARNING

Policies for vocational education and training in Finland and in the various European countries seem to be seeking for a new balance between school-based and work-based education. Especially under the threat of an increased acceleration of developments and change, both initial and continuing education and training provisions have to adapt continuously in order to cope with and master new needs in all their dimensions: cultural, economic, social, technological and ecological. This search occurs within the context of the traditions perceived to be fairly stable of the respective vocational education and training systems. Does the '*consigne historique*' determine the restricted spectrum of policy options taken into consideration at present as well as in the future? All vocational education and training systems are more or less bound by a policy system that seems to enable only a restricted range of rather specific options. Traditions as well as existing contextual arrangements thus restrict the range and width of policy options. There is, however, an awareness of other options that might be worthwhile. (CEDEFOP 2000.)

Today there are fifty-two higher education institutes in Finland for its population of five million and young age group of sixty thousand. The expansion of tertiary level education enables the system to offer yearly 50 000 places for new students, thus at least in principle four fifths of the age group start their studies in universities and polytechnics every year. This means that there is one institute of higher education for each 800 starting students. The technical or scale efficiency are not an issue here. A reformed education system is based on a sequential model; in practice, more than half of an age group is studying up to the age of 25 and beyond. According to the OECD (1999) Finnish youngsters stay in formal education and school on average for 17.3 years. Almost all Finnish higher education is full-time-based and implemented in daytime in the institutions.

The people's high estimation of higher education together with the "very complete" education system causes problems in the arena of practical know-how.

Almost all university students and a great majority of polytechnic students come from upper secondary general schools. In many cases, these students do not have any work experience, although – according to some polytechnics' claims, for example – they should be experts in work and technology. In Finland, there is no tradition as in Germany that matriculated students also go to apprenticeship education before their studies in polytechnics. In Germany, one fifth of the matriculants – of girls as many as one third – choose this alternative (Baumert 1990, 140; CEDEFOP 1995, 7).

In point of fact the polytechnic reform of the 1990s seems especially to have lowered the status and esteem of practical skills and competencies in the work of the educational system. The phenomena of 'Academisierung' and academic drift seems to rule the mainstream of Finnish vocational education. 'Academisierung' refers to the development in which the share of theoretical elements in the curriculum increases (Ringer 1979, 37–40; König 1993, 67–68). Academic drift is a phenomenon identified by Pratt and Burges (1974), which was partly responsible for the whole polytechnic system being abandoned in the UK by the end of the 1980s and the polytechnics being transformed into universities. In Finland practical learning has been limited in a declining part of upper secondary vocational education. In the Finnish tradition and social atmosphere practical and on-the-job learning have been reserved for those young people who do not manage in so-called normal or theoretical school, and who are – because of this – at risk of social exclusion.

It is also typical of the Finnish VET education system that the position of apprenticeship education has been peripheral, especially compared with that of Germany. In educational discourse, especially after the educational reforms of the 1960s and 1970s, apprenticeship education was understood as a choice for those who dropped out of normal school education. Nevertheless, apprenticeship education had a place of its own 30 years ago, especially in the clothing industry and trade. According to Vartia and Ylä-Anttila (1992, 195) prosperity in Finland was built on unschooled labour; until the 1960s, most of the learning happened *on the job*. During the decades of formal vocational education, the share of apprenticeship education as an initial vocational education tapered off. Today in the rapidly growing IT sector as many as 37 percent of the labour force do not have any kind of formal vocational training. Their skills and competencies are based on on-the-job learning (TIPAL 1999).

In the 1990s, the number of apprenticeship contracts grew dramatically. However, the boom is a consequence of manoeuvres in labour policy. Today Finnish apprentices are older than in earlier times, and they already have at least one vocational qualification. This development is the same as in some other European countries, in Netherlands, for example (CEDEFOP 1995, 8).

Compared to Europe, the total number of Finnish apprentices seems to be quite big. It is the fourth biggest after Germany, Austria and the Netherlands, and much bigger than the number of such students in the United Kingdom, for example. If we compare the situation in Finland with that in Germany, the relative number

of apprenticeship students is only one third of that in Germany. Although the number of students in apprenticeship education in Finland is considerable, the position of this form of education is still marginal. The number and share of the young people taking part in education in Finland is very large. In Finland, six persons out of seven in the age group of 18-year-olds are still studying (OECD 1996), which is about 53 000 people. If we estimate a thousand of them being apprenticeship students, the share is only two percent.

On the whole, the volume of upper secondary vocational education is decreasing. From 1995 to 2000, the number of students in VET schools decreased by 29 percent. This is partly due to the increasing popularity of the upper secondary general schools and the matriculation examination and partly to the educational reforms carried out in the 1990s. The share of students in upper secondary general schools increased from 49 percent of the age group in 1985 to 59 percent in 1999 (Tilastokeskus 1991–1999).

The dominant position of school-based education has led to criticism from employers: the students graduating from Finnish VET schools do not have enough practice and experience in practical work in industry. The educational administration has identified the problems: the governmental plan for 1995–2000, called 'Education and Research 2000', directs vocational education into more pragmatic applications; the goal is to increase the share of apprenticeship training to 20% of initial vocational education within a few years. This means yearly about 10 000 new apprentices, which is ten times more than in 1995. This governmental decision is intended to link studies to working life, and especially to the new IT technology.

The new educational legislation (630/1998) requires a six-month on-the-job learning period in every qualification in upper secondary vocational education. The time for completing the qualification is set at three years. By on-the-job learning the legislation means a curriculum-guided period equivalent to twenty Finnish credits, carried out in companies, enterprises, and other workplaces. This new mode of action differs from traditional practical training mainly in that it is planned and supervised. The on-the-job learning period is part of the curriculum, and it relates the theoretical elements of school-based learning with the student's practical and contextual learning in a workplace. In the new legislation, a demonstration examination will also be included in the qualifications of upper secondary vocational youth education. In the demonstration examination, the student proves his or her competence on both the theoretical and practical levels.

The OECD *Thematic Review of the Transition from Initial Education to Working Life* reported that workplace experience by itself does not ensure that workplace learning will take place. What is needed for high quality workplace learning is that:

- work placements are long enough,
- a systematic analysis of the training capacity of the workplace is carried out,
- a formal training plan (a curriculum) is worked out with the division of labour between school and workplace,

- employer involvement in student selection for work placements is a must,
- the presence of a trained programme co-ordinator, is required to intermediate between the school and the firm and troubleshoot the problems,
- qualified and competent workers are used as workplace trainers,
- the co-ordinator and employers and in-house supervisors meet regularly face-to-face,
- students on the job are monitored by the programme co-ordinator,
- the student performance is evaluated against the training plan jointly by the job supervisor and the co-ordinator,
- schools systematically relate what has been learned at work to students' school-based learning.

(Source: OECD 2000a, 105.)

The new legislation aims at making Finnish vocational education more open and at co-operation with working life. It also gives the education into a more practical or contextual orientation. Thus the process can also be called the 'Europeanisation' of Finnish vocational education and training. The Finnish vocational education system has differed in its restrictive school-dominated nature from the system in Germany and other central European countries (e.g. Selka 1999).

The preparation process of the new on-the-job periods has opened up new contacts and links between upper secondary vocational education institutions and working life. There are currently co-operative working teams, co-operative training for working place mentors, for example, formed for implementing and developing the new study periods. As organisational approaches, these new forms of co-operation between education and working life resemble the forms of so-called local partnership undertaking or the new local consortiums for organising vocational education and training in the United Kingdom (Brown & Keep 1999). One can see this development as an opportunity for a new configuration of school-based and work-based learning in Finland. In the process, the traditional school-based and the traditional apprenticeship education can merge into a new form of initial vocational education.

From the point of view of lifelong learning, this new configuration may be fruitful. However, the results of our study, show that there are problems especially in SMEs in organising the on-the-job periods. We can assume that these enterprises also have problems in promoting apprenticeship education. In these cases, some VET schools have organised a kind of teacher assistance for mentoring in workplaces. The school arranges a time for some teachers to visit the enterprises and to "co-mentor" the students in their on-the-job periods, which could be the beginning of arrangements for permanent teacher assistance in enterprises. This assistance is focused on all kinds of education and training in the enterprise. The teachers can also help the SMEs in creating links to research and development institutions and learning the reality of developing working life, for example. These arrangements promote stable regional and sectoral networks of industries and education. They

also prepare the social and educational environment for the expansion of on-the-job learning. Perhaps temporally, a half or more of the initial vocational education qualifications will soon be taken in enterprises and other workplaces. In any case, the new on-the-job period has tripled the share of practical studies in Finnish VET. Earlier, the average number of practical studying days was 38, which is about seven weeks (Lairio & Puukari 1999, 96–98).

Our results show that, co-operation between upper secondary vocational and general schools increased in the 1990s. Today there is an option for a so-called combination examination in both types of schools. The student can take both the vocational qualification and the matriculation examination. Although the possibilities for and the popularity of the combination studies differ from one geographical and occupational area to another, there seems to be a clear tendency towards wider co-operation between the two types of schools. In some studies on students and studies in polytechnics, one conclusion has been the need to develop some kind of comprehensive and practical work-oriented "youth school". At least solutions promoting development in a more practical direction in upper secondary education are needed (e.g. Nurmi 1997).

The new on-the-job period in upper secondary vocational education can be seen as a start to such a development. Especially if the popularity of the combination studies increases and the on-the-job-training periods are extended, a higher standard of both theoretical knowledge and practical know-how can be expected from the young people. In point of fact, the studies in polytechnics, too, should be developed in a more practical direction. Those having a polytechnic degree also criticise the studies for being too theoretical (Tulkki 1997). One possibility is to make practical studies or experience in working life a requirement for the new students in polytechnics, i.e. new students must have taken combination studies, or at least on-the-job periods, in VET schools. From the educational point of view, the apprenticeship examination is also suitable, but pure work experience is problematic. The latter includes no educational elements. It is also a question of money: by organising the work in an educational way, the costs for the employers are much lower.

Co-operation between educational institutions is currently increasing. There are linkages not only between different types of institutions in upper secondary education, but also between educational levels. The VET schools co-operate both with local polytechnics and universities. Although there are some problems of 'distinction' and 'divergence' caused by the polytechnic reform and the separation of the old 'middle-level' VET institutions, the main partner for the VET schools seems to be local polytechnics. In any case, this kind of co-operation has been most successful.

The widening co-operation between the institutions at different educational levels can promote new types of qualifications. In many cases, the industries' needs dictate the competences that differ from those in the qualifications of different educational institutions. Attempts have been made to solve this problem by dividing the studies into modules. From the industries' point of view, the



modules are a step in the right direction, but not enough. What is needed is freedom to combine modules from different institutions, also across the educational borders. There are some programmes of this type in adult education, but this kind of solution may also work in initial vocational education.

A process of constructing a new kind of regional network of education and industries is currently underway. The polytechnics are seeking their place in the network and a suitable way of working. The new network is based, on the one hand, on traditional linkages between schools and industries, and on the other hand on the experiences of this and on the new demands of the learning economy. Polytechnics and VET schools seem to position themselves in the network by identifying the core skills of the schools and teachers. Perhaps because of this only some teachers are actively working in the network and searching and building up new linkages.

The actors and representatives of the polytechnics describe the situation of the regional networks between schools and enterprises as functioning more on the head teachers' and degree programme leaders' level than in the everyday work of teachers and students. Such a situation may be a reflection of the problems associated with the process of establishing a new mode of operation; it may also be a consequence of the traditional hierarchic structure and old modes of operation in educational institutions. Naturally, there are differences between the sectors in the polytechnics. For example, polytechnic education in the social care sector has a long tradition of co-operation with working life, and the education is positioned in the regional network as a natural actor. The representatives in the field of natural resources, especially, have participated in EU projects together with provincial federations, municipalities, environment centres, and local enterprises. The regional centres of expertise have also acted as the co-operation forums. Nevertheless, the polytechnic degrees so far seem to be little known in industrial life. Students have to explain during their practical training period what they are studying and what they will become after graduating. However, the employers have adopted a favourable attitude towards the polytechnic students and the polytechnic degrees.

The Finnish polytechnics are multidisciplinary institutions formed by merging several sectoral vocational colleges. They are therefore educational networks. The interviews showed that learning in a network is now underway in the new polytechnics. Co-operation among teachers has increased. They have participated in common teams formed by the polytechnic personnel, addressing curricula, international activities, and the quality of teaching, for example. Mobility of teachers' between different polytechnic units has also increased, especially among general studies teachers. Student mobility, however, is still very limited.

The situation in secondary VET schools is the same; student mobility is slight and only few teachers move between units. The new regional VET concerns have been formed in the same way as the polytechnics. Several VET schools merged into larger and more multidisciplinary institutions in the mid-1990s. We can consider the new network structure of VET schools and polytechnics first as an arena for learning network practices. Secondly, the structure in VET concerns and in

polytechnics is in itself something that promotes the construction of regional networks of education and industries; in education it establishes modes of operation suitable for networking. It seems in the light of the interviews that the functioning of VET schools is more stable than the working of polytechnics. VET schools continue on the traditional path of Finnish vocational education, and their tasks, qualifications and traditions are fairly well known to industry.

The new on-the-job periods in the secondary VET schools encourage the schools to find new linkages and forms of co-operation with regional industries. The forms of on-the-job training vary between the educational sectors but, in general, the representatives of industries perceive the new system as essentially good and productive. Certainly, there are numerous problems, for example, availability of practice jobs. Moreover there is concern in the teachers' discourse about a downswing in student grades. Possibly the reason for this anxiety is a consequence of the changes in the education system; the students in VET schools are now younger than before and have no work experience. Some of the students arrive through a so-called compulsory application, which impairs their motivation to study. In some VET schools, motivation and participation in studies plays a decisive role in channelling students into training; the best and most highly motivated students do their on-the-job periods in the best companies.

## **Challenges of learning economy and development of education**

Structural reform has officially been completed; for example, all upper secondary programmes are unified up to three years and the polytechnic system works on a permanent basis. The basic structure itself is adequate to implement a new formulated educational policy and to serve the needs of individual citizens, industries, and society. The study shows that there are many problems and open questions originating from the former system. The status and relation of the individual parts of reformed system are unestablished. The horizontal and vertical integration and mobility are unclear, and in practice, there exist a lot of structural friction and attitudinal boundaries. In addition to the demand for structural improvement, the cultural and pedagogical reform is unaccomplished. Based on the findings of the study, there are a various number of development tasks; the educational system has to respond to the following challenges.

1. In the learning society, education and industries have to produce the required competencies in co-operation. This will call for lower borders between these social institutions; their functions should be integrated. The formal on-the-job training periods are a step in the right direction but not enough. The

development should concern not only the initial and further vocational training, but also all kinds of education. In the Finnish case, this will mean a new kind of orientation; both partners have to commit themselves to producing competencies and to taking the responsibility for learning. They have to adopt the idea of educationalisation of working life.

2. The supply of formal education has probably reached the quantitative maximum in Finland. On the upper secondary level, the supply of training is one and half study-places per school leaver, while the ratio for higher education is 0.83 compared to the annual age cohort. Forthcoming improvements should be targeted at the qualitative relevance of the supply and flexibility of the system. Contemporary horizontal and vertical integration of the different parts of the system as well as students' transition are relatively low. For example, the boundaries between the very popular upper secondary school and the undervalued secondary vocational training should be questioned; more combinations to complete secondary education should be offered. The reformed education system is based on a sequential model; in practice, it means that more than half of an age group is studying up to the age of 25. Almost all of Finnish higher education is full-time-based and implemented daytime in the institutes. Alternative ways to organise higher education should be to improve the basis of the life-long learning and work-related learning. Increasing integration and flexibility will diminish overlapping and facilitate effective use of resources.
3. The established dual higher education system is still developing and it seems that the principle of parallel institutions has been implemented so far. However, there are tension and open questions between polytechnics and universities. Internationally, the widely known Academic Drift phenomenon could also be observed also in the Finnish development. The polytechnic system appropriates some features of academic tradition. The risk is that both institutions will lose their own characteristics. The degree system, the accreditation of studies taken in an other part of the system and the form of co-operation require clarifying the role of both types of institutions. They should compete through their own strengths and improve transition between polytechnics and universities.
4. There are fifty-two higher education institutes for five million people with a young age group of sixty thousand; it might be a world record. The wide regionalisation of higher education with small units is not an effective way to organise a network; the assumed synergy benefit and concentration of expertise cannot be reached. According to our data, the aim to serve regional and sectoral needs of working life will not be realised effectively. Almost all polytechnics serve general standard programmes in small units. These units have limited resources for following up the development of industry and contributing to sectoral networks. The polytechnic network should be re-organised by strengthening regional and/or sectoral orientation and by favouring more specialised units which have been unified with a relevant network.

5. The organisational culture of vocationally oriented education is changing; it is no longer any more so isolated and centrally steered than ten years ago. The regional contribution and capacity for monitoring environmental development vary a lot among individual institutions and departments. However, in most of the cases, the process is still beginning and the relations are organised at the institutional level. Wide and lively relations with industries and individual workplaces should be improved; close and partly integrated relations with local industries is the basis of managing work-related learning and updating of the competence of the training provider. More resources must be targeted at teachers to improve their contacts with industries; in the best case a teacher could be a developer for a workplace. The SME sector in particular is expected to benefit from co-operation with VET providers.
6. Building up social capital has become an essential issue addressed in the learning society. The role of the training provider is more to be a concentration of expertise than a production of qualifications; educational institutions are expected to support the producing of competencies of their community. In addition to the formal education, providers should develop new, alternative forms of training for the needs of different age and occupational groups and local industries. They should accumulate social capital by implementing life-long learning.
7. The policy aims at a higher rate of labour market participation, prevention of too early retirement and a higher standard of education for the whole age group are new challenges for the educational system. For example, today, the middle-aged have lower education than the young generations, and they are assumed to continue up to the normative age of retirement. In addition to the flexible forms of training, inclusion-oriented training will need versatile pedagogical methods, which accommodate the needs of different groups and individual trainees. The first experiments from workshop training, workplace-integrated training and co-operation with labour market authorities have been promising.
8. Finnish education is strongly degree-oriented and the length of the complete degrees is longer than the normative duration. Programmes vary from 3.5 to 4.5 years in polytechnics, and it seems that the system does not produce so many degrees as expected. Almost all university students start the master's programmes and complete the degree after 7–10 years. The degree system should be improved so that it would not be necessary to complete the whole degree in one go. Transition from higher education to the labour market and back to education should be made more acceptable. The scheme of the higher education degree system and the opportunities to continue studies in one's own or in another discipline or institution should be improved to become more flexible. The status of the polytechnic bachelor's degree should be raised and the bottlenecks in changing the academic branch should be eliminated. The relation between polytechnic and university degrees needs to be defined.

Overall, the degree system should account for the studies from the point of competence, not based on the type of the institution.

9. Lack of students in upper secondary vocational training and overloading of the polytechnics will have an effect on the labour market. Job openings and the supply of the labour force with higher education are not in balance. This causes a problem of over-qualified labour force as well as educational inflation. The greater part of the work in Finnish industries is carried out in so-called traditional or low-tech industries, where the qualification needs differ from those in so-called high-tech industries, in telecommunications industries, for example. This also applies to most of the work in the service sector. From this point of view, it is reasonable to invest more in developing upper secondary vocational education as a competitive route into working life besides tertiary education.
10. The Finnish labour market seems more and more to follow the model of the transition labour market. The formerly stable careers of educated people are breaking up and, on the other hand, people seem to make more atypical individual choices. Expanded higher education is no longer a key to higher positions, the selection function has moved from the education more to the labour market. Education is more than before a supporting mechanism which works as an intermediary producing and updating competences. The education should serve the needs of individuals, industries, and society. To meet these challenges, education should be networked, innovative, and flexible.

## Suomenkielinen tiivistelmä

# KOULUTUS OSAAMISYHTEISKUNNASSA

## Osaamisyhteiskunnan haasteet koulutukselle

Vuosituhanneen vaihteen yhteiskunnallisia ja tuotannollisia muutoksia on kuvattu käsitteillä osaamisyhteiskunta ja tietointensiivinen tuotanto. Erityisesti läntisissä teollisuusmaissa on ollut nähtävissä, että näillä muutoksilla on syvällisiä vaikutuksia työorganisaatioihin ja ammattitaitovaatimuksiin. Tiedon ja oppimisen korostuminen sekä toimijoiden lisääntynyt yhteistoiminta on antanut aiheen puhua innovaatioverkostoista. Yksittäisen valtion tasolla tätä kuvataan kansallisella innovaatiojärjestelmällä. Erityisesti taloustieteellisesti ja teknologisesti orientoituneessa tarkastelutavassa hi-tech -yritysten ja tutkimus- ja tuotekehityksen rooli on nähty keskeisenä. Vähäisemmälle tarkastelulle on jäänyt osaamisen perustan luominen. Useissa innovaatiotoiminnan kuvauksissa yliopistot on liitetty osaksi järjestelmää, mutta muu koulutus on jäänyt vaille huomiota. Osaavan työvoiman koulutuksen on katsottu ikään kuin kuuluvan yhteiskunnan peruspalveluihin.

Kansainvälinen tarkastelu osoittaa, että koulutuksen merkitys korostuu ja sen rooli muuttuu siirryttäessä entistä tietointensiivisempään talouteen. OECD:n raportti *Knowledge Management in the Learning Society* toteaa, että tietoyhteiskunta on ennen kaikkea oppimisyhteiskunta (Knowledge economy is learning economy). Talous ja tuotanto perustuvat keskeisesti tiedon tehokkaaseen hyödyntämiseen, hankkimiseen, jakamiseen ja uuden tiedon luontiin. Oppiminen nähdään prosessina, jossa sekä yksilö että yhteisö hyötyvät lisääntyneestä kompetenssista ja kasvaneista taidoista. Lisääntynyt työmarkkinoiden dynamiikka ja yhteisöllisesti

jaetun osaamisen korostuminen asettavat koulutukselle uusia vaatimuksia. Koulutus ei voi enää toimia eristyneenä alueena, vaan sen on toimittava yhteistyössä työelämän ja yhteiskunnan muiden instituutioiden kanssa.

Ammatillisesti suuntautuneen koulutuksen organisointi- ja toimintatavassa on löydettävissä kolme toisistaan eroavaa linjausta (taulukko 1). Niistä ensimmäinen korostaa oppilaitoksissa annettavan opetuksen ensisijaisuutta ja suhtautuu väheksyen työssäoppimiseen. Organisatorisesti tästä ajattelutavasta seuraa koulutuksen ja työelämän erillisyyden tai muodollisen yhteydenpidon käytäntöjä.

	Oppimisen keskittämisen malli	Oppimisverkostojen malli	Oppimismarkkinoiden malli
Rakenne	Erilliset ja etäiset instituutiot	Itsenäisten oppilaitosten ja yritysten verkostot	Ammatillinen koulutus alistettu elinkeinoelämälle
Opetussuunnitelma	Tiukka, erillinen ja tiedeperusteinen	Joustava, integroitu ja työperusteinen	Työperusteinen
Osaaminen	Toisistaan erilliset tiedeperusteiset teoreettiset taidot ja niistä eroava toimintakeskeinen osaaminen	Toisiinsa integroidut teoreettiset ja toimintakeskeiset taidot	Toimintakeskeiset taidot
Oppiminen	Erillinen ainekohtainen oppiminen ja niistä eroava työssäoppiminen	Yleissivistävän (akateemisen) ja työperäisen oppimisen (on-the-job) integrointi	Työperäinen (in-the-job) oppiminen
Akateemisen ja ammatillisen koulutuksen integroiminen	Formaali, keskitetysti johdettu yhteistoiminta	Joustava tapauskohtainen integrointi	Ulkoapäin määrätty modulointi
Osaamisstandardien määrittely	Keskitetty (valtiollinen tai kunnallinen)	Oppilaitos ja yritykset muotoilevat vuorovaikutuksessa	Elinkeinoelämän sanelema
Työssäoppiminen	Harjoittelu; opiskelijan vastuulla	Oppilaitoksen ja yrityksen vuorovaikutteinen ohjaus ja kehittäminen	Oppisopimus: kaikki tarvittava oppiminen työssä
(Koulutus)-politiikan orientaatio	Erilliset politiikat ja hallinnot	Koulutuspolitiikka integroituna osaksi alueellista kehittämistä	Koulutuspolitiikka elinkeinopolitiikalle alistettuna

Taulukko 1. Oppimisperusteisen talouden tulkinnat koulutuksen alueella.

Edelliseen nähden aivan vastakkainen linjaus on oppisopimuskoulutusta tai yksipuolisesti työssä tapahtuvaa oppimista korostava malli. Tämän ajattelutavan mukaan työelämän kannalta relevantin osaamisen oppiminen käy päinsä ainoastaan työelämässä ja vain siellä. Oppilaitosten tarjoama teoreettinen ja yleissivistävä aines on käytännön työelämän kannalta hyödyttömiä, ja voi myös häiritä käytännöllistä tekemällä oppimista. Oppipoika-järjestelmää ainoana järkevänä muotona esittävä ajattelutapa on sidoksissa neo-klassisen talousteorian ”*business as usual*” -ajatteluun, ollen jonkinlainen ”*education as usual*” -sovellutus siitä. Tämän linjauksen mukaan tehokas oppimisen malli on ”*in-the-job learning*”, ei monipuolisempi ”*on-the-job learning*”.

Kolmas, edellä kuvattujen linjausten äärimmäisyyksiä välttelevä linjaus, on oppilaitosten ja elinkeinoelämän verkottumisen varaan rakentava teoreettista koulutusta ja työssäoppimista toisiinsa yhdistävä malli. Tässä mallissa sekä teoreettinen että työelämässä tapahtuva opiskelu nähdään yhteistä koko opetusyhteisön tiedon lisäämistä palvelevana kokonaisuutena. Oppilaitokset ovat monialaisia ja vuorovaiikutuksessa alueellisiin ja alakohtaisiin innovaatioverkostoihin. Oppimista tarkastellaan tapahtumana, jossa ammatillisten oppilaitosten opetusyhteisöt oppivat yrityksistä ja muilta verkostoon osallistuvilta sekä päinvastoin. ”*Education as usual*” -linjauksesta verkottumisen merkitystä korostava linjaus poikkeaa ennen muuta siinä, että se korostaa kehityksen ja muutoksen jatkuvuutta.

OECD:n tutkimukset korostavat, että koulutuspolitiikka on keskeinen väline, kun ehkäistään nuorten syrjäytymistä ja turvataan heidän siirtymistään työmarkkinoille. Onnistuneet siirtymät edellyttävät luonnollisesti tervettä taloutta ja hyvin organisoituja koulutusväyliä. Peruskoulutuksen jälkeen nuorille tulisi olla tarjolla kolme eri vaihtoehtoista väylää: ammatillinen, oppisopimuskoulutus ja yleissivistävä koulutus. OECD-maissa näihin ammatillisen koulutuksen haasteisiin on vastattu esimerkiksi:

- Monipuolistamalla yhteyksiä ammatillisesta koulutuksesta korkea-asteen koulutukseen.
- Lisäämällä ammatillista ainesta yleissivistävään koulutukseen.
- Viivästäväällä erikoistumista ja yhdistämällä ammatillisia linjoja laajoiksi kokonaisuuksiksi.
- Lisäämällä sisällöllistä valinnanvapautta ammatillisessa koulutuksessa.
- Moduloimalla opetussuunnitelmia ja laatimalla henkilökohtaisia opetussuunnitelmia.
- Laajentamalla ei-yliopistollista korkea-asteen koulutusta.



## Koulutuksen ja osaamisyhteiskunnan suhde tutkimuskohteena

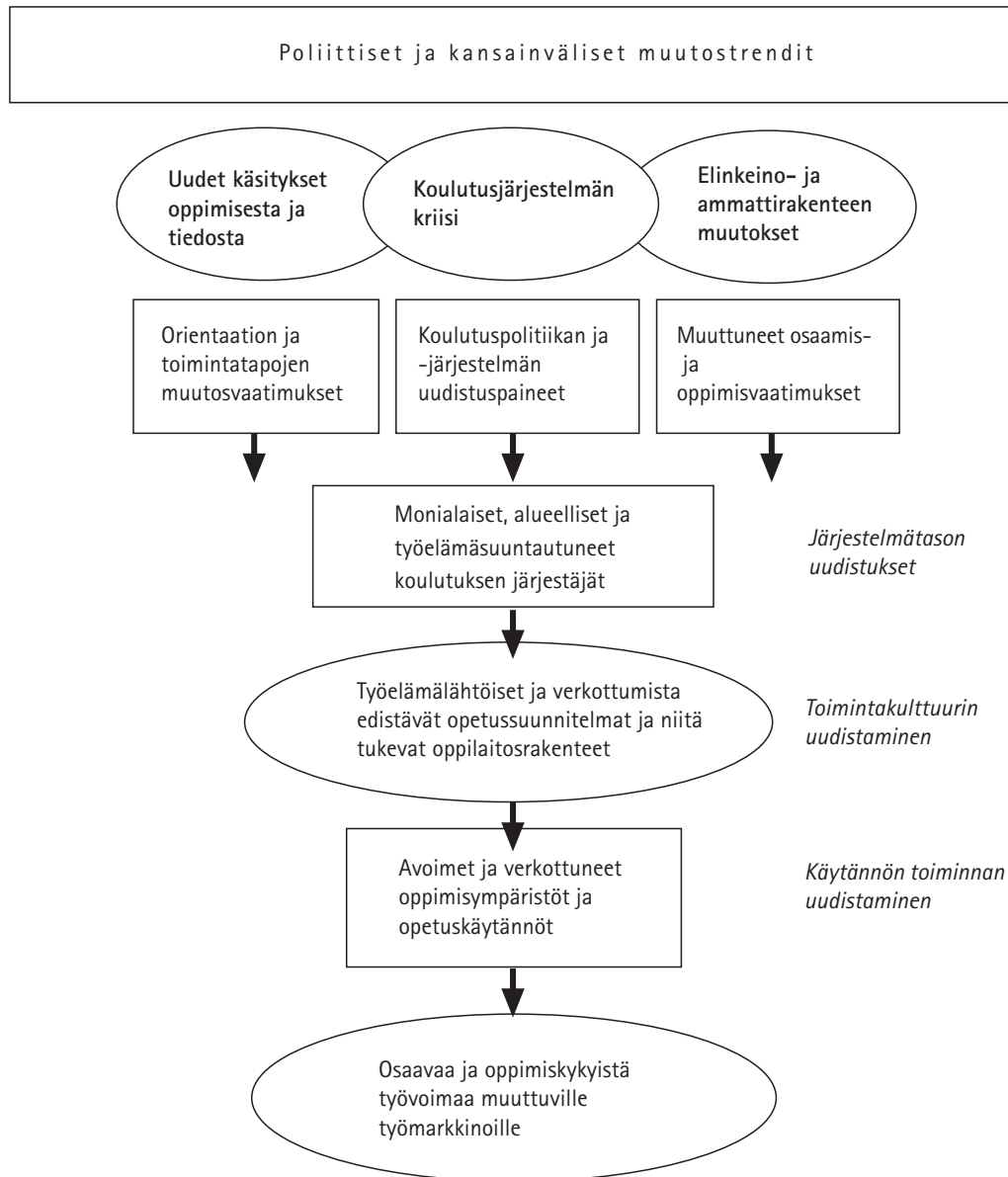
Kansallisten koulutusjärjestelmien kehittäminen sekä koulutuksen ja työelämän vuorovaikutuksen lisääminen ovat koulutuspoliittisia välineitä, joilla on pyritty ratkaisemaan osaamisyhteiskunnan työvoimatarpeita. Suomessakin ammatillinen koulutus uudistettiin 1990-luvulla ja se pyrittiin kytkemään aiempaa kiinteämmin osaksi elinkeino- ja aluekehittämistä. Koulutuspolitiikkaa ja uudistusta on tutkittu useista eri lähtökohdista. Tämä tutkimus toteutettiin osana Sitran Kansallisen innovaatiojärjestelmän tutkimushanketta. Tämän tutkimuksen tehtävänä on tuoda yksi lisänäkökulma hankekokonaisuuteen, koulutuksen tarkastelu innovaatiojärjestelmän näkökulmasta. Näistä lähtökohdista tutkimushankkeen keskeiseksi tehtäväksi määriteltiin:

- Kuinka olemassa oleva koulutusjärjestelmä kykenee vastaamaan osaamisyhteiskunnan haasteisiin?

Tutkimuksessa ei kuitenkaan tarkastella mekaanisesti tämänhetkisten laadullisten tai määrällisten tarpeiden tyydyttämistä, vaan tutkitaan koulutusta yhteiskunnallisena instituutiona, jolla on oma kehityshistoriansa ja jolla on useita eri funktioita. Koulutuksen kehitys on näin ollen riippuvainen monista eri tekijöistä ja siihen kohdistuu ristiriitaisia intressejä. Seuraavilla tarkennetuilla tutkimuskysymyksillä pyrittiin löytämään vastauksia erityisesti ammatillisesti suuntautuneen koulutuksen tehtävään ja kykyyn palvella eri tarpeita.

- Millaista osaamista koulutuksen tulisi tuottaa?
- Miten 1990-luvulla uudistettu ammatillisen koulutuksen järjestelmä toimii kokonaisuutena?
- Miten muuttuneet koulutusrakenteet ja työelämän ammattirakenteet vastaavat toisiaan?
- Ovatko ammatilliset oppilaitokset ja ammattikorkeakoulut verkottuneet alueellisesti?
- Miten oppilaitosten työelämäyhteistyö on kehittynyt ja mitä muotoja siinä käytetään?
- Ovatko oppilaitokset verkottuneet muiden koulutuksen tuottajien kanssa?

Tutkimuskohteena ammatillisen koulutuksen kenttä on monitahoinen ja -tasoinen. Tässä tutkimuksessa ei ole tyydyttyä evaluoimaan tehtyjen koulutuspoliittisten päätösten vaikutuksia. Poliittisilla ratkaisuilla on valtiojohtoisen koulutuspolitiikan maassa luonnollisesti keskeinen asema muotoiltaessa järjestelmää ja määriteltäessä sen osien tehtäviä. Kuviossa 1 esitetään viitekehys, jossa kuvataan tämän tutkimuksen ja suomalaisen ammatillisen koulutuksen uudistamisen keskeiset elementit.



Kuvio 1. Ammatillisen koulutuksen 1990-luvun uudistuksen keskeiset piirteet.

Suomalainen koulutus ei toimi yhteiskunnallisessa eikä kansallisessa tyhjiössä, vaan siihen vaikuttavat elinkeino- ja ammattirakenteessa tapahtuvat muutokset, kulloisetkin käsitykset oppimisesta ja koulutuksen roolista sekä koulutusjärjestelmän oma kehitys. Viime vuosina kansainväliset vaikutteet ja EU:n tekemät koulutuspoliittiset linjaukset ovat välittyneet entistä selvemmin keskusteluun ja kansalliseen päätöksentekoon. Erityisesti tämä piirre on leimannut 1990-luvun ammatil-

lisen koulutuksen reformia, jonka perustelut ja ratkaisut sisältävät monelta osin kansainvälisestä keskustelusta ja malleista johdettuja piirteitä.

Järjestelmän toimivuutta tutkittaessa on välttämätöntä analysoida eri tasojen toimintaa. Tässä tutkimuksessa tarkastelutasoina ovat koulutusjärjestelmä, oppilaitoksen toimintakulttuuri ja opetustoiminta. Ammatillisen koulutuksen roolia ja toimintaa eri tasoilla on tarkasteltu haastatteluaineistojen, aiempien tutkimusten, muiden dokumenttien ja tilastoaineistojen avulla.

## Koulutusreformilla uudelle vuosituhannelle

Ammatillisen koulutuksen rakenteet uudistettiin 1990-luvulla. Perustettiin alueelliset ammattikorkeakoulut ja myös toisen asteen ammatillinen koulutus koottiin alueellisiksi monialaisiksi konserneiksi. Rakenteellisen uudistuksen ohella keskeisenä koulutuspoliittisena tavoitteena oli lähentää koulutusta työelämään ja kehittää uusia yhteistyön muotoja. Tutkintojärjestelmä uudistettiin kaksiportaiseksi, jolla osaltaan pyrittiin lisäämään ammatillisen koulutuksen arvostusta. Toisen asteen ammatillinen perustutkinto ja lukio rinnastetaan monelta osin toisiinsa, samoin ammattikorkeakoulu- ja yliopistotutkinnot ovat molemmat korkeakoulututkintoja.

Tehtyä uudistusta on luonnehdittu suurimmaksi koulutusreformiksi kautta aikojen. Sen tavoitteet voidaan tiivistää viiteen keskeiseen teemaan, jotka ovat ohjanneet sekä järjestelmän uudistusta että toiminnan kehittämistä.

- 1. Koulutuksen tason nostolla* pyritään nostamaan koko kansan osaamistasoa. Keskeistä on korkea-asteen koulutustarjonnan lisääminen niin, että jatkossa jopa 70 % ikäluokasta voi suorittaa korkeakoulututkinnon. Kaikille peruskoulun päättävälle tarjotaan toisen asteen koulutus ja erityisesti tutkintoon johtavaa aikuiskoulutusta kehitetään.
- 2. Desentralisaatiolla ja oppilaitoksen autonomian lisäämisellä* siirrettiin päätöksentekoa koulutuksen järjestäjille ja oppilaitoksille. Lähtökohtana on, että näin koulutuksen tuottajalla on mahdollisuus profiloida omaa osaamistaan ja vastata aiempaa paremmin toimintaympäristön muutoksiin. Opetusministeriöllä on edelleenkin varsin voimakas rooli tulosohjausmekanismin kautta; käytännössä se päättää mille aloille ja minkä verran koulutetaan ja kuka kouluttaa.
- 3. Opetussuunnitelmauudistuksen* keskeisenä piirteenä on ollut paikallisen suunnittelun lisääminen ja opiskelijoiden valinnanmahdollisuuksien kasvattaminen. Molemmassa koulutusmuodoissa, ammattikorkeakouluissa ja toisen asteen ammatillisessa koulutuksessa, opintoihin sisältyy nyt kaikille pakollinen vähintään puolen vuoden työssäoppimisjakso. Moduloimalla opintojaksoja on pyritty edis-

tämään opiskelijoiden liikkuvuutta koulutusohjelmasta ja oppilaitoksesta toiseen.

4. *Alueellisuus ja monialaisuus* toteutettiin yhdistämällä aiemmin erillään toimineita ja monessa tapauksessa yksialaisia oppilaitoksia toisiinsa. Ammattikorkeakoulut koottiin 31 yksikköön ja toisen asteen oppilaitoksetkin muodostavat monissa tapauksissa maakunnallisia konserneja. Koulutuksen alueellisen tuottajan oletetaan tuovan oman panoksensa alueelliseen kehittämistyöhön ja vahvistavan paikallista osaamista.
5. *Työelämäyhteyksien vahvistamisen* uskotaan tuottavan entistä parempaa osaamista. Työssäoppimisjaksot ovat konkreettisin toimenpide yhteistoiminnan lisäämiseksi. Työelämään kytkeytyvät projektit ja opinnäytteet sekä työelämässä toimivien asiantuntijoiden käyttö opetuksessa lähentävät osaltaan koulutusta työelämään.

## Ammattikorkeakoulu – ammatillisen koulutuksen korkeampi muoto

Ammattikorkeakoulujärjestelmän perustamisella pyrittiin ratkaisemaan monia koulutukseen kohdistuneita paineita. Lukiokoulutuksen kasvu oli pahentanut ylioppilassumaa koko 1980-luvun ajan eikä yliopistoja oltu valmiita laajentamaan merkittävästi enemmän kuin oli jo tapahtunut. Ammatillinen linja ei ollut nuorten silmissä vetovoimainen vaan sitä pidettiin toissijaisena vaihtoehtona. Ammatilliset opistot olivat eristäytyneitä ja kapea-alaisia, minkä lisäksi niiden tutkintojärjestelmä oli sängen sekava. Aiemman järjestelmän kansainvälinen vertailtavuus oli heikko. Merkittävänä lähtökohtana oli myöskin paisuneen ammatillisen koulutuksen verkoston rationalisointi.

Viimeiset ammattikorkeakoulut vakinaistettiin kesällä 2000. Ammattikorkeakouluverkosto koostuu tällä hetkellä 31 yksiköstä, jotka toimivat yli 60 paikkakunnalla ja lähes 200 erillisessä toimipaikassa. Virallisesti ammattikorkeakoulut on määriteltävä ei-yliopistollisiksi korkea-asteen oppilaitoksiksi, joissa suoritetaan korkea-asteen tutkintoja. Koulutuspoliittinen tavoite tarjota korkea-asteen opiskelupaikka yli 2/3 osalle nuorista on toteutunut, sillä vuonna 2000 yliopistoissa aloitti 19 900 ja ammattikorkeakouluissa puolestaan runsaat 33 000 opiskelijaa, yhteensä siis lähes 53 000 opiskelijaa. Vertailukohtana oleva peruskoulun päättävä ikäluokka puolestaan on keskimäärin 64 000.

Opiskelijamäärä ammattikorkeakouluissa on kasvanut sängen nopeasti ja se on selvästi lisännyt ammatillisesti suuntautuneiden opintojen suosiota. Tilastoissa opintojen keskeyttäneiden osuus on noin 10 %, mutta valmistuneiden määrä näyttää jäävän selvästi alle suunniteltujen tavoitteiden. Laskennallisesti tarkastellen alle 60

% aloittaneista on suoritunut opinnoistaan normiajassa. Suosituimmille aloille, kuten kulttuuriin, on jopa kymmenkertainen määrä hakijoita, kun taas tekniikan alalla joka toinen hakija saa opiskelupaikan. Tekniikan alan koulutusta tarjotaan yli 10 000 opiskelijalle ja kulttuuria pääsee vuosittain opiskelemaan runsaat 2 000 opiskelijaa.

Ammattikorkeakoulututkinnon suorittaneet ovat pääasiallisesti työllistyneet hyvin. Pari vuotta valmistumisen jälkeen työttömien osuus on jo laskenut alle 10 prosentin. Poikkeuksen muodostavat eräät suosituimmat alat, kuten kulttuuri- ja sosiaali- ja terveysala, joilta valmistuneilla on vaikeuksia sijoittua työmarkkinoille. Ammattikorkeakoulusta siirrytään hyvin työmarkkinoille, vain noin kuusi prosenttia jatkaa opintoja tutkinnon jälkeen.

Ammattikorkeakoulu-uudistuksen tavoitteena oli selkiyttää tutkintojärjestelmää ja helpottaa vertailtavuutta. Kaikki suorittavat nykyisin yhtenäisen rakenteen mukaisen tutkinnon. Ammattikorkeakoulujen lisääntynyt vapaus nimetä koulutusohjelmia kuitenkin johti siihen, että vuonna 2000 saattoi 50 eri tutkintonimikettä suorittaa 300 koulutusohjelmassa, jotka jakautuivat edelleen yli 800 suuntautumismavaihtoehtoon. Näytti siltä, että mielikuvitus oli joissakin tapauksissa riittänyt uusien nimikkeiden keksimiseen, mutta sisällöllisesti pinnan alta löytyi vanha opistoaikainen opetussuunnitelma. Parhaissa tapauksissa on kehitetty sisällöllisesti ja rakenteellisesti innovatiivisia koulutusohjelmia, jotka ovat verkottuneet elinkeinoelämän kanssa. Opetusministeriön ja ammattikorkeakoulujen yhteistyönä tutkintojärjestelmä uudistettiin ja nimikkeiden määrää karsittiin. Vuonna 2001 hakijan tarvitsee valita enää 151 koulutusohjelma- tai suuntautumismavaihtoehtoa. Tutkintojen määrä väheni yhdeksään ja tutkintonimekkeitä on 45. Opetussuunnitelman perusrakenne on edistänyt työelämäyhteyksien kehittymistä ja nostanut opin- näytteiden tasoa.

Monialaisuuden toivottiin tuottavan lisää alojen välistä yhteistyötä ja synnyttävän uudentyypisiä koulutusohjelmia tai opintokokonaisuuksia. Yleisesti ammattikorkeakoulureformia perusteltiin synergiaeduilla. Selvästi on nähtävissä, että ammattikorkeakoulut pyrkivät rakentamaan yhtenäistä toimintakulttuuria ja hakevat vahvaa roolia omassa toimintaympäristössään. Vanhojen oppilaitosperinteiden yhteensovittaminen on kuitenkin osoittautunut aikaa vaativaksi prosessiksi ja uusien toimintamuotojen käynnistäminen on törmännyt moniin asenteellisiin esteisiin ja jarruttaviin rakenteisiin.

Tällä hetkellä monialaisuuden hyödyntäminen näkyy selvemmin opettajien kuin opiskelijoiden työssä. Opettajien välinen yhteistyö on lisääntynyt: he osallistuvat henkilökunnan yhteisiin opetussuunnitelmia, kansainvälisiä asioita ja opetuksen laatua käsittelevään yhteistyöhön. Opiskelijan arjessa monialaisuus näkyy lähinnä yhteisten opintojen jaksolla, jonka ammattikorkeakoulut tarjoavat kaikille opiskelijoille. Yhtenä uudistuksen tavoitteena oli valinnaisuuden kautta laajentaa ammatillista osaamista, mutta toistaiseksi näin ei ole tapahtunut. Parhaissa tapauksissa on käynnistynyt eri alojen opiskelijoiden yhteisiä hankkeita.

Ammattikorkeakoulujen strategioissa alueelliseen kehittämiseen osallistuminen ja työelämäyhteistyön tiivistäminen ovat keskeisellä sijalla. Alueellinen osallistuminen näyttäisi toistaiseksi olevan ensisijaisesti edustuksellista osallistumista. Varsin vähän tuli vastaan hankkeita, joissa opiskelijat ja riviopettajat olisivat olleet mukana alueellisesti orientointuneessa toiminnassa. Osallistumisen foorumeina ovat toimineet lähinnä alueelliset osaamiskeskukset. Jotkut oppilaitokset ovat mukana myös EU-projekteissa yhdessä maakuntaliittojen, elinkeinokeskusten ja paikallisten yritysten kanssa. Opiskelijavirtojen perusteella näyttää, että osa ammattikorkeakouluista kouluttaa paikallista nuorisoa oman alueen tarpeisiin, kun taas toiset oppilaitokset kouluttavat muilta alueilta tulevia opiskelijoita kolmansien alueiden työmarkkinoille.

Koulutuksen ja työelämän väliset kytkennät ovat lisääntyneen selvästi. Huomattava osa opinnäytetöistä tehdään työelämälähtöisistä teemoista ja erityisesti teknisillä aloilla suoraan yrityksille. Monissa tapauksissa yhteydet olivat kuitenkin vielä muotoihin sidottuja ja vastuu niistä keskittyi harvoille opettajille. Työelämää palveleva tutkimus- ja tuotekehitystoiminta oli pääsääntöisesti vielä lapsenkengissä, myöskään yritysten henkilöstön koulutustoiminta ei ollut oikein löytänyt muotojaan.

Koulutustason nosto oli yksi uudistuksen keskeisiä tavoitteita. Jos sitä mitataan opettajien koulutustason kohoamisella, on tavoitteessa edetty sangen nopeasti. Painetta opettajien opiskeluun on osaltaan tuonut se, että yliopettajilta vaaditaan tutkijankoulutus ja lehtoreilta edellytetään ylempää yliopistotutkintoa. Tilastollisesti koulutustason nosto tulee varsin pian näkymään nuorten vanhempia ikäluokkia korkeampana koulutustasona. Opetuksen sisällön ja käytettyjen metodien osalta ammattikorkeakoulut ja niiden yksiköt vaihtelevat varsin paljon. Monissa eletään vielä oppitunneilla entiseen tapaan, kun taas parhaissa tapauksissa käytetään yhteisöllisiä oppimisprosesseja kuten pienryhmissä tehtävää projektityöskentelyä, joilla edistetään monipuolisesti osaamisen kehittymistä.

Kokonaisuutena ammattikorkeakoulu-uudistuksen voi arvioida olevan puolitieessään. Ensimmäisen vaiheen rakenteellinen uudistus on toteutettu ja paikalliset ammattikorkeakoulut luovat omia toimintamallejaan. Perinteiden muuttaminen on hidas prosessi, jota asenteiden lisäksi hidastavat monet rakenteelliset seikat mm. pienet erilliset yksiköt ja opettajien aiemmista oppilaitosmuodoista periytyvät monenkirjavat virkajärjestelyt. Kärjistäen voidaan sanoa, että hallinto ja uudistavat opettajat toteuttavat uudistuksen ideaalia, mutta keskiverto opiskelijan arkisissa opinnoissa se näkyy toistaiseksi lähinnä uudistuneina nimikkeinä.

## Toisen asteen ammatillinen koulutus

Toisen asteen koulutuksen piirissä hallitseva tendenssi jo pitkään on ollut lukio-koulutuksen suosion ja aloituspaikkamäärien lisääntyminen sekä vastaavasti toisen asteen ammatillisen koulutuksen supistuminen. Vuosina 1995-2000 ammatillisen koulutuksen aloituspaikkamäärä supistui lähes 50 000:lla, mikä merkitsee reilun neljänneksen supistusta. Viime vuosikymmenellä toteutettiin myös hallinnollisia reformeja, jotka johtivat oppilaitoskoon kasvuun. Useimmissa tapauksissa aiemman sektorikoulutukseen perustuneen oppilaitosjaon tilalle muodostettiin yhteensulauttamalla laajoja monialaisia koulutuskonserneja. Kolmas piirre on ammatillisen koulutuksen eriytyminen ja eriyttäminen.

Aiemman kaikille yhteisen ja pakollisen kouluopetuksen sijaan nuorisoasteen ammatillinen koulutus toteutuu nykyisin monien vaihtoehtoisten väylien kautta. Saman ammattipätevyyden voi saavuttaa paitsi perinteisessä kouluperusteisessa koulutuksessa, jota toki on edelleen hallitseva koulutustyyppi, myös oppisopimuskoulutuksessa ja nk. pajakouluissa. Oman vaihtoehdonsa tarjoavat nuorisokoulukoikeiluista liikkeelle lähteneet lukioiden ja ammatillisten oppilaitosten koulutusta yhdistävät mallit sekä nk. ammattilukiot. Hallinnollisen yhdistämisen rinnalla koulutus näyttäisi monipuolistuvan, mikä kertoo palvelukoulumallin esiinmurtautumisesta vanhan työmarkkinakoulutuksen sijaan.

Oman merkittävän panoksensa nuorisoasteen ammatillisen koulutuksen monipuolistamiseen antaa kouluperusteiseen opetukseen liitettyjen työssäoppimisen jaksoiden käynnistäminen. Jaksot ovat käytännöllispainotteisen opiskelun kokonaisuuksia, joiden tavoitteena on avata opiskelijalle mahdollisuus koulussa jaettavan teoreettisen tiedon yhdistämiseen käytännön työtilanteissa. Jakson koulutuksellista luonnetta korostaa se, että opiskelijaa ohjaa sekä työpaikalla oleva koulutettu ohjaaja että vastuullinen opettaja. Uudet työssäoppimisen jaksot epäilemättä paikkaavat sitä puutetta, jonka käytännöllisen osaamisen alueelle on jättänyt suomalaisen ammatillisen koulutuksen vahva kouluvetoinen perinne. Uusia jaksoja voi tarkastella avauksena oppisopimuskoulutuksen suuntaan. Toisaalta ne ylittävät perinteisen oppisopimuskoulutuksen siinä, että niiden toteuttamisessa korostetaan jakson pedagogisia elementtejä. Vahvemman oppisopimuskoulutuksen perinteen maissa on ryhdytty pedagogisia elementtejä vahvistaviin toimiin.

Uudet työssäoppimisen jaksot avaavat työntäjille mahdollisuuden nk. pitkitettyyn rekrytointiin ja juuri sellaisen työvoiman kouluttamiseen, joka on tarpeen. Tämän seikan voisi olettaa parantavan toisen asteen ammatillisesta koulutuksesta valmistuneiden työllistymistä, mikä kiistatta on jäänyt jälkeen ammattikorkeakouluista ja yliopistoista valmistuneiden vastaavista. Työllistymisen paranemisen voi olettaa lisäävän myös ammatillisen koulutuksen suosiota. Jaksoilla on merkitystä myös opiskelijoiden jatkokoulutuksen kannalta.

Ammattikorkeakoulujen koulutustehtävän kannalta on ensiarvoisen tärkeää, että valmistuvat työelämän asiantuntijat omaavat myös käytännöllistä kokemusta työelämästä. Ilmeisesti olisi tarpeen pohtia sellaistaakin vaihtoehtoa, että niille opiskelijoille, jotka jatkavat opintojaan ammattikorkeakouluissa, turvattaisiin mahdollisuus ylimääräiseen työssäoppimisen jaksoon toisen asteen ammattitutkinnon suorittamisen ja ammattikorkeakouluopintojen aloittamisen välissä. Tämä voisi koskea myös ylioppilastutkinnon suorittaneita.

Työssäoppimisen jaksot kiinnittävät ammatillisen koulutuksen tuottajia, eli kouluja ja opettajia tiiviimmin alueellisiin ja alakohtaisiin innovaatiojärjestelmiin tiivistämällä koulutuksen ja työelämän välistä yhteistoimintaa. Tämä on eduksi paitsi koulutuksen menetelmällisen ja sisällöllisen ajankohtaistamisen kannalta myös työelämän, erityisesti alueellisten pienten ja keskisuurten yritysten kannalta. Yrityksillä on periaatteessa käytössään koulujen opetushenkilökunnan tietovaranto, jota ne voivat hyödyntää innovaatiotoiminnassaan. Uudenlaiset käytännöt luonnollisesti vaativat uudenlaisen työtyylin opettelemista, mihin näyttäisi olevan valmiutta erityisesti teknisten alojen koulutuksessa. Haastattelemamme koulujen edustajat pitivät opettajien työelämäjaksoja eräänä keskeisenä keinona synnyttää verkostomallista toimintatapaa yritysmaailman ja koulujen yhteistoiminnassa.

Vanhoissa oppisopimusmaissa on törmätty työpaikkaohjaajien pedagogisen osaamisen puutteista aiheutuviin ongelmiin. Perinteisen oppisopimuskoulutuksen on myös havaittu olevan perin tehotonta ajatellen uudenlaisen, esimerkiksi telekommunikaatioalalla tarvittavan osaamisen synnyttämistä. Suomessa ollaankin panostamassa työpaikkaohjaajien koulutukseen. Tämä kouluttaminen palvelee paitsi työssäoppimisjaksojen onnistunutta toteuttamista myös koulutuksen ja työelämän yhteistoiminnan ja tiiviimmän vuorovaikutuksen synnyttämistä. Työpaikkaohjaajat toimivat yritysmaailman suunnasta vastuuhenkilöinä koulujen kanssa toteutettavassa yhteistoiminnassa. Heillä tulee olemaan tietoa koulumaailman toiminnasta ja tietovarannoista, ja tässä mielessä heidän merkityksensä on ensisijainen. Yksi esitetty malli on keskittää työpaikkaohjaajien koulutus ikääntyneempiin työntekijöihin, joiden hallussa on jäsentynyttä kodifioitua ja hiljaista tietoa työpaikan toiminnasta. Tämä epäilemättä paitsi mahdollistaisi tämän tietovarannon käyttöönoton koulutuksessa ja työpaikalla laajemmin, myös edistäisi vanhenevien työntekijöiden työssä jaksamista monipuolistamalla heidän työtään.

Tärkein hyöty työssäoppimisen uusista koulutusjaksoista kuitenkin kertyy opiskelijoille, jotka saavat uusien jaksojen kautta kokemusta käytännön työstä ja mahdollisuuden testata ja soveltaa koulussa oppimaansa teoreettista ainesta. Opiskelijalle tarjoutuu mahdollisuus myös todellisen osaamisensa ja elämänasenteensa näyttämiseen, minkä luonnollisesti olettaisi parantavan hänen työllistymismahdollisuuksiaan valmistumisen jälkeen. Kaiken kaikkiaan uudet työssäoppimisen jaksot ovat kokonaisuus, jonka seurantaan ja josta saatujen kokemusten erittelyyn tulee jatkossa panostaa.



## Miten koulutus vastaa osaamisyhteiskunnan haasteisiin?

Työelämän rakennemuutokset ja tiedon nousu keskeiseksi tuotannontekijäksi ovat selvästi muuttanut työntekijöihin kohdistuvia osaamisvaatimuksia. Ilmiö ei koske ainoastaan korkean teknologian ammatteja tai perinteisiä asiantuntijatehtäviä, vaan muutos on havaittavissa kaikilla aloilla ja organisaatiotasolla. Työmarkkinoille siirtyviltä nuorilta edellytetään laajaa yleissivistystä, oman alan perustaitojen hallintaa, sosiaalisia ja kommunikaatiotaitoja sekä kykyä uuden oppimiseen. Aiemmin erillisinä saarekkeina toimineet ammatilliset oppilaitokset eivät kyenneet vastaamaan muuttuneen toimintaympäristön vaatimuksiin. Tiukka ammattiperustainen ja kvalifikaatiopohjainen opetus ei tuottanut riittävän laajaa osaamista ja esti osaltaan liikkuvuutta työmarkkinoilla. Nämä ongelmat pyrittiin ratkaisemaan uudistamalla suomalainen koulutusjärjestelmä. Vaikka 1990-luvun reformi kohdistui ammatilliseen koulutukseen, vaikutti se koko koulutusjärjestelmään. Koulutusrakenteesta tehtiin selkeästi kolmiportainen, jossa toisella asteella lukio ja ammatillinen koulutus rinnastetaan toisiinsa ja korkea-aste jakautuu kahteen rinnakkaiseen sektoriin.

Rakenteellinen uudistus on pääosin viety päätökseen ja on nähtävissä, että koulutusjärjestelmä vastaa nyt entistä paremmin yksilöiden, työelämän ja yhteiskunnan tarpeisiin. Monelta osin on kuitenkin vielä avoinna, millaiseksi uudistuksen jälkeinen koulutusjärjestelmä muotoutuu. Uusi järjestelmä on rakennettu vanhan pohjalta ja on nähtävissä, että monet aiemmat ongelmat ovat siirtyneet uuteenkin järjestelmään. Aivan selvää on, että oppilaitosten toimintakulttuurin ja käytäntöjen kehittäminen on vielä puolitiessä. Tutkimustulosten perusteella voi esittää seuraavia havaintoja:

1. Osaamisyhteiskunnassa oppimisen tulee tapahtua koulutuksen ja työelämän yhteistyönä, eivätkä pelkät muodolliset työssäoppimisjaksot riitä toteuttamaan tätä tarvetta. Tulevaisuudessa työn ja koulutuksen välisen rajan tulee madaltua ja toimintojen limittyä. Kehitys vaatii koulutuksen ja työelämän vastuullista sitoutumista osaamisen tuottamiseen, tarvitaan työelämän opinnollistamista.
2. Uusi korkea-asteen duaalijärjestelmä on vielä muotoutumisvaiheessa ja toistaiseksi on pidetty kiinni rinnakkaisten koulutusväylien periaatteesta. Ammattikorkeakoulun ja yliopiston välillä on kuitenkin jännitteitä ja avoimia kysymyksiä. Kansainvälisistä kokemuksista tunnettu academic drift -ilmiö, jossa ammattikorkeakoulu hakee oikeutusta itselleen ja kilpailee yliopistomaisin tunnuksin, ei ole vieras meilläkään. Tutkintojärjestelmä ja opintojen hyväksiluku sekä yhteistyö vaativat roolien selkeyttämistä, muuten on vaarana, että molemmat menettävät omaleimaisuutensa. Keskinäisessä kilpailussa tulisi keskittyä omien vahvuuksien kehittämiseen.

3. Koulutuksen tarjonta lienee saavuttanut Suomessa määrälliset rajansa. Toisen asteen aloituspaikkoja on 1,5-kertainen määrä peruskoulun päättäviin nuoriin nähden ja korkea-asteen vastaava ikäluokkakerroin on 0,83. Jatkossa onkin syytä kiinnittää huomiota tarjonnan kohdentamiseen ja järjestelmän joustavuuteen. Opintojen integroiminen ja opiskelijoiden liikkuminen horisontaalisesti ja vertikaalisesti on vielä varsin vähäistä. Integrointia lisäämällä voitaisiin poistaa päällekkäisyyttä ja käyttää resursseja tehokkaasti. Toisen asteen jakautuminen vain suosittuun teoreettiseen lukioon ja koulumuotoisiin ammatillisiin oppilaitoksiin on syytä kyseenalaistaa. Nuorille voitaisiin kahden vaihtoehdon lisäksi tarjota erilaisia tapoja suorittaa toisen asteen opinnot. Ne on mahdollista toteuttaa poistamalla raja-aitoja tutkintojen väliltä ja tukemalla eri tavoin suoritettujen opintojen kokoamista tutkinnoiksi.
4. Suomessa toimii 52 korkea-asteen koulutuksen tarjoajaa. Laaja verkosto on ongelmallinen kansantalouden ja osaamisen tuottamisen kannalta. Pienehköjen ja samankaltaisten ammattikorkeakoulujen voimavarat eivät riitä erikoistuneiden osaamiskeskittymien luomiseen, eikä ammattikorkeakouluilla ole selkeää alueellistakaan profiilia. Verkoston rationalisointi ja yksittäisten korkeakoulujen entistä selkeämpi profiloituminen varmistaisi osaltaan korkealaatuisten osaamiskeskittymien kehittymistä.
5. Ammatillisesti suuntautuneen koulutuksen tulisi kytkeytyä entistä kiinteämmin alueellisen elinkeinoelämään ja luoda elävät yhteydet oppilaitosten ja työpaikkojen välille. Näiden yhteyksien avulla koulutus pysyisi mukana työelämässä tapahtuvissa muutoksissa ja opettajat voisivat toimia osaltaan työelämän kehittämisresursseina, erityisesti pk-sektorilla. Opettajille tulisivat suunnata resursseja työelämäyhteyksien ylläpitoon ja oppilaitosten tulisi kehittää työelämän kannalta merkittävää osaamistaan.
6. Sosiaalisen pääoman muodostuminen on noussut olennaiseksi näkökulmaksi tarkasteltaessa osaamisyhteiskunnan toiminnan perusteita. Koulutuksessa tulisivat entistä enemmän tarkastella oppilaitoksia osaamiskeskuksina, jotka edistävät sosiaalisen pääoman muodostumista toimialueellaan. Tutkintokoulutuksen ohella oppilaitosten tulee avoimesti ja joustavasti kehittää uusia monipuolisia toimintatapoja, joilla ne tukevat sosiaalisen pääoman karttumista ja siihen kytkeytyvän elinikäisen oppimisen toteuttamista.
7. Nuorten työmarkkinoille osallistumisasteen kohottaminen ja koko ikäluokan entistä korkeampi kouluttaminen ovat uusia haasteita koulutukselle. Nykyisten keski-ikäisten, joista huomattavalla osalla on alhainen koulutus, tulisi jatkaa työelämässä normaaliin eläkeikään asti. Joustavien rakenteiden lisäksi tuleekin kehittää monipuolisia pedagogisia ratkaisuja, joilla tuotetaan kullekin ryhmälle ja yksilölle sopivaa koulutusta. Erilaiset pajakoulut, yhteiset koulutusprojektit työelämän kanssa ja yhteistoiminta työvoimahallinnon kanssa tarjoavat jo nyt malleja toimivista ratkaisuista.

8. Suomalaiset työmarkkinat näyttävät kehittyvän kohti siirtymien työmarkkinoita. Koulutuksen aiemmin tuottama työuran vakaus näyttää murtuvan useimilla aloilla ja toisaalta yksilötkin tekevät entistä enemmän omia perinteisestä työurasta poikkeavia ratkaisuja. Laajeneva koulutus ei enää tuotakaan entiseen tapaan tutkinnon suorittaneelle hyvää työmarkkina-asemaa, vaan valinta on siirtynyt koulutuksesta työmarkkinoille. Koulutus on yhä enemmän työmarkkinoille siirtymistä ja sinne palaamista tukeva mekanismi. Siirtymien työmarkkinoilla koulutuksen tulisi palvella yksilöiden, yritysten ja yhteiskunnan tarpeita. Tässä tehtävässä onnistuu vain joustava, toimintaympäristöönsä verkottunut ja tehokkaasti toimiva koulutus.

## References

- Alasoini, T. (1993) *Ohut tuotanto ja antroposentrinen tuotanto tulevaisuuden tehtaan malleina: Näkökulmia kansallisen FAST-tutkimusprojektin kannalta*, Tampereen yliopisto, Yhteiskuntatieteiden tutkimuslaitos, Työelämän tutkimuskeskus, Työraportteja 39/1993. Tampere.
- AMKOTA database (2000) A statistical database of the polytechnic system maintained by the Finnish Ministry of Education, (<http://www.csc.fi/amkota/>) (The project has a permission for the database.)
- Argyris, C. & Schön, D. (1978) *Organizational learning: a theory of action perspective*, Reading, Massachusetts: Addison-Wesley.
- Arminen, O. (1996) *Työpajatoiminta kunnissa*, Helsinki: Suomen Kuntaliitto.
- Asetus ammattikorkeakouluopinnoista 256/1995.
- Autio, V., Hanhijoki, I., Katajisto, J., Kimari, M., Koski, L., Lehtinen, J., Montén, S., Taipale, U. & Vasara, A. (1999) *Ammatillinen koulutus 2010, työvoiman tarve 2010 ja ammatillisen koulutuksen mitoitus*, Helsinki: Opetushallitus.
- Bartholomew, S. (1997) 'National systems of biotechnology innovation: Complex interdependence in the global system', *Journal of International Business Studies* 28, 2: 241–267.
- Baumert, J. (1990) 'Die Gesamtschule', in Max-Planck-Institut für Bildungsforschung, 303–327.
- Bourdieu, P. (1977) *Outline of a theory of practice*, Cambridge: Cambridge University Press.
- Bourdieu, P. (1985) 'The social space and genesis of groups', *Social Science Information* 24, 2: 195–220.
- Bourdieu, P. (1986) 'The Forms of Capital', in Richardson, J. G. (ed.) *Handbook of theory and research for the sociology of education*, New York: Greenwood Press, 241–258.
- Bourdieu, P. (1993) *Sociology in question*, London: Sage.
- Bourdieu, P. & Wacquant, L. J. D. (1991) 'Das Feld des Machts und die teknokratische Herrschaft', in Dölling, I. (ed.) *Pierre Bourdieu, Intellektuellen und die Macht*, Hamburg: VSA Verlag, 67–100.
- Brown, A. & Keep (1999) *Review of vocational education and training research in United Kingdom*, Institute for Employment Research & The University of Warwick with European Commission, Brussels.
- Castells, M. (1996) *The rise of the network society*, Oxford: Blackwells.
- CEDEFOP (1995) *Apprenticeship in the EU member states – A comparison*, Berlin.
- CEDEFOP (2000) 'Scenarios and strategies for vocational education and training in Europe', Executive Summary and Synthesis of European Level Report, phase 1, Thessaloniki/Turin/Amsterdam. Paper for discussion at the European Conference in Athens 20–21 January 2000.
- CERI/CD (1999) 10: 'Knowledge in the learning society', Paris: CERI & OECD.
- CERI/CD (2000) 2: 'Learning cities and regions', Intermediate Report, Paris: CERI & OECD.
- Conner, K. R. & Prahalad, C. K. (1996) 'A resource-based theory of the firm: knowledge versus opportunism', *Organization Science* 7: 477–501.
- Cooke, P. & Wills, D. (1999) 'Small firms, social capital and the enhancement of business performance through innovation programmes', *Small Business Economics* 13: 219–234.
- Crevoisier, O. (1997) 'Financing regional endogenous development: the role of proximity capital in the age of globalization', *European Planning Studies* 5: 407–416.
- Danish Ministry of Education (1994) 'Youth education in Denmark: Problems and achievements', Background Report for the OECD Review, Copenhagen: Author.
- Dixon, N. (1999) 'The changing face of knowledge', *The Learning Organization* 6, 5: 212–216.
- Edquist, C. (1997) 'Systems of innovation approaches – Their emergence and characteristics', in

- Edquist, C. (ed.) *Systems of innovation: Technologies, institutions and organizations*, London: Printer/Cassell.
- Ellström, P.-E. (1997) 'The many meanings of occupational competence and qualification', *Journal of European Industrial Training* 21, 6/7: 266–273.
- Eurydice (2000) *Two decades of reform in higher education Europe: 1980 onward*, European Commission, Education and Culture, Eurydice Studies.
- Farr, M. & Moscovici, S. (1984) *Social representations*, Paris-Cambridge: Cambridge University Press.
- Florida, R. (1995) 'Towards the learning region', *Futures* 27: 527–536.
- Granovetter, M. S. (1985) 'Economic action and social structure: the problem of embeddedness', *American Journal of Sociology* 91: 481–510.
- Gustafsson, U. A. & Madsén, T. (1995) 'Transition in a school-based vocational training system: The case of Sweden'. Prepared for the CERI/NCAL Roundtable on School-to-Work Transition in OECD Countries, Paris, February 2–3.
- Hatchuel, A. & Weil, B. (1995) *Experts in organisations: A knowledge-based perspective on organisational change*, Berlin-New York: Walter de Gruyter.
- Hautala, J. & Orelma, A. & Tulkki, P. (1995) *Insinöörikoulutus valinkauhassa*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportteja 25, Turku..
- Hobsbawm, E. (1999) *Äärimmäisyyksien aika. Lyhyt 1900-luku (1914–1991) [The Age of Extremes. The Short Twentieth Century, 1914–1991]*. Tampere-Jyväskylä::Vastapaino.
- Huttula, T. (toim.) *Ammattikorkeakoulutuksen laatuyksiköt 2000*, Ammattikorkeakoulujen arviointineuvoston julkaisuja 13:2000, Helsinki::Edita.
- Hyypä, H. & Tulkki, P. (1996) *Rinnan vai sarjassa – Suomalainen insinööriosaaminen kouluttajien ja työelämän näkökulmasta*, Kauppa- ja teollisuusministeriön tutkimuksia ja raportteja 4/1996, Helsinki: Edita.
- IPTS (2000) The IPTS Future Project, Conference Proceedings, Futures Report series 17, Seville: JRC-IPTS.
- Jaatinen, P. (1999) *Synergian siemenet ja torajyvät. Tutkimus monialaisen ammattikorkeakoulun organisaatiokulttuurista*, Turun yliopiston julkaisu sarja C 148. Abstract in English: Synergy – a study of the organisational culture in a multidisciplinary polytechnic in Finland.
- Jarvis, P. (1992) *Paradoxes of learning. On becoming an individual in society*, San Francisco: Jossey-Bass Publishers.
- Järvinen, A. & Koivisto, T. & Poikela, E. (2000) *Oppiminen työssä ja työyhteisössä*, Porvoo: WSOY.
- Järvinen, M.-R. (1993) *Koulutus hoivatyöhön: Terveystieteiden koulutuksen muotoutuminen ja tulevaisuudennäkymät*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportteja 15, Turku.
- Järvinen, M.-R. (1995) *Ammattikorkeakoulut ja yhteensulautuminen Suomessa*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportti 27, Turku.
- Järvinen, M.-R. (1998) *Eriytyneistä kouluista laaja-alaisia oppimiskeskustoja? Ammatillisten oppilaitosten yhdistäminen suomalaisen koulutuspolitiikan välineenä 1900-luvulla*, Turun yliopiston julkaisu: Sarja C, osa 135. Turku.
- Kantola, I. & Panhelainen, M. (toim.) (1998) *Kansainvälistyvät ammattikorkeakoulut. Jyväskylän, Tampereen ja Turun ammattikorkeakoulujen kansainvälistyminen*, Korkeakoulujen arviointineuvoston julkaisuja 2:1998, Helsinki: Edita.
- Kasanko, M. & Tiilikka, J. (1999) *Osaamisintensiivisen palvelusektorin kehitys Suomessa*, Helsingin Kauppakorkeakoulu, Liiketaloustieteellinen tutkimuslaitos, Julkaisu B 148, Helsinki.
- Kierchner, P. & Van Vilsteren, P. (1997) 'The design of a study for acquiring academic and professional competence', *Studies in Higher Education* 22, 2: 151–171.
- Kilpinen, E. (2000) *The enormous fly-wheel of society: pragmatism's habitual conception of action and social theory*, University of Helsinki, Department of Sociology, Research reports n:o 235, Helsinki.

- Klemelä, K. (1999) *Ammattikunnista ammatillisiin oppilaitoksiin. Ammatillisen koulutuksen muotoutuminen Suomessa 1800-luvun alusta 1990-luvulle*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportti 48, Turku.
- Kogut, B. & Zander, U. (1992) 'Knowledge of the firm, combinative capabilities and the replication of technology', *Organization Science* 3: 383–397.
- Kogut, B. & Zander, U. (1996) 'What do firms do? Coordination, identity and learning', *Organization Science* 7: 502–518.
- Koike, K. (1988) *Understanding industrial relations in modern Japan*, London: Macmillan.
- Korhonen, K. & Mäkinen, R. (1995) *Ammattikorkeakouluopiskelija ja opiskelu. Ensimmäisinä kokeiluvuosina tapahtunut kehitys entiseen opistoasteeseen verrattuna*, Jyväskylän yliopisto, Kasvatustieteiden tutkimuslaitoksen julkaisusarja A, tutkimuksia 65, Jyväskylä.
- Korkeakoulujen arviointineuvoston julkaisuja 1:1997. *Armottomat ammattikorkeakoulumatkalla kehittyneisiin arviointijärjestelmiin*, Virtanen, A. (toim.) Helsinki: Edita.
- Korkeakoulujen arviointineuvoston julkaisuja 2:1998. *Kansainvälistyvät ammattikorkeakoulut. Jyväskylän, Tampereen ja Turun ammattikorkeakoulujen kansainvälistyminen*, Kantola, I. ja Panhelainen, M. (toim.) Helsinki: Edita.
- Korkeakoulujen arviointineuvoston julkaisuja 4:1998. *167 syytä korkeakouluksi – ammattikorkeakouluhakemusten arviointi 1998*, Helsinki: Edita.
- Korkeakoulujen arviointineuvoston julkaisuja 9:1998. *Programme evaluation of industrial management and engineering in Finnish higher education institutions*, Helsinki: Edita.
- KOTA-database (2000) A statistical database of the university system maintained by the Finnish Ministry of Education. (<http://www.minedu.fi/minedu/education/KOTA.html>)
- König, W. (1993) 'Technical education and industrial performance in Germany: a triumph of heterogeneity', in Fox, R. & Guagnini, A. (eds.) *Education, technology and industrial performance in Europe, 1850–1939*, Cambridge: Cambridge University Press, 65–88.
- Lairio, M., Puukari, S. & Peltosalmi (1999) *Opinto-ohjaajan toimenkuva muuttuvassa yhteiskunnassa*, Jyväskylän yliopisto, Koulutuksen tutkimuslaitoksen tutkimusjulkaisuja 1, Jyväskylä.
- Lairio, M. & Puukari, S. & Peltosalmi, J. (1999) 'Oppilaanohjaus ja työelämäyhteydet', in Lairio, M. & Puukari, S. (ed.) *Opinto-ohjaajan toimenkuva muuttuvassa yhteiskunnassa*. Jyväskylän yliopisto, Koulutuksen tutkimuslaitoksen tutkimusjulkaisuja 1, Jyväskylä.
- Laki (255/1995) Laki ammattikorkeakouluopinnoista.
- Laki (630/1998) Laki ammatillisesta koulutuksesta.
- Lampinen, O. (toim.) (1995) *Ammattikorkeakoulut – vaihtoehto yliopistoille*, Helsinki: Gaudeamus, Otatieto.
- Lampinen, O. (1998) *Suomen koulutusjärjestelmän kehitys*, Helsinki: Gaudeamus.
- Lampinen, O. & Savola, M. (1995) 'Ammattikorkeakoulujen kehittämisen vaihtoehdot', in Lampinen, O. (ed.) *Ammattikorkeakoulut - vaihtoehto yliopistoille*, Tampere: Gaudeamus, Otatieto, 11–25.
- Lash, S. (1995) 'Refleksiivisyys ja sen vastinparit: rakenne, estetiikka, yhteisö', in Beck, U. & Giddens, A. & Lash, S. (eds.) *Nykyajan jäljillä. Refleksiivinen modernisaatio [Reflexive Modernization. Politics, tradition and aesthetics in the modern social order]*, Tampere-Jyväskylä: Vastapaino, 153–235.
- Lehtisalo, L. & Raivola, R. (1999) *Koulutus ja koulutuspolitiikka 2000-luvulle*, Juva: WSOY.
- Lei, D. & Hitt, M. (1996) 'Dynamic core competences through meta-learning and strategic context', *Journal of Management* 22, 4: 549–569.
- Lundvall, B-Å. (1999) 'Understanding the role of education in the learning economy: The contribution of economics', in CER/CD (99)10 *Knowledge management in the learning society*, OECD: Paris.
- Maskell, P. & Malmberg, A. (1999) 'Localised learning and industrial competitiveness', *Cambridge Journal of Economics* 23: 167–186.

- Maskell, P. (1999) 'Social capital, innovation and competitiveness', mimeo for CERI/CD (2000)2.
- Metsä-Tokila, T., Tulkki, P. & Tuominen, P. (1998) *Ammattitaito, koulutus ja työ: Oppilaitoskeskeisyydestä työelämäpainotteiseen ammatilliseen koulutukseen*, ESR-julkaisut 37/98, Helsinki: Edita.
- Ministry of Education (1995) *Education, training and research in the information society – A national strategy*, Helsinki.
- Ministry of Education (1998) *Higher education policy in Finland*, Helsinki.
- Ministry of Education (1999a) *Koulutuksen ja tutkimuksen tietostrategia 2000–2004*, hankesuunnitelmat, Opetusministeriö, Helsinki.
- Ministry of Education (1999b) *Koulutuksen ja tutkimuksen tietostrategia 2000–2004*, toimeenpanosuunnitelma, Opetusministeriö, Helsinki.
- Moscovici, S. (1984) 'The problem of social representations', in Farr, M. & Moscovici, S. *Social representations*, Paris-Cambridge: Cambridge University Press.
- Nahapiet, J. & Ghoshal, S. (1998) 'Social capital, intellectual capital, and the organizational advantage', *Academy of Management Review* 23, 2: 242–266.
- National Board of Education (1999) *Education system in Finland*, (<http://www.edu.fi/info/system/english/>)
- National Board of Education *Tilastoja koulutuksesta*, <http://www.edu.fi/info/tilastot/>
- Niewenhuis, L. (1998) 'New developments in qualifying strategies for sectoral and regional innovations', STOAS, Studies into Education and Employment, Wageningen, the Netherlands.
- Nonaka, I. & Takeuchi, H. (1995) *The knowledge-creating company. How Japanese companies create the dynamic of innovation*, New York-Oxford: Oxford University Press.
- Nurmi, J. (1997) *Keiden koulutusväylät?*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportti 43, Turku.
- OECD: United Kingdom (1994) Contribution to the seminar "Apprenticeship, 'Alternance' and Dual System: Dead-Ends or Highways to the Future?" organized by the OECD, the French authorities, and the Centre d'Études et de Recherches sur les Qualifications (CEREQ), Marseille, France, April 12–14.
- OECD (1996) *Education at a glance – Indicators*, Paris.
- OECD (1996a) *The OECD jobs strategy: Technology, productivity and job creation*, Vol. 1: Highlights, Paris: OECD.
- OECD (1996b) *The OECD jobs strategy: Technology, productivity and job creation*, Vol. 4: Analytical Report, Paris: OECD.
- OECD (1998) *Education at a glance: OECD Indicators*, Paris: OECD.
- OECD (1999) *Education at a glance: OECD indicators*, Paris: OECD.
- OECD (2000a) *From initial education to working life. Making transitions work*, Paris: OECD.
- OECD (2000b) *Knowledge management in the learning society*, Paris: OECD.
- OECD (2000c) *Education at a glance: OECD indicators 2000, Education and skills*, Paris: OECD.
- OECD (2001) *Cities and regions in the new learning economy*, Paris: OECD.
- Opetushallitus (1988) 'Työssäoppimisen opas opettajille ja kouluttajille', *Kehittyvä koulutus 5/1998*, Helsinki: Opetushallitus.
- Opetusministeriö (1993) *Koulutuksen ja korkeakouluissa harjoitettavan tutkimuksen kehittämissuunnitelma vuosille 1991–1996*, VNp 18.3.1993.
- Opetusministeriö (1999) *Suomalainen koulutus: ammattikorkeakoulut*, Helsinki: Opetusministeriö.
- Parikka, A. (1999) *Ekonomi vai tradenomi*, Koulutussosiologian tutkimuskeskuksen raportti 46, Turku: Turun yliopisto.
- Peltonäki, M. & Silvennoinen, H. (1998) *Oppisopimus peruskoulutuksena*, ESR-julkaisut 15/98, Helsinki: Työministeriö.
- Pihlaja, K. (1997) 'Ovatko nuorten työpajat tulleet jäädäkseen?' *Sosiaaliturva* 8, 85: 4–6.
- Planas, J. (1995) 'School-to-work transition in Spain', prepared for the CERI/NCAL Roundtable on School-to-Work Transition in OECD Countries, Paris, February 2–3.



- Polanyi, M. (1958) *Personal knowledge*, Chicago: University of Chicago Press.
- Portes, A. (1998) 'Social capital: Its origins and applications in modern sociology', *Annual Review of Sociology* 24: 1–24.
- Pratt, J. & Burgess, T. (1974) *Polytechnics: A Report*, Bath: Pitman.
- Putnam, R. D. (1995) 'Bowling alone: America's declining social capital', *Journal of Democracy* 6: 65–78.
- Putnam, R. D. (1999) *Education and social capital*, National Bureau of Economic Research, Cambridge (Mass.).
- Raivola, R. (2000a) 'Tiedot, taidot ja osaaminen tietoyhteiskunnassa', in Raivola, R. (2000) *Työssäoppimisen juhlaseminaari 2000* -julkaisu, Tampereen yliopisto ja Hämeen ammattikorkeakoulu.
- Raivola, R. (2000b) *Tehoa vai laatua koulutukseen*, Helsinki: WSOY.
- Raivola, R. & Vuorensyrjä, M. (1998) *Osaaminen tietoyhteiskunnassa*, Helsinki: Sitra 180.
- Rauner, F. (1995) 'School-to-work transition: The example of Germany', prepared for the CERI/NCAL Roundtable on School-to-Work Transition in OECD Countries, Paris, February 2–3.
- Resnick, L. B. (1987) 'Learning in school and out', *Educational Researcher* 16, 9: 13–20.
- Ringer, F. K. (1979) *Education and society in modern Europe*, Bloomington: Indiana University Press.
- ROA (1995) *The labour market by education and occupation to 2000*, University of Maastricht, Research Centre for Education and the Labour Market, the Netherlands.
- Rosenfeld, S. (1998) 'Technical colleges, technology development and regional development', paper on OECD conference: Building competitive regional economies – upgrading knowledge and diffusing technology to small firms, Modena Italy 28–29 May 1998.
- Salminen, H. (2001) *Suomalainen ammattikorkeakoulu-uudistus opetushallinnon prosessina: Koulutussuunnittelu valtion keskushallinnon näkökulmasta*, Yhteenveto-osa ja artikkelit, Opetusministeriön koulutus- ja tiedepolitiikan osaston julkaisusarja 81, Helsinki: Opetusministeriö.
- Scientific Software Development's ATLAS/ti, *Visual qualitative data analysis management model building in education, research & business*, Short User's Manual.
- Selka, R. (1999) 'Trainers and enterprises – Developments in Germany and the European dimension', in Nyyssölä, K. (ed.) *New challenges in the co-operation between education and training, and working life*, Final Report, Ministry of Education & National Board of Education in co-operation with European Commission, Helsinki.
- Sherman, S. (1996) 'Hot products from hot tubs, or how middle management innovate', *Fortune* 133, 8: 165–167.
- Silvennoinen, H. & Naumanen, P. & Hautala, J. (1994) *Työt ja taidot ajan tasalla? Näkökulmia työelämän muutoksiin ja koulutustarpeisiin*, Turun yliopisto, Koulutussosiologian tutkimuskeskuksen raportteja 23., Turku.
- Sipilä, J. & Anttonen, A. (2000) *Suomalaista sosiaalipolitiikkaa*, Tampere: Vastapaino.
- Snellman, L. (1989) 'Sosiaaliset representaatiot á la Moscovici', *Suomen Antropologi* 1: 13–19.
- Spender, J. (1996) 'Competitive advantage from tacit knowledge? Unpacking the concept and its strategic implications', in Moingeon, B. & Edmondson, A. (eds.) *Organizational learning and competitive advantage*, London: Sage.
- Spinello, R. (1998) 'The knowledge chain', *Business Horizons* 41, 6: 4–11.
- Stasz, C. & Brewer, D. (1999) 'Academic skills at work: two perspectives', online <http://ncrve.berkeley.edu/MDS-1193/MDS-1193.html>
- Statistics Finland (1999a) *Education in Finland – statistics and indicators*, in Havén, H. (ed.) Helsinki (<http://www.stat.fi/tk/he/edufinland/>)
- Statistics Finland (1999b) *On the road to the Finnish information society II*, Helsinki: University Press.
- Stenvall, K. (1999) *Opinnäytetyökulttuurit ammattikorkeakouluissa*, Opetusministeriön koulutus- ja tiedepolitiikan osaston julkaisusarja 63, Helsinki: Opetusministeriö.



- Stern, D. (1992) 'Institutions and incentives for developing work related knowledge and skill', in Adler, P. (ed.) *Technology and the future of work*, New York & Oxford: Oxford University Press.
- Stern, D., Bailey, T. & Merritt, D. (1996) 'School-to-work policy insights from recent international developments', NCRVE & Office of Vocational Adult Education, U.S. Department of Education (online edition).
- Stern, D., Stone, J. R., Hopkins, C., McMillion, M. & Crain, R. (1994) *School-based enterprise: Productive learning in American high schools*, San Francisco: Jossey-Bass.
- Sternberg, R. & Okagaki, L. (1990) 'Practical intelligence for success in school', *Educational Leadership* 48, 1: 35–39.
- Sternberg, R. (1998) 'Enhancing education for immigrants: the role of tacit knowledge', *Educational Policy* 12, 6: 705–718.
- Streumer, J. N. (1994) 'School-to-work programs in the Netherlands: Transition from formal and non-formal education to work', prepared for the CERI/NCAL Roundtable on School-to-Work Transition in OECD Countries, Paris, February, 2–3.
- Sweet, R. (1995) 'An overview of school-to-work arrangements in Australia', prepared for the CERI/NCAL Roundtable on School-to-Work Transition in OECD Countries, Paris, February 2–3.
- Sveiby, K. (1999) *Tacit knowledge*. [www2.eis.net.au/~karlerik/polanyi.html](http://www2.eis.net.au/~karlerik/polanyi.html)
- Tilastokeskus: Koulutus ja tutkimus 1991:14, 1992:12, 1993:9, 1994:9, 1995:13, 1996:10, 1997:7, 1998:7, 2000:1, Helsinki: Tilastokeskus.
- TIPAL Tietotekniikan Palveluliiton palkkatutkimus (1999) Kaaviot: henkilöstö/koulutus, henkilöstö/koulutustaso.
- Tulkki, P. (1993) *Työelämän ja ammattikorkeakoulujen yhteys*, Turun yliopisto, Koulutussosiologia tutkimuskeskuksen raportti 18, Turku.
- Tulkki, P. (1995) 'Ammattikorkeakoulu ja työelämä', in: Lampinen, O. (ed.) *Ammattikorkeakoulu – vaihtoehto yliopistolle*, Tampere: Gaudeamus, Otatieto, 193–211.
- Tulkki, P. (1995) 'Ammattikorkeakoulu tiedonsiirron keskiössä', *Korkeakoulutieto* 4: 64–66.
- Tulkki, P. (1996) *Valtion virka vai teollinen työ. Insinöörikoulutus sosiaalisena ilmiönä 1802–1939* (Summary: State service or work for industry? Engineer education as a social phenomenon 1802–1939), University of Turku, Research Unit for the Sociology of Education, Reports 38. Turku.
- Tulkki, P. (1997) *Polytechnic, employment and future of Satakunta*, [Ammattikorkeakoulu, työllistyminen ja Satakunnan tulevaisuus], Satakunnan va. ammattikorkeakoulun seurantatutkimuksen V osaraportti, Satakunta Polytechnic, Application Reports, Series A.
- Tulkki, P. (1999a) 'The birth of engineer education in Finland', *European Journal of Engineering Education* 24, 1: 83–94.
- Tulkki, P. (1999b) 'Two types of engineers in a slowly industrialising Finland', *History and Technology* 16, 1: 33–66.
- Tulkki, P. (1999c) 'Korkeakoulutus ja tulevaisuuden työelämän haasteet', in *Tekniikan oppia ja teollista osaamista*, Satakunnan ammattikorkeakoulu, Tekniikan Porin yksikkö, Helsinki: Edita, 187–201.
- Tulkki, P. (2001) 'Finnish way to the information society: Expanding engineer education', *European Journal of Engineering Education* 26, 1: 39–52.
- Tulkki, P. & Granroth, V. (1999) *Tekniikan oppia ja teollista osaamista*, 100-vuotis-juhlaulkaisu, Satakunnan ammattikorkeakoulu, Tekniikan Porin yksikkö, Helsinki: Edita.
- Tulkki, U. (1999) *Nuorten pajakoulu Porissa*, Porin kaupungin tutkimuksia 109/1999, Pori.
- Tuomi, I. (1999) *Corporate knowledge. theory and practice of intelligent organizations*, Helsinki: Metaxis.
- Tuomisto, J. (1998) 'Arkipäiväoppiminen aikuiskasvatuksen ja elinikäisen oppimisen kontekstissa', in *Arkipäivän oppiminen*, Aikuiskasvatuksen 39. vuosikirja, Gummerus: Jyväskylä, 11–55.
- Työministeriö (1998) *Työvoima 2017*, Työpoliittinen tutkimus nro 184, Helsinki.
- Valkama, H. (1998) *Organisaatio prosessissa*, Acta Universitatis Tamperensis 608, Tampereen

- yliopisto. (English summary: Organisation in process –The strategies and learning of educational organisations in the decade of downsizing in Finland)
- Vartia, P. & Ylä-Anttila, P. (1992) *Kansantalous 2017*, Sitra 125, Sarja B 80, Helsinki: Sitra.
- Virtanen, A. (toim.) (1997) *Armottomat ammattikorkeakoulut – matkalla kehittyneisiin arviointijärjestelmiin*, Korkeakoulujen arviointineuvoston julkaisuja 1:1997, Helsinki: Edita.
- Virtanen, P. (1998) *Innovatiiviset työpajat*, ESR-julkaisut 14/98, Helsinki: Edita.
- Weick, K. (1995) *Sensemaking in organizations*, Thousands Oaks: Sage Publications.
- Wood, S. (1989) 'The Japanese management model. Tacit skills in shop floor participation', *Work and occupations* 16, 4: 446–460.
- Woolcock, M. (1998) 'Social capital and economic development: towards a theoretical synthesis and policy framework', *Theory and Society* 27: 151–207.

## Appendix 1

## List of interviews

Polytechnic	Field(s) of education
Lahti Polytechnic Jyväskylä Polytechnic	<ul style="list-style-type: none"> <li>• design</li> <li>• natural resources</li> <li>• logistics</li> <li>• the Team Academy</li> </ul>
Satakunta Polytechnic	<ul style="list-style-type: none"> <li>• social care</li> <li>• logistics</li> </ul>
Pirkanmaa Polytechnic	<ul style="list-style-type: none"> <li>• social care</li> <li>• natural resources/trade</li> </ul>
Oulu Polytechnic Kymenlaakso Polytechnic	<ul style="list-style-type: none"> <li>• natural resources</li> <li>• logistics</li> </ul>
Pohjois-Savo Polytechnic Seinäjoki Polytechnic	<ul style="list-style-type: none"> <li>• electronics and information technology</li> <li>• natural resources</li> </ul>
Häme Polytechnic Pohjois-Karjala Polytechnic	<ul style="list-style-type: none"> <li>• design/ technology</li> <li>• social care</li> </ul>
Espoo-Vantaa institute of technology	<ul style="list-style-type: none"> <li>• electronics</li> </ul>
17 degree programme leader/ head teacher interviews, 35 interviewed students (in 12 groups)	
<b>II Vocational Education Institutions</b> City of Helsinki Education Department Jyväskylä Educational Federation of Municipalities  City of Tampere Town of Pori  Kalajokilaakso Educational Federation of Municipalities Häme Vocational Higher Education Federation of Municipalities City of Helsinki  The Oulu Region Joint Authority for Vocational Training	<b>Field(s) of education/ institution</b> <ul style="list-style-type: none"> <li>• Vocational and adult education department</li> <li>• ICT project, TOP TEN project (two interviews)</li> <li>• Jyväskylä Institute of Health and Social Care</li> <li>• Hervanta institute</li> <li>• Pori Institute of Technology</li> <li>• Pori Institute of Forestry</li> <li>• Pori Institute of Services</li> <li>• Kalajokilaakso Institute (2 interviews)</li> <li>• Häme Vocational Institute (3 interviews)</li> <li>• Helsinki Institute of Technology</li> <li>• Helsinki Institute of Social and Health Care</li> <li>• Oulu Region Institution for Vocational Training</li> </ul>
16 interviews with teachers and other staff in charge of planning of on-the-job learning periods in secondary vocational education level	

## Appendix 2

# Interview themes

1. Personal particulars of the interviewees
1. Structure and operation of the polytechnic/ joint educational institutions
3. Information on the degree programme
4. Development of the polytechnic system/ VET institution
5. Internal co-operation and development of educational institution (e.g. new forms of instruction, mobility of teachers and students)
6. Working-life relations (on-the-job training, theses in co-operation with employers, providing services for employers and companies)
7. Internal and external research and development projects
8. Know-how challenges of working life
9. Student placements in working life after studies
10. Status of the educational institutions as a regional actor

## Appendix 3.

### An example of ATLAS/ti analysis

HU: amk-opettajien haastattelut  
File: [d:\anu\atlas\koodatut haastattelut\amk-opettajien haastattelut239]  
Edited by: Super  
Date/Time: 2001/03/27 - 13:58:28

-----  
5 quotation(s) for code: TYÖELÄMÄN SUHT. AMK-OPISKELIJOIHIN  
Quotation-Filter: All  
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P4: maas1.txt - 4:43 (543:549) (Super)  
Media: ANSI  
Codes: [työelämän suht. amk-opiskelijoihin]

V: Silloin kun he menee töitä hakemaan, minä tiien se, ja joskus jopa harjoittelupaikkoja, niin tommoset ennakkoluulot on kovin suuret, kun tämä on niin perinteisestä agrologi-metsätalousinsinööri-hortonomi-tommosesta poikkeava taa heidän ainakin nämä koulutusohjelmat, ennemminkin nää koulutusrakenteet. Ennakkoluulot on hirveen suuret ja noi opiskelijat sanoo, että pitää tunti suurin piirtein selvittää, että mikä tää koulutus on. Minun käsittääkseni nyt sitten ketä sinne on sijoittunut, niin ne on suhteellisen hyvin menestynyt.

P 9: sos1.txt - 9:48 (1008:1014) (Super)  
Media: ANSI  
Codes: [työelämän suht. amk-opiskelijoihin]

K: Mitenkä koet, että kuinka tunnettu tää uusi ammattikorkeakoulujärjestelmä niin kuin työelämän edustajille tällä hetkellä on, että tietääkö he niin kuin tästä?

V: Huonosti. Että siinä on kyllä iso työmaa, että koko ammattikorkeakoulujärjestelmä ja sitten ma en tiedä oisko ihan erityisesti, mutta ainakin kyllä hyvin tuntematon on tää meidän. Että kyllä sitä saa niin kuin koko ajan selvittää ja se, siinä tarvittais semmosia ihan niin kuin isompiakin manööreveita, että miten se tulis tunnetuksi.

P14: elektro1.txt - 14:79 (1436:1442) (Super)  
Media: ANSI  
Codes: [työelämän suht. amk-opiskelijoihin]

V:...saadaan jopa noita opiskelijoita koulutettua ihan. Ja ne menee, niistä ollaan tyytyväisiä, että opiskelijoiden tasoon ollaan tyytyväisiä ja.

K: Tuolla työelämässä?

V: Työelämässä. Että kyllä se sillä tavalla näyttäis toteutuneen. Mutta on siellä sitten niin kuin parantamisen varaa on tietysti joka paikassa.