



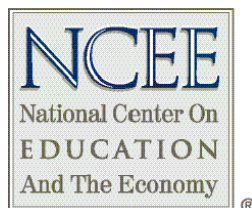
# FINLAND EDUCATION REPORT

# **Finland Education Report**

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## Finland Education Report

With just over 5 million people, Finland is Europe's largest archipelago and home to Nokia. When Finland gained independence in 1917, Finland was one of the least advanced economies in Europe. Today, it is one of Europe's richest and most successful nations. In fact, according to the World Economic Forum, Finland has the world's most competitive economy. One of the secrets of Finland's success is a high level of public investment in education and training. Finland's education system is one of the best in the world and generates people with the right skills to succeed in a modern knowledge economy. In a study analyzing the education of children in OECD nations, Finnish children had the highest overall scores. A massive 65 percent of school leavers in Finland go on to higher education. There are no fees for tuition. The Finns regard investment in new technology and innovation as a political priority. That's why Finland spends a higher proportion of its national income than any other nation on research and development, enabling new technologies to be brought on stream faster. This has helped to make Finland a world leader in technological innovation. Finland's economic success has allowed the country to invest more in high quality public services and a generous welfare system, which tackles poverty and inequality. Finland has the lowest level of child poverty in the world. Three percent of Finnish children grow up in poor households. Finland is one of Europe's modern success stories. (Finnish Marketing Material, 2005)

5.2 million people live in Finland. Finland is both the same size geographically and in population as Arizona. Southern Finland, particularly the area around Helsinki, is the most densely populated area of the country. The official language is Finnish, however 6% of the population speaks Swedish. Finnish is very different from all other European languages including Swedish. The majority of Finns are Lutheran (85%).

In the last fifteen years, Finland's students have performed at world-class levels on all of the international tests comparing student performance.

Finland has made it a priority to provide quality daycare at reasonable prices to families with children under school age. A majority of Finnish children live in two-earner families and mothers of small children generally work full-time. In 1996, it became a right that all families with under school age children are able to attend locally-run daycare centers and, if they prefer private childcare, they receive an allowance for that care. Prior to starting school, 98% of Finnish students attend some form of pre-school in schools or day-care centers. Since 2001, all six-year-olds have had the right to free pre-school education.

For over fifty years, Finland has provided free compulsory education including one hot meal per day to its children. Children begin compulsory education at age seven, one year later than most industrialized countries. School is compulsory until age 16 or after nine years of schooling. At this point students attend either general upper secondary school or vocational upper secondary school. General upper secondary school lasts for three years and leads to university, typically a five-year program of study ending in a Masters Degree. Vocational school is also a three-year program leading to the polytechnic, typically a three-year course of study ending in a BA. It is possible for vocational students to go to university after some extra study. This, however, is not the norm.

	<b>Students</b>	<b>Institutions</b>	<b>Degrees Annually</b>
<b>Compulsory Education</b>	596,000	3,953	
<b>General Upper Secondary</b>	131,000	441	
<b>Vocational Upper Secondary</b>	140,000	290	
<b>Polytechnics</b>	120,000	29	
<b>University</b>	163,000	20	16,000

(Education in Finland, 2003, National Board of Education)

### **Pre-School**

While pre-school has been available free since 2001, children do not have to attend although most do. They spend approximately four to five hours per day in school focused on play and preparation for primary education. Municipalities are required by law to fund pre-school along with the national government.

### **Primary Education**

Primary education begins at seven for historical reasons. These included the long distances to travel to school, the small size of the population in many areas, and parents who did not want to send their children away from home at such an early age. In recent years, there has been a debate on changing the starting age of schooling, but there was consensus not to change the age. All students attend nine years of school where instruction during the first six years is usually taught by a class teacher and the last three years by subject-specific teachers. At the primary level, the faculty divides subjects such as art, music and foreign language up among themselves by identifying which teacher is best at which subject. Finnish primary schools can be very small – with as few as ten students – to a maximum of three hundred students. Most classes have twenty-five students in them.

The national government determines the objectives for education and the number of hours for each subject. All students study the same core subjects with similar content. Learning usually occurs in heterogeneous groups. Called the ***National Core Curriculum for Basic Education***, this national framework defines the objectives, describes the core content that must be taught, and describes good performance in each of the subjects taught in schools. These “national standards” are identified not for each grade, but at transition points in schooling – e.g., for grades 1-2; grade 3-5; grades 6-9 and also criteria for a final subject assessment in Grade 8.

### **National Standards by Subjects and Grade for Basic Education**

	1-2	3-5	6-9	Grade 8 Assessment	Comments
Mother Tongue and Literature	√	√	√	√	
Second National Language	√	√	√	√	Typically Swedish; Either the second national language or

					foreign language must be a core subject. If core, starts in grade 3. If optional in grade 7.
Foreign Language	√	√	√	√	Typically English
Mathematics	√	√	√	√	
Environmental & Natural Sciences	√	√			Ends in grade 4
Biology			√	√	Starts in grade 5
Geography			√	√	Starts in grade 7
Physics			√	√	Starts in grade 5
Chemistry			√	√	Starts in grade 7
Health Education			√	√	Starts in grade 7
Religion	√	√	√	√	Lutheran or Orthodox
Ethics	√	√	√	√	
History			√	√	Starts in grade 5
Social Studies			√	√	Starts in grade 7
Music	√	√	√	√	
Visual Arts	√	√	√	√	
Crafts	√	√	√	√	
Physical Education	√	√	√	√	
Home Economics			√	√	Starts in grade 7

The chart above shows that the majority of Finnish students must take Finnish, Swedish, English, Math, General Science, Religion, Ethics, Music, Art and PE beginning in the earliest grades and add Biology, Geography, Physics, Chemistry, Health Education, Social Studies and History by the time they reach grade 5 or 7 (our grades 6 and 8).

All students can spend twenty-percent of their time in school taking optional subjects. These may include foreign languages, physical education, art, music, more in-depth courses or applied studies in the core subjects. The national government defines the classroom hours required for each of the subjects listed above by grade (see *Distribution of Lesson Hours in Basic Education*, page 298, National Core Curriculum for Basic Education, 2004). Most children start English in grade one, but are required to start by grade three. Schools can specialize in these particular subjects to distinguish themselves from other schools.

### **More on the National Core Curriculum**

While the national government defines the core subjects, the content to be covered, the performance requirements and instructional hours for each subject at each grade level, municipalities may decide to develop or adopt a specific curriculum for a subject or allow the schools to develop their own curriculum based on the national standards. Some curriculum for some subjects may contain regional, municipal and school sections. The National Board of Education recommends that schools and municipalities consider local conditions (the economy, the culture) and prepare curriculum in cooperation with experts from the field. Each municipality must approve a school's curriculum. Parents can appeal any problems to the courts. Each year, the National Board of Education takes a

sample of local curriculum and writes reports on the relationship of the curriculum to the national standards. Any consequences for non-compliance are at the municipal level. Often schools and teachers develop their own classroom curriculum based on the national standards. Text books used by schools are typically developed by the four or five major Finnish publishers, but teachers and schools choose materials and use additional materials offered by the municipality or that they create themselves. According to an official at the National Board of Education, it is in the publisher's best interest to follow the guidelines set out in the National Core Curriculum.

### **Lower Secondary School**

Students move on to lower secondary school at age twelve or thirteen to begin grade seven. Most lower secondary schools average 250 students per school. As in primary school, there is no tracking. Students that are behind receive remedial education. According to officials in the Board of Education, parents and the students ask for this help and there is no stigma. Teachers also identify students having problems and arrange for extra help during or after school. There is no final exam covering all of basic education.

As you can see below, the mathematics content required in lower secondary school (our grades 7-10) is comparable to the average American high school graduate's course of study.

### **Core Mathematics Content by Grade**

Grade 1-2	Gr. 3-5	Gr. 6-9
Numbers & Calculations	Numbers & Calculations	Thinking Skills & Methods
Algebra	Algebra	Numbers & Calculations
Geometry	Geometry	Algebra
Measurement	Measurement	Functions
Data Processing & Statistics	Data Processing, Statistics & Probability	Geometry
		Probability & Statistics

(National Core Curriculum for Basic Education, 2004)

All students in basic education and general upper secondary school receive counseling in how to study, career planning and how to choose their next phase of education. Students with learning problems must receive remedial education and the government is required to provide education to the severely handicapped. Students that adequately perform in all of their graded courses in basic education receive a basic education certificate.

### **Upper Secondary School**

Once compulsory school ends, students can choose between general and vocational upper secondary school. Half choose general upper secondary with some of these schools specializing in certain subjects similar to compulsory schools. After leaving compulsory school, students can choose any educational institution in the country to continue their

studies. This is possible because a student's home municipality is required to cover upper secondary or vocational education costs not covered by government subsidies. Municipalities fund 43% of upper secondary or vocational education while the state funds 57%. There are no fees and both lunch and healthcare are provided free-of-charge. Students do buy their own books. Materials used by teachers in upper secondary school are developed by publishers. Schools, and at times, municipalities, choose textbooks. Students buy their books from the school bookshop.

Students apply to upper secondary school and schools choose students based on their academic record including grades and test scores. There are no teacher recommendations. As an aside, the grading scale in lower secondary school begins at 4 points and ends at 10 points with 10 as the best score. The highest achieving students have "5 10's".

Upper secondary schooling in Finland is more flexible than in most countries in terms of how classes are organized and sequenced as well as the amount of student choice available. There are no specific year-long classes so students can graduate in less than or more than a three-year period. The government requires that students complete a minimum of 75 courses (38 hours each) of which 47-51 courses are compulsory and 10 are specialized subjects (more in-depth than compulsory courses) over three years. Each course is assessed by the teacher and graded by the teacher. Students adequately performing in each of their courses receive an upper secondary school leaving certificate noting their grades and scores on the courses in their individual syllabus.

However, this flexibility is directed again by a set of national curriculum standards called the **National Core Curriculum for Upper Secondary Schools**. Similar to the national core curriculum standards for basic education, these contain objectives and core content topics for each compulsory and specialization course. They do not, however, describe good performance. An example of the compulsory courses in mathematics at the upper secondary level follows:

**Compulsory Mathematics Courses, Upper Secondary School**

<b>Advanced Syllabus</b>	<b>Basic Syllabus</b>
Functions and Equations	Expressions & Equations
Polynomial Functions	Geometry
Geometry	Mathematical Models I
Analytical Geometry	Mathematical Analysis
Vectors	Statistics & Probability
Probability & Statistics	Mathematical Models II
The Derivative	
Radical & Logarithmic Functions	
Trigonometric Functions & Number Sequences	
Integral Calculus	

(National Core Curriculum for Upper Secondary Schools, 2003)

From the example above, it is clear that Finnish high school students are required to take both more types of mathematics courses and more rigorous mathematics than most U.S. high school students. In fact, by completing the advanced syllabus in mathematics, Finnish students have completed math coursework similar to that of a U.S. college math major.

In addition, the government defines the minimum number of hours required in each compulsory course for upper secondary school students.

### **The Matriculation Exam**

While teachers and schools are responsible for assessing student performance from compulsory through upper secondary school, the matriculation examination, which concludes upper secondary school, is organized and scored by a national examination committee appointed by the Ministry of Education. At the end of upper secondary school, students take a national matriculation exam that tests their Mother Tongue, and three subjects chosen from their second national language – Swedish or Finnish – a foreign language, math, or general studies (history, geography, religion, chemistry, biology, physics, psychology, philosophy). Most students choose to take their exam in three successive periods, e.g., in October of the third year with English, and the remainder by the spring. If a student fails their exam, they can try again twice. If a student is unhappy with their results on an exam, they can try again once more and use the higher score. This is often done. Students receive a certificate of matriculation that makes them eligible for higher education.

In 2007, the test for the Mother Tongue will be revised. It will include writing an essay based on topics that the student can choose from as well as another essay based on materials given to the student. In 2006, the general studies test will be changed. At present, students are given one test with many questions covering all of the different subjects and the student chooses a certain number to answer. The revised test will include subject-based tests and students will have to choose a subject and answer all of the questions. Students can answer questions in a maximum of six subjects. The mathematics portion of the matriculation exam is not being changed. The test is comprised of ten assignments or tasks taken from all subjects within mathematics required in the core curriculum. The exam in a second national language and a foreign language includes a reading, listening, comprehensions, grammar, vocabulary and essay sections.

The key to this flexible system of upper secondary school is the school counseling system. Most schools have between 100 and 800 students attending. The average upper secondary school is 400 students. Each counselor works with approximately 80-100 students. At the beginning of the school year (mid-August), students spend the first week working with their counselor to plan their program of study. There are five to six periods per year, not semesters or quarters. Most subjects are offered in modules that make up 38 lessons. Students and their counselors organize the modules over a three-year period. It is the school that has the challenge of organizing classes in order to allow all students to complete their studies in three years. Some do not finish on time, but continue to a fourth



year. Other benefits to this flexible system are that there are no permanent groups of students and independent study is possible as an entire course or part of a course. Because the system requires efficient student counseling, the Finns worry that with the fall-off in the number of students entering school as the birth-rate drops, there will not be enough money to support what they already consider a shortage of counselors at this time.

### **Teachers**

Initial teacher education is the responsibility of universities. There are 8-10 teacher education departments across the country. Universities use the National Core Curriculum standards to build their teacher training programs. Since 1974, all teachers at all levels are university educated. All have master's degrees that take from five to seven years depending on the subject area specialty. Most class teachers (primary school teachers) take a five year program and leave university with a Masters in Education. Subject teachers leave after six or seven years with a Masters in arts or science. It is very difficult to be accepted into a teacher education program in Finland. There are far more applicants than vacancies. According to officials in the National Board of Education, "Finnish teachers are the best and the brightest because universities are able to choose the very best to high standards of entry." In addition to grades in upper secondary school and scores on the matriculation exam, universities develop entrance exams. Those accepted are at the top of their class, leave university with a masters degree and then apply to the municipality of their choice for a teacher position. While pay is not high – comparable to a civil servant's pay for compulsory school teachers and above that for upper secondary school teachers – the pay differential throughout the country is relatively flat and, therefore, not a major disincentive for entering the teaching profession. There are far more candidates than teaching positions in the big cities in Finland. Most new teachers go out into the countryside and teach for three years or more before trying again to get a position in an urban school. This means that highly qualified teachers are teaching in all of Finland's schools. (See attached *Attracting Teachers* report for more on teachers and teacher education in Finland)

### **Vocational Education**

Students who choose vocational upper secondary school attend a three year program that includes a minimum of six months of on-the-job-training. Forty-five percent of Finnish students work toward a vocational qualification.

In the early 1990s, in the midst of a major economic downturn, the Finnish Government began a reform of its vocation education system including basic vocational education and post-secondary vocational education and training. The reform had two major goals: to increase the number of Finns attending higher education by offering a shorter and cheaper alternative pathway to higher education and to upgrade and consolidate vocational education institutions at both the basic and post-secondary levels. Over the last decade, the Finns created the 'Ammattikorkeakoulut' AMK (polytechnics), higher education institutions created by combining many of the 215 former vocational schools and colleges. By 2004, two-thirds of those entering higher education are in the polytechnic. Between 1993 and 1998, the number of students in polytechnics tripled, and

the total in universities nearly doubled in the same five-year period (Blomström, Kokko & Sjöholm 2002, p.18). Since 1999 all three-year degree level vocational courses have had to offer six months' work experience to every student (United Nations Development Program 2001, p.85).

A recent OECD review has noted: "The polytechnic policy in Finland has been remarkably successful. There is general acceptance of the existence and value of a sector of higher education with a distinctive educational mission, though controversy exists about the future development of the sector. In general, the programs are relevant to working life, innovative, and well received by employers and students ... There is a substantial consensus in Finland for provision of higher education different from that traditionally provided by universities, and directed towards the needs of working life." (OECD 2003b, p.133)

### **Upgrading Vocational Education**

Vocational education was divided into separate fields, each with its own schools and institutes. These were often very small and there was little co-operation between fields of study ... The Finnish vocational education system was difficult to describe and grasp, and in particular there was little understanding of the role of post-secondary vocational education and its standing. (OECD 2003b, p.50) The reforms involved setting up new institutions in the form of polytechnics, upgrading the qualifications of staff and the engagement in research and development. The mission of the polytechnics states that they are 'to engage actively in the development of working life and to produce relevant new knowledge' (OECD 2003b, p.110). Other goals of the reform process were to set up institutions in regional locations to promote regional development (OECD 2003b, p.110), improve the operations and entrepreneurial capacity of small and medium sized enterprises (p. 124), and to take part in basic research.

The majority of eligible school leavers in Finland now elect to go to a polytechnic rather than a university. This, together with higher completion rates than universities and high post-graduation employment, indicates strong acceptance of the reforms among both young people and employers.

### **Adult Education and Training (Mary's section here)**

Finland is one of the leading promoters of continuing education in Europe. Finland has more adults engaged in continuing education programs at the tertiary level (200,000) than young people enrolled in traditional degree courses (150,000).

### **The Central Government**

The legislative framework for and general principles of education policy are enacted by Parliament. The Government, the Ministry of Education and the National Board of Education are responsible for implementing this policy at the national level.

**The Ministry of Education** prepares education legislation and makes the necessary decisions for submission to the Government. The purview of the Ministry of Education includes education and research: compulsory school, upper secondary school, vocational

schools and colleges, and universities. The Ministry is also responsible for culture, church, youth and sports affairs. The Ministry of Education has two ministers: the Minister of Education, responsible for education and science; and the Minister of Culture, responsible for culture, church, youth and sports affairs. The Ministry of Education is divided into an education and science policy section, a culture section and administrative and staff functions.

**The National Board of Education** is the agency responsible for the development of education goals, content and instructional methods in compulsory school, upper secondary school, vocational training and adult education. It develops and approves the national guidelines for curriculum design and is responsible for evaluating the Finnish education system. It also assists the Ministry of Education in preparing education policy decisions. The National Board of Education is managed by a Board of Directors, whose members are education experts, representatives of the social partners, municipal officials and teachers. The National Board of Education is divided into a general education section, a vocational education section, an adult education section, a Swedish-speaking education section, a planning group and administrative and service functions.

There are no other central administrative units in the education sector in Finland. The Government and the Ministry of Education is responsible for establishing new secondary and higher education institutions and determines which sector and region offers new forms of vocational education. Feedback on the work of the education system is collected through statistics and targeted evaluations.

### **Regional and Local Governance**

Finland is divided into twelve provinces. Each province has a provincial government headed by a governor, and a state department or unit for the administration of schools and culture. In the past few years, the duties of the provincial governments have decreased; they now manage only the national student selection system within the province, allocate vocational training student capacity among the colleges in the province and allocate certain extraordinary Government subsidies. Provincial involvement in education administration continues to decrease; the goal is to create a two-tier administration system involving only the state central administration and local authorities. Legislation (1994) has shifted regional planning and development to the regions themselves, managed by Regional Councils whose authority is based on the municipalities that make up their respective regions. Regional development is being transferred from the national parliamentary decision-making process to the municipal level.

Local administration is managed by the municipalities, which are self-governing and have the right to collect taxes. There are about 440 municipalities in Finland. Elected Municipal Councils run municipalities and appoint an executive board and several advisory boards. Each municipality has at least one School Board appointed by the Municipal Council. Most upper secondary schools and compulsory schools are maintained by the municipalities. The municipal school authority can also be responsible for adult training centers, night schools and vocational institutions. State owned and privately owned schools are supervised by the central administration, not municipalities.

In Finland, a municipality is required to organize compulsory school education for all children living within its borders or to ensure that children of school age can receive comparable teaching in some other manner. Upper secondary schools, vocational schools and colleges can be maintained by municipalities, intermunicipal authorities (cooperation between municipalities for certain schools), or private organizations or foundations, subject to government approval.

There are only 24 private comprehensive schools in Finland (0.5%). These are mainly maintained by internationally recognized educational organizations. Only one school is maintained by a religious organization. About 54% of all vocational institutions are maintained by municipalities (usually by two or more municipalities jointly); 34% are state owned and 12% are private.

Each school can and usually does have a managing board where teachers, non-teaching staff, students and parents are represented. The main tasks of the managing board are developing the work of the school and promoting cooperation inside the school and between the school, parents and the local community. In each school there is also a student union which, among other things, elects the student representatives to the managing board. Each municipal authority decides on the distribution of responsibilities between the municipal administration and the managing board of a particular school. Municipalities can coordinate school administration and two or more schools can have a managing board in common.

Vocational schools and higher vocational education institutions usually have similar managing boards (parents are not represented), but they tend to be more independent and powerful. State and privately run vocational schools always have one. In addition to managing boards, as a rule vocational institutions have one or more advisory boards to promote training and cooperation between school and working life. These boards consist of representatives from the school, its teachers, the main social partners in the relevant fields and other experts.

Curriculum design in universities and polytechnics is guided solely by legislation. Teaching materials are not inspected or defined in advance in Finland. The decision for choosing teaching material usually rests with individual teachers.

All universities are maintained by the State. They enjoy a high degree of autonomy in organizing teaching, research and other internal matters. At the university level it falls within their autonomy to found advisory bodies. The decision-making bodies are regulated in Acts and Decrees and there is separate legislation about each university. The legislation varies from university to university but there are generally decision-making bodies at three levels: central administration, faculty (by science) and institute (by subject) levels. At each level at least professors, other personnel and students are represented.

## **Inspection**

There is no separate school inspectorate. National guidance of the education system is at the discretion of the Government and the Ministry of Education.

### **Financing**

Responsibility for education provision, construction and financing is divided between the State and local authorities; universities are financed directly from the state budget. A separate Act stipulates the distribution of financial responsibility for comprehensive schools, upper secondary schools and vocational education. The principles of public financing are the same for all levels.

Local authorities and other parties maintaining schools and institutions are entitled to government grants for the start-up and operating costs of educational institutions in addition to their own funding. Government subsidies are calculated to cover from 25% to 70% of start-up costs and 45% to 60% of operating costs. The main factors affecting government subsidies are the number of pupils and the financial capacity of the municipalities concerned. Government subsidies are not earmarked for any particular costs. Teachers' salaries are paid by the school or the owner of the school, usually the municipality.

The Government supports secondary and university-level students through grants, study loan guarantees and interest subsidies.

### **Private education**

Non-subsidized private education is practically non-existent in Finland. The general principles of government subsidies and curricular guidance also apply to privately maintained schools.

### **Challenges Ahead**

The Finnish education system provides an excellent basic education to the majority of its children at a cost close to the international average with a very high percentage of young people entering higher education. To continue to compete in the global economy, government and non-government education experts in Finland note a number of areas in need of improvement. These include:

- Increase foreign language study by offering new languages in comprehensive schools;
- Promote critical thinking and problem-based learning in the classroom;
- Update vocational programs to match the needs of the knowledge economy;
- Open the university to allow foreign expertise in and cooperate more with industry;
- Compress the time it takes to finish tertiary degrees and match those degrees with the needs of the economy.

OECD Directorate for Science, Technology and Industry

## **Developing Highly Skilled Workers: Review of Finland**

March 2004

Finland scores at the top of OECD countries on measures of the development and use of highly-skilled workers, including educational attainment, female participation in the labor force, and upskilling through continuous education and training. Rapid growth and extensive structural change in the 1990s necessitated a retooling of Finland's workforce which was achieved with relative ease. The information and communications technology (ICT) sector now dominates the economy, accounting for 30% of GDP and almost 12% of employment, and has contributed to recent productivity growth. However, rapid aging of the population and further structural evolution of the economy towards technology-based sectors present future challenges in fulfilling industry needs for skilled workers.

There is concern whether the higher education system and labor market policies are able to match supply and demand for worker skills. Finland's population is expected to retire earlier and more rapidly than in other OECD countries. Changes in industrial structure and within sectors will lead to higher demand for technical workers and researchers. Immigration of skilled workers into Finland is minimal, and there is the prospect of increasing brain-drain from the country as well. Although women are highly educated and comprise a large share of the labor force, career choices and wage gaps have combined to reduce their contribution to productivity. And adverse attitudes towards entrepreneurship and business failure have tended to depress start-ups from research and reduce mobility from the public to the private sector.

Rigidities in the production and use of highly-skilled workers persist in Finland. The dual system of higher education tends to track students into occupational streams, one for vocational studies often leading to industry jobs and the other for university studies which tend to result in public sector positions. There is little cross-over between the two systems. Finland has a large public sector with small but increasing outsourcing to business. Although cooperation with the social partners has created effective worker training provisions, collective bargaining has contributed to a rigid wage structure. This has dampened the role of wage signals in allocating resources. More flexibility is needed in higher education, public sector activities and wage-setting to enhance the responsiveness of these institutions to changes in industry demand for skilled workers. A summary of progress and recommendations concerning policies for highly-skilled workers in Finland is given in Table 1.

Finland has one of the highest levels of educational attainment and shares of female tertiary graduates among OECD countries (Figure 1). Evaluations and international comparisons show the Finnish higher education system to be comprehensive, relatively well-resourced, cost-effective in terms of expenditures per student, and a leader in terms of the quality, innovativeness and learning outcomes of studies (OECD, 2001b). Major reforms were undertaken in the 1990s to increase the responsiveness of education and training structures to changing labor market demands. A system of polytechnic institutes (Ammattikorkeakoulu) (AMK) was created to offer more practical vocational and occupational training. This dual system of higher education now comprises 20

universities and 31 polytechnic institutes. A recent OECD review attested to the success of the polytechnic institutes, which accounted for more than 58% of all new tertiary education students in 2000 (OECD, 2003c).

Finland offers places in higher education to 65% of the average age cohort, with the result that educational attainment is among the fastest-growing in the OECD area (Figure 2). During the 1990s, the number of persons with tertiary education increased on average by 3% per year, with females registering the highest growth. Those who completed a doctoral degree rose by 7% per year in the 1990s, with twice as many doctoral theses approved in 2001 as in 1991. Finland has specific targets for enrolments for different types and levels of tertiary education. In 2004, 25 000 places will be offered in the polytechnic institutes and 19 000 in universities, which is a significant increase on past enrolments. For 2008, the Ministry of Education is aiming for 15 000 masters degrees and 1 800 doctoral degrees granted in universities and 2 000 postgraduates enrolled in the polytechnic institutes (MOE, 2002c).

Finland's dual system of higher education has resulted in two distinct types of tertiary graduates as well as a profile of earned expertise somewhat different than the OECD average (Figure 3). Although they offer education in a wide range of fields, the prominent role of the polytechnic institutes has led to a higher share of graduates in engineering-related fields than in other OECD countries. The universities, with their large female enrolments, graduate a higher proportion of students specialised in areas such as health and welfare. The universities are also responsible for training teachers and others taking up public service. In 1999, over half of the previous year's university graduates were working for central and local government, while 75% of employed polytechnic graduates had jobs in the private sector. Polytechnic graduates were also more than twice as likely to become entrepreneurs (OECD, 2001b).

In OECD comparisons, Finland has evidenced low rates of return to higher education generally due to the long duration of university studies (Blondal et. al., 2002). Since it is not compulsory to obtain an undergraduate Bachelor's degree, most university students are accepted directly into Master's degree programmes. The median time spent at university is thus six years, while the average age of an university graduate is 27 (MOE, 2001). At universities, students tend to take too long to complete their studies, while there is no tradition of mature adults entering university later in life. Most polytechnic graduates obtain a degree in 3-4 years, with postgraduate polytechnic education now being offered on an experimental basis. Although attempts have been made to shorten the length of university studies, e.g. through reductions in the duration of financial aid, the time spent obtaining a university degree decreased by less than one year in the past decade. The Ministry of Education has recently issued an action plan to promote the completion of degrees within fixed time periods in order to reduce the time taken to graduate and to increase completion rates (MOE, 2003).

The dual system of education may be leading to a general over-skilling of the Finnish population as well as mismatches between educational output and the needs of the labour market. Although the international trend is to eliminate formal differences between

higher education degree programmes, there remains in Finland a separation between the programmes and degrees of universities and polytechnic institutes, with little student mobility between the two. For example, it is rare that a polytechnic graduate would attend a university for a higher degree or that university students would attain more practical skills through study at the polytechnic institutes (OECD, 2003c). From the viewpoint of industry, this system may be producing an oversupply of people with university education and an insufficient number of workers with the right combination of technical and professional skills (e.g. engineering and business).

Although higher-skilled workers are more likely than the lower-skilled to find employment in Finland, the country still has a relatively high unemployment rate for those with tertiary education compared to other OECD countries (Figure 4). In 1999, 48% of the workers recruited by Finnish industry had tertiary degrees from universities and polytechnic institutes. In 2001, about 25% of those employed in manufacturing and over half of those employed in the information sector held tertiary degrees. Almost half of those employed in public administration, social services and financial services also hold tertiary degrees. The increasing difficulties for those with tertiary degrees in finding employment suggests that many workers may be overqualified for their jobs or mismatched to the skills needed by industry.

As Finland's industrial structure evolved in the 1990s, the greatest surge in labor demand has been in the information industry. An economy based largely on forestry and natural resources has become one with 30% of GDP related to information technology. Finland has the highest share of employment in the information and communications technology (ICT) sector among OECD countries (Figure 5). Although ICT enterprises account for less than 7% of all firms in Finland, they play a prominent role in overall employment. In the late 1990s, more than one-third of new manufacturing jobs involved production of ICT goods, primarily communications equipment (mobile phones) followed by computers and electronic components. ICT services (programming, design, digital content, Internet) account for over 60% of employees in this sector, and this share is increasing due to declining equipment prices as technology advances. According to the information industry, demand for ICT workers in Finland will double by 2010, while demand for ICT skills will increase in other sectors as well (FFEEI, 2002).