# The Competitiveness Yearbook Czech Republic 2005 – Analysis

## QUALITY OF HUMAN RESOURCES



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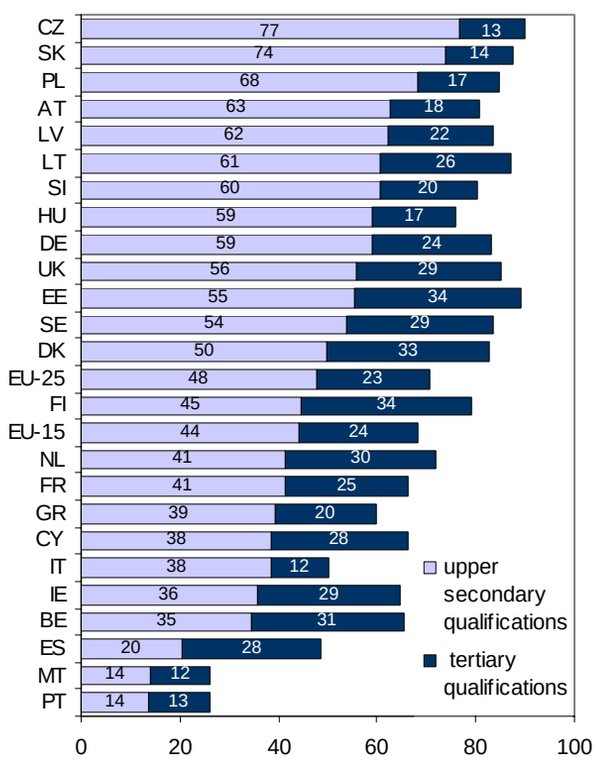
## 1. Knowledge and flexibility of population

It is only an educated and flexible population that is able to create, share and use new findings that are necessary for the economy to become knowledge-based. The educational attainment of the population is most frequently expressed in terms of the proportions of groups with particular qualifications in the overall population. Apart from this indicator the level of literacy in adults and occupational and geographical mobility are also subject to analysis.

### 1.1 Education structure and educational mobility

The education structure of the population reflects the proportions of groups with various qualifications in the overall population aged 25-64 (see Table 1A). In terms of economic development, the representation of groups with more advanced qualifications is particularly important. An educated population is capable not only of generating and applying new findings, but it is also technologically more advanced, demands more sophisticated goods and services and, in this way, stimulates innovation in enterprises.

**Figure 1: Share of population aged 25-64 with upper secondary qualifications and share of population with tertiary qualifications (2005, in %)**




Source: EUROSTAT (2005c).

As part of the Lisbon strategy the European Union aims, as one of its objectives, to ensure that, by 2010, 80% of the population aged 25-64 have at least secondary education. As Figure 1 shows, in 2005 nearly 71% of the EU-25 population and 68% of the EU-15 population aged 25-64 held at least upper secondary qualifications. The benchmark set as part of the Lisbon strategy was exceeded by 12 EU-24 countries as early as 2005 (data for Luxembourg is not available). The CR is one of them and it has been steadily showing the highest proportion of the population in this age group who have at least secondary education. In 2005 it was almost 90%.

However, in terms of the proportion of the population with tertiary education the CR is far below the EU-25 average. Only 13% of the Czech population had tertiary qualifications as compared to the EU average of 23%. The situation is gradually improving as the capacity of both public and private higher education institutions and tertiary professional schools is increasing. Over the last eight years (1998–2005) the proportion of the population which completed tertiary education in the CR increased from 10.6% to 13.1%, i.e. by 2.5 pp. Unfortunately this has not reduced the gap between the CR and the EU-25 average. On the contrary, the gap has further widened. In 2000 the difference was 8.5 pp and in 2005 it was 9.7 pp. The development of shorter study programmes is of particular importance in this respect as developed EU countries are far ahead in terms of their supply. When making international comparisons it is also necessary to take account of the differences in education systems. It is typical of the education system in the CR that the vocational specialisation which, in other countries, young people mostly achieve at tertiary level, can be acquired as early as upper secondary level.

An educated workforce is expected to contribute more towards GDP. The relationship between the proportion of the workforce with tertiary qualifications and the level of GDP per capita in 2004 is illustrated in Figure 2. In the first quadrant there are countries where the proportion of people with tertiary qualifications is lower than the EU-25 average and GDP per capita is above the average. This favourable relationship is characteristic of Austria and Italy. The second quadrant shows countries, including the CR, which have a lower proportion of the workforce with tertiary education and a lower GDP. If the workforce with tertiary qualifications in the CR was to contribute to GDP development, as is the case with the EU-25 average, then GDP per capita would have to reach 12.6 thousand EUR, i.e. 1.5 times than the present level (8.5 thousand EUR).

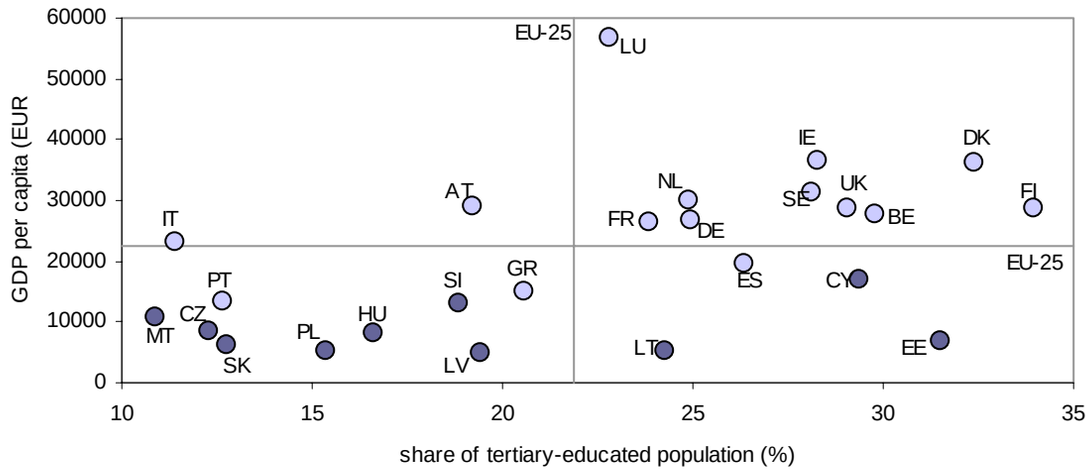
The situation in the countries in the third quadrant is the least favourable in terms of the relationship under review. Although the proportion of groups with tertiary qualifications is above the average, GDP is below the average. This is the case with Estonia and Cyprus. The fourth quadrant includes countries with an above-average proportion of the workforce with tertiary qualifications and GDP per capita higher than the average. These are exclusively the old EU countries.

In terms of international comparisons, the low proportion of the population with tertiary education in the CR is offset by a high proportion of people with upper secondary education and a very low proportion of people who have only completed basic education. In 2005 people with only basic qualifications accounted for just 10% of the population in the CR while the EU-25 average was three times the figure (29%).

In the CR the low proportion of people without qualification is related to the traditional trend to pursue education at upper secondary level and, in particular, to the structure of educational provision which attempts to meet various study ambitions. Most young people continue studying upper secondary programmes of some type and complete

their studies successfully, although many transfer to a less demanding programme or school. However, in recent years the proportion of drop outs from secondary education has slightly increased.

**Figure 2: Population with tertiary qualifications and GDP per capita**




Source: EUROSTAT (2005c).

## Educational mobility

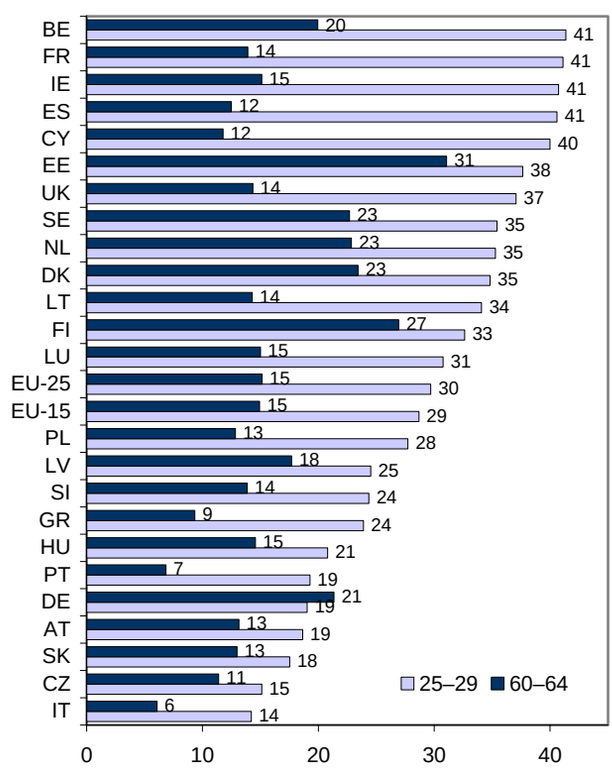
Educational mobility is analysed by comparing the proportion of tertiary educated in the 25-29 age group with that in the 60-64 group. The reason is that it is important for the development of knowledge-based economies that those entering the labour market have higher qualifications than those leaving the labour market. Room for educational mobility is affected to a large degree by the proportion of individuals with tertiary education in the 60-64 age group as this proportion comes up against a certain natural limit which can only be overcome by lowering the demand for a high quality of tertiary education.

The Czech Republic, although it is among the countries with the lowest proportion of people with tertiary qualifications in the 60-64 group (i.e. a low comparison base) shows the lowest level of inter-generation mobility of all EU countries – less than 4 pp. (see Figure 3). In this respect the CR lags far behind the EU average. The average proportion of the European population with tertiary qualifications in the 60-64 group is 15%, while in the CR it is 11%. However, a far larger difference is seen in the 25-29 age group where the EU-25 average was 30% as compared to a mere 15% in the CR.

According to the data for 2005 there is positive educational mobility in all EU-25 countries except Germany. This negative trend is probably a result of the fact that, on average, students in Germany complete tertiary education later and often interrupt their studies due to work placements, studies abroad, changes of specialisation, etc. This suggestion is also supported by the fact that the 30-34 age group already shows positive educational mobility as compared to the population aged 60-64 (4 pp).

Apart from the actual competencies and study aptitudes of young people, inter-generation mobility is also influenced by social background inequalities. Social background has a major impact on the development of young people's educational aspirations and perception of education as a value for their professional as well as personal and civic lives. Research shows that educational aspirations of young people in the CR are more influenced by the educational attainment of their parents than the financial situation of the family.

**Figure 3: Educational mobility between the 25-29 and 60-64 age groups (2005, in %)**

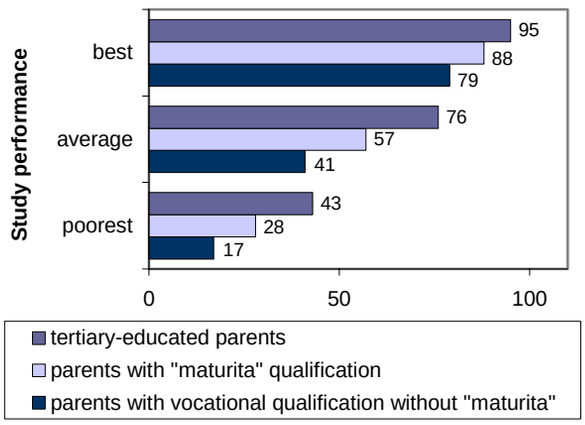



Source: EUROSTAT (2005c).

If the influence of a wider family background is negative in terms of educational aspirations, it should be modified by the education system so as to ensure that all individuals acquire education proportional to their capacities. The relationship between educational aspirations of children and the educational attainment of parents in the CR is

illustrated in Figure 4 which shows the link between the aspirations to pursue tertiary education among secondary school leavers with "maturita" on the one hand, and their study performance and their parents' education on the other hand. The "maturita" holders are broken down into three groups according to their study performance. The education of their parents is also divided according to three levels.

**Figure 4: Aspirations to continue study in tertiary education (in %)**




Source: Burdová, Matějů, Procházková (2003).

Aspirations to continue studying at tertiary level vary according to the parents' qualifications. An intention to apply for higher education was expressed by a higher percentage of students who had the poorest study performance but whose parent had a tertiary qualification, as compared to students with better (i.e. average) performance but whose parents did not reach a higher level than vocational qualification without "maturita".

Relatively strong educational ambitions are seen in students with the poorest study performance whose one parent has tertiary education; 43% of them aspire to achieve this qualification, while the same only applies to 17% of those whose parents have a vocational qualification without "maturita" (or lower) and 28% of those whose parents have "maturita". The link between the education of parents and the study aspirations of their children after completion of upper secondary schooling is the weakest in the group of students with the best study performance. In this group the difference in aspirations for tertiary education between students whose parents have tertiary qualifications and those whose parents have "maturita" is only 7 pp, and it is 16 pp for students whose parents have a vocational qualification without "maturita" (or lower).

## 1.2 Knowledge and skills of population

The knowledge and skills of the population are the result of lifelong learning, although initial education plays a decisive role as it is expected (a) to lay the foundations of education on which it is possible to build at later stages, (b) to provide instruments whereby an individual can learn and understand the possibilities of obtaining and processing information, and (c) to motivate for lifelong learning.

### Knowledge and skills of young population

Measuring the knowledge and skills (literacy) of the population aged 15 is the subject of an international study implemented by the OECD and entitled PISA (Programme for International Student Assessment).

Average literacy level of young people

The average results of pupils in the Czech Republic, except in the case of reading literacy, are above the OCED level. When comparing the results of EU member countries participating in the study, Czech pupils scored the best results in scientific literacy. The CR ranked third among EU countries, only Finland scored a statistically much better result. As regards the Netherlands, the difference is statistically negligible. However, Japan ranked much better.

In mathematical literacy the CR ranked fourth. Only Finland, the Netherlands and Japan had much higher scores in terms of statistics. As regards Belgium, the difference is not statistically important. In problem solving the rating of Czech 15-year-old pupils was lower as they ranked sixth on the scale. Only Finland scored a statistically much better result. The worst scores were received by Czechs in reading literacy where they occupied twelfth position, while five EU countries were rated much higher in terms of statistics.

Although the Czech education system certainly has various drawbacks, the quality of education of fifteen-year-olds is above average except in the case of reading literacy.

**Table 1: Mean literacy figures – 15 year old pupils**

| mathematics | | reading | | science | | probl. solving | |
|---|---|---|---|---|---|---|---|
| cou. | points | cou. | points | cou. | points | cou. | points |
| FI | 544 | FI | 543 | FI | 548 | FI | 548 |
| NL | 538 | IE | 515 | JP | 548 | JP | 547 |
| JP | 534 | SE | 514 | NL | 524 | BE | 525 |
| BE | 529 | NL | 513 | **CZ** | **523** | NL | 520 |
| **CZ** | **516** | BE | 507 | FR | 511 | FR | 519 |
| DK | 514 | JP | 498 | BE | 509 | DK | 517 |
| FR | 511 | PL | 497 | SE | 506 | **CZ** | **516** |
| SE | 509 | FR | 496 | IE | 505 | DE | 513 |
| AT | 506 | USA | 495 | HU | 503 | SE | 509 |
| DE | 503 | DK | 492 | DE | 502 | AT | 506 |
| IE | 503 | DE | 491 | PL | 498 | HU | 501 |
| SK | 498 | AT | 491 | SK | 495 | IE | 498 |
| LU | 493 | LV | 491 | USA | 491 | LU | 494 |
| PL | 490 | **CZ** | **489** | AT | 491 | SK | 492 |
| HU | 490 | HU | 482 | LV | 489 | PL | 487 |
| ES | 485 | ES | 481 | ES | 487 | LV | 483 |
| LV | 483 | LU | 479 | IT | 486 | ES | 482 |
| USA | 483 | PT | 478 | LU | 483 | USA | 477 |
| PT | 466 | IT | 476 | GR | 481 | PT | 470 |
| IT | 466 | GR | 472 | DK | 475 | IT | 469 |
| GR | 445 | SK | 469 | PT | 468 | GR | 448 |

| | |
|---|---|
| | above the OECD average |
| | deviance from the OECD average is not statis. signif. |
| | below the OECD average |

Source: OECD (2005a).

The CR ranks among the countries with a major shift towards higher literacy levels in 15-year-olds between 2000 and 2003 in terms of mathematical and scientific literacy and problem solving (see Table 2A). The re-

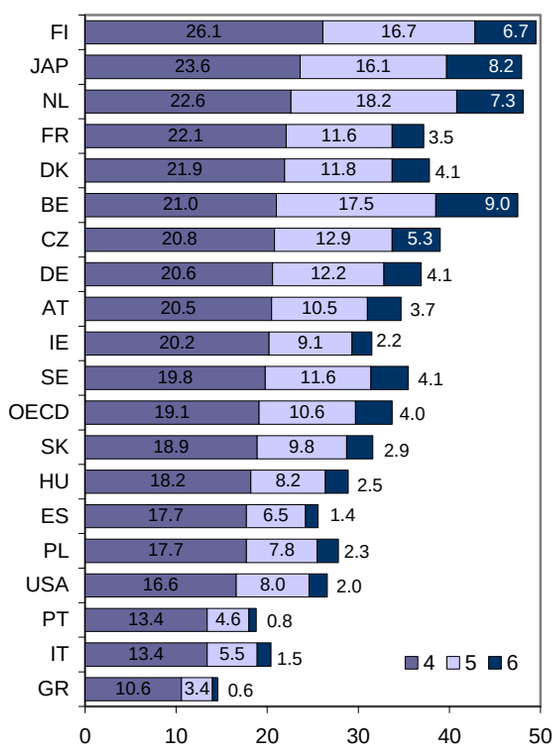
sults in reading literacy worsened in this period, although the difference is not a major one in terms of statistics. However, this is a very negative trend as in terms of reading literacy the CR occupies a place in the bottom half of the imaginary scale. It is obvious that in teaching increased attention must be paid to active work with written texts on the part of pupils.

The highest literacy level in the young population

In the PISA survey the level of mathematical literacy was rated using a seven-degree scale (0-6). It may be expected that pupils who score above-average results in mathematical and scientific literacy represent a potential for the development of science and technology.

Overall, Finland scored the best results in terms of the three highest levels of mathematical literacy, where almost a half (49.5%) of fifteen-year-old pupils achieved these levels. In the CR it was 39%, which is far less than the result of the best countries, but more than the OECD average (33.7 %). The lowest scores among EU countries were achieved by Greece and Portugal where the three highest levels of proficiency were only achieved by 14.6% of fifteen-year-olds (18.8% respectively (see Figure 5).

**Figure 5: Share of fifteen-year-old pupils scoring the highest levels of mathematical literacy (2003, in %)**




Source: OECD (2005a).

The largest contribution to the knowledge-based economy can in theory be expected from those who achieved the highest (i.e. the sixth) level of mathematical literacy. In this respect Belgian education scored the best results with 9% of fifteen-year-old pupils at this level. The Czech education system only produced 5.3% of pupils who demonstrated this level of proficiency.

Although the PISA results are not unfavourable for the CR, it does not mean that Czech education does not need changes. On the contrary, the necessary changes are of a fundamental nature and they are related to the concept of lifelong learning, the implementation of which cannot go ahead unless the role of initial education as a whole is altered. Planned modification of initial education is embedded in long-term policy documents of the Ministry of Education, Youth and Sports which comply with the objectives of the education policy jointly adopted by EU countries. According to the Long-Term Plan for Education and Development of the Education System, the gradual alteration of initial education should take place via two long-term processes – decentralisation of education systems and modernisation of the content and methods of education. Both processes are already underway. The state has transferred its responsibility for setting up educational institutions to municipalities and regions, and the powers of school directors have been strengthened. The second part of the decentralisation process, which is related to school autonomy and the involvement of parents, community and social partners in school life, is also gradually being put into practice (especially involvement in the school curricula development and participation in the operations and management of school).

Modernisation of educational programmes has been launched via curricula reform which reinforces, to a large degree, the influence of schools and other stakeholders in the formulation of objectives and content of education. All changes related to enhancement of quality and effectiveness of education are conditional upon a change in the role and position of teachers, as the success of implementation of the planned policy measures will depend on them.

## Knowledge and skills of adult population

The knowledge and skills of the adult population are largely based on the knowledge and skills acquired in initial education. However, they also illustrate the quality of continuing education. If initial education at school is not followed up by various forms of continuing education, the knowledge and skills acquired not only become outdated, but they can even be partially or entirely lost if they are not used in civic or professional lives. Moreover, continuing education may also redress the consequences of dropping out from schooling or of an earlier bad choice of educational pathway. Nevertheless, all studies show that if a positive attitude to education and learning is not acquired during compulsory schooling, this drawback is very hard to eliminate in adulthood.

The knowledge and skills of the adult population are analysed based on data obtained as part of an International Adult Literacy Survey (IALS) focusing on people aged 16-65. The CR took part in the second stage of the survey in 1998.

Average literacy level of adult population

The rating achieved by the adult population in the CR in comparison with other EU-25 countries is shown in Table 2. The level of literacy is expressed using a scale ranging from 0 to 500 points where the higher the number, the higher the level of literacy.

As with fifteen-year-old pupils, adults in the CR have the best results in quantitative literacy. Although its mean level of quantitative literacy was ranked third from the top, the difference from first-placed Sweden and second-placed Denmark is not statistically important.

In terms of document literacy the Czech population can be compared to that of Germany and Belgium. Four EU countries scored results far better in terms of statistics (Sweden, Finland, the Netherlands and Denmark). Document literacy and prose literacy are not among the strengths of the Czech adult population, while the situation is worst in terms of prose literacy. The CR's mean level is comparable with Belgium, Great Britain and Ireland, but it is far lower as compared to another five EU countries (Sweden, Finland, the Netherlands, Germany and Denmark) and the USA.

**Table 2: Average literacy level of adult population (15-64 year olds)**

| prose lit. | | document lit. | | numeracy | |
|---|---|---|---|---|---|
| country | points | country | points | country | points |
| SE | 301.3 | SE | 305.6 | SE | 305.9 |
| FI | 288.6 | FI | 289.2 | DK | 298.4 |
| NL | 282.7 | NL | 286.9 | **CZ** | **298.1** |
| DE | 275.9 | DK | 293.8 | DE | 293.3 |
| DK | 275 | DE | 285.1 | NL | 287.7 |
| USA | 273.7 | BE | 278.2 | BE | 287 |
| BE | 271.8 | **CZ** | **282.9** | FI | 286.1 |
| **CZ** | **269.4** | USA | 267.9 | USA | 275.2 |
| UK | 266.7 | UK | 267.5 | HU | 269.9 |
| IE | 265.7 | IE | 259.3 | UK | 267.2 |
| HU | 242.4 | HU | 249 | IE | 264.6 |
| SI | 229.7 | SI | 231.9 | SI | 242.8 |
| PL | 229.5 | PL | 223.9 | PL | 234.9 |
| PT | 222.6 | PT | 220.4 | PT | 231.4 |

| | |
|---|---|
| | statistically significantly better then CR |
| | statistically significantly worse then CR |
| | difference is not statistically significant |

Source: OECD (2000).

The average level of literacy in adults should be complemented by an indicator pointing to the percentages of the population at various literacy levels. IALS distinguishes five literacy levels, the fifth being the highest.

The third level constitutes the minimum of skills necessary for an individual to function actively in a modern developed society. A high proportion of the population at literacy levels 4 and 5 is an indisputable advantage for society. This population is expected not only meet the demands of globalised economies, but to facilitate progress of the national economy towards higher competitiveness. A high proportion of the population at level 3 and lower points to problems related to social integration and the inclusion of this population that is situated at the margin of society.

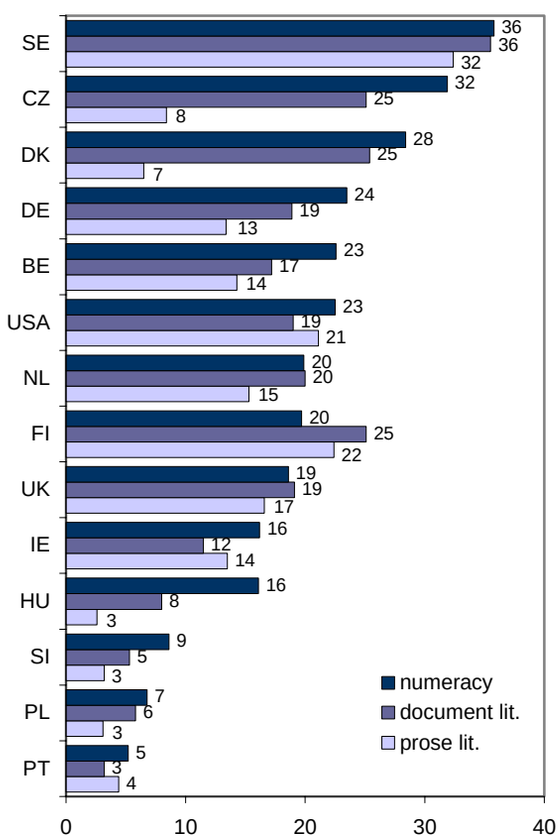
The highest level of literacy in adult population

Although the CR has a relatively good comparative position in terms of the average level as regards the various adult literacy components (see Table 2), its position in terms of the proportion of the population achieving higher literacy levels is worse (see Figure 6). In prose literacy there are only 46% of the Czech population at the three highest levels, while in the "best" Sweden it is almost three quarters.

In the Czech Republic level 3 of prose literacy was achieved by 38% of adults, while in Denmark it was 48%. Levels 4+5 were scored by a mere 8% of the Czech adult population, while in Sweden it was 32%. It is clear that the rate of our lagging behind increases along with a growing literacy level. Another alarming fact is that over a half of the Czech population only achieved levels 1 and 2 and therefore are not able to function actively in a globalised economy.

As regards document literacy, the results were slightly better. In terms of the percentage of the population at the two top levels the CR ranked in the first half of the imaginary scale. It is clear that the margin of difference from the best of the countries under review is not so dramatic as is the case with prose literacy. The proportion of Czech adults at level 3 was, as with prose literacy, 38%, but the proportion at levels 4+5 was a nice 25%. The largest proportion of the population at level 3 was in the Netherlands (44%), and at levels 4+5 it was Sweden (36%).

**Figure 6: Share of adult population at the two highest levels of literacy (1998, in %)**




Source: OECD (2000).

The best results were scored by the Czech population in quantitative literacy where the margin from the best country is the smallest. Level 3 was achieved by 37% of the population of the CR, levels 4+5 by 32% in total (in Sweden it was 36%).

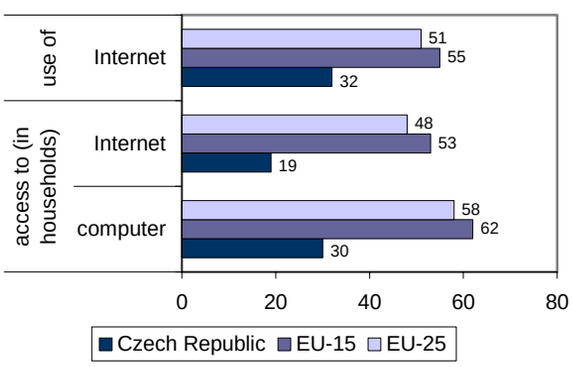
## 1.3 Computer literacy of population

The competitiveness of enterprises and individuals is increasingly linked to the use of information and communication technologies (ICT), and a certain level of proficiency has become one of the necessities of an ordinary civic life. This is why all developed countries seek to establish equal opportunities for the acquisition of ICT com-

petencies. These concern not only an across-the-board provision of the relevant infrastructure and its wide accessibility, but also respect for the specific needs of various population groups in terms of age, gender, social position, geographic location and health and intellectual capacity.

Access to ICT has a positive impact on an individual's competitiveness, provided that ICT are used for learning and searching information about employment opportunities. The most comfortable environment for these activities is a household with a PC and connection to the Internet. Households in the CR have a below-the-average level of facilities in this respect, both in terms of EU-15 and EU-25 comparison. (see Figure 7). On average over a half of households (58%) have a computer in EU-25 while it is less than a third in the CR (30%). Almost a half of households in EU-25 are connected to the Internet, while it is less than one fifth in the CR (19%). The situation is even worse in terms of EU-15 comparison as ICT facilities available in the old member countries are at a far higher level as compared to the new members (data for individual countries – see Table 3A).

**Figure 7: ICT facilities and use of Internet in households (2005, in %)**




Source: EUROSTAT (2005d).

The main barrier to improvement in terms of ICT facilities and Internet connection in households is the relationship between an average family income and the costs of living on the one hand, and the PC and Internet connection costs on the other hand. The importance attributed to these facilities also plays a certain role. The level of facilities in households in the CR varies largely depending on whether or not there are children in the household.

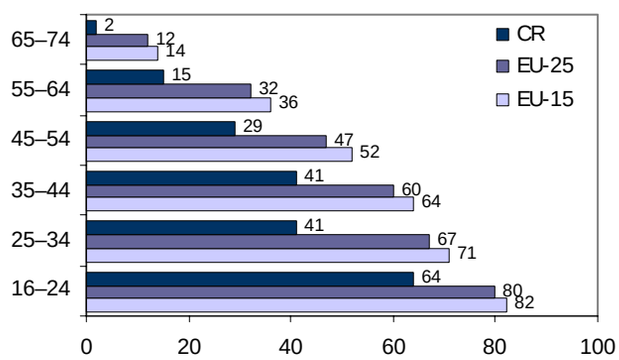
Among households consisting of two adults and no children only 15% had a PC and 10% had an Internet connection in 2005, while the figures for households with two adults and children were 56% and 35% respectively[1].

Children constitute a major stimulus for ICT acquisition. However, age also plays a certain role. It may be expected that a large proportion of households without children consist of elderly people who have a more reserved relationship to PCs and the Internet as compared to younger generations. The most frequently stated reasons for not having a PC and access to the Internet are the level of fees (38% of households) and the fact that household occupants have access to the Internet elsewhere, particular at work, at school, etc. (35%).

The population in the CR aged 26-74 uses the Internet much less in comparison with the EU population. In 2005 during the three months before the survey an average of 51% of the population in EU-25 used the Internet, while it was only 32% in the CR. In EU-15 it was over a half of this age group (55%). These low figures reflect both the low level of ICT facilities in households and a lower level of employment in professions using the Internet, a lower level of Internet-connected ICT facilities in schools and a limited development of services provided via the Internet.

The use of the Internet by the population depends on age (see Figure 8). In the CR as in the EU (on average) the use of the Internet decreases as age increases. According to EU-15 as well as EU-25 figures this decline is more or less even across ten-year age groups, and a more radical decline occurs in the 55-65 and 64-74 age groups. The CR shows a relatively large difference between the youngest age group (16-24) and the following group (25-34). The latter also shows the biggest difference as compared to the EU-25 average (26 pp) and EU-15 average (as many as 30 pp). However, in the next age group there is no change and the proportion of the population aged 35-44 who use the Internet is the same – 41%.

**Figure 8: Individuals using Internet by age groups (2005, in %)**




Note: The figures on the use of the Internet relate to the three months before the statistical survey. Source: ČSÚ (2005b).

It is clear that older people who did not have an opportunity to acquire basic computer skills in initial education only clear their paths to ICT use with difficulties. The National Programme for Computer Literacy, which was launched by the Ministry of Informatics in February 2003, aims to help people overcome fears of new technologies and to support computer literacy. Since 2003 nearly 132 thousand people have participated in the courses. This testifies to a great interest on the part of both the general public and companies, as many participants were signed in by their employers. It may be expected that these are mostly small enterprises with limited resources for the training of their employees.

## 1.4 Flexibility of population

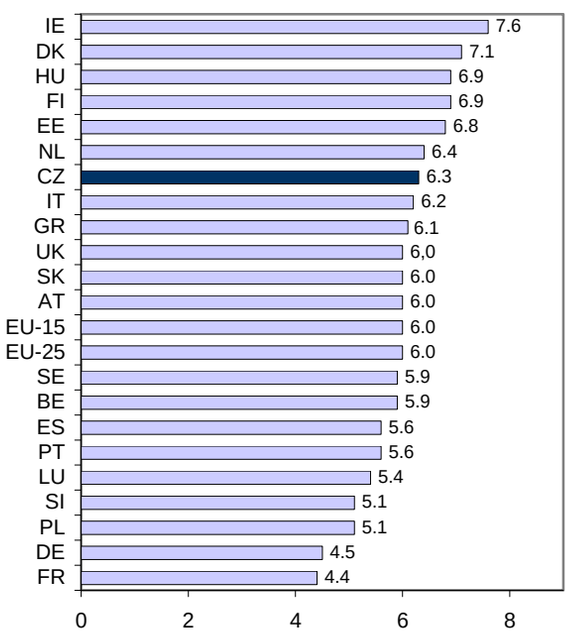
In economic terms the flexibility of the population can be defined as a capacity to adjust to the changing needs of the labour market. This capacity is becoming an increasingly important quality of an individual and it is influenced by his/her education and attitude and, particularly, willingness to acquire new knowledge and skills.

[1] The analysis of household facilities in the CR is based on a publication by ČSÚ (2005b).

The International Institute for Management Development (IMD) in Switzerland publishes annually the rates of population flexibility in its World Competitiveness Yearbook. The flexibility is evaluated based on questionnaires where domestic and foreign experts answer the question "The flexibility and adaptability of people in the economy is low – high when confronted with new demanding tasks". The rate of flexibility is ranked on a ten-degree scale.

In 2005 the Czech population was ranked more flexible as compared to the EU-25 and EU-15 average (see Figure 9). Only 6 EU member countries showed a higher level of flexibility than the CR. In terms of flexibility the Czech population made major progress between 2004 and 2005. Conversely, there was a decline in terms of the EU average. In 2001-2004 the rate of flexibility in the CR ranged from 5.5 to 5.8 points, in 2005 it scored to 6.3 points which is a year-on-year increase of 0.6 pp.

**Figure 9: Flexibility and adaptability of people in the economy (2005, points)**




Source: IMD – International Competitiveness Year Book (2005).

As flexibility is a quality which cannot be expected to show large year-on-year increases, it is necessary – if there is no change in legislation in the given year – to put off evaluation by another two years to see whether the increase points to a longer-term positive trend or merely a year-on-year fluctuation. The levels of indicators ascertained via questionnaires are sensitive to the overall economic situation. If there is positive economic development or positive expectations the evaluation is usually more optimistic. In terms of international comparison there may also be an influence of varying levels of criticism on the part of respondents in various countries.

### Geographical and occupational mobility

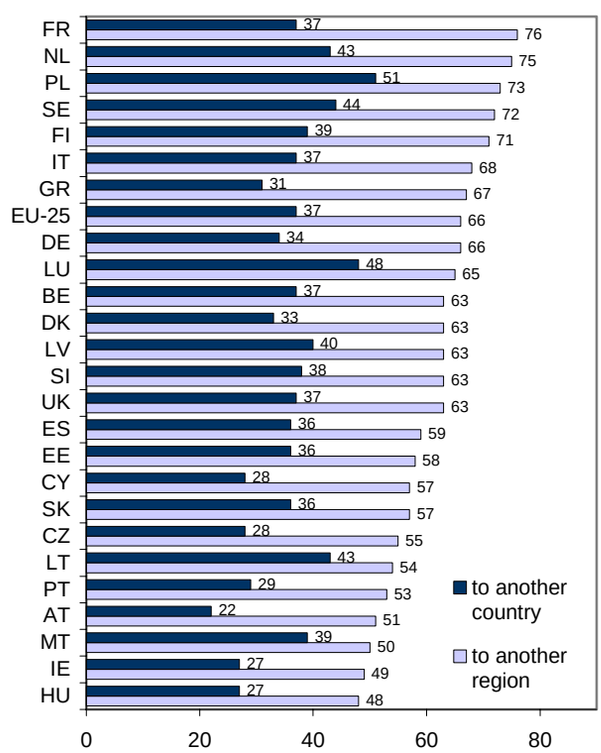
In advanced countries occupational mobility is supported by retraining (see Chapter 2), guidance services and the activities of institutions which assist individuals in finding a suitable position in the labour market. Occupational mobility may be a substitute for geographical mobility, provided that an individual finds a job for which he/she has a qualification in another region. Geographical mobility, in the form of a change of residence or commuting, need not always be linked to the use of the individual's current qualification. There can be a number of other reasons from the need to change an environment to better economic prospects in general.

A prerequisite for both occupational and geographical mobility is good awareness of employment opportunities. Willingness to change an occupation or a residence is to a large degree undermined by an overly generous safety net which fails to force individuals to quickly find a new job and spend the resources necessary for doing so (either financial or intellectual). The fact is that mobility is supported by measures which lower the risks an individual must undertake during its implementation.

Mobility on the European labour market should be boosted in 2006 as this year has been designated by the European Commission as the European Year of Workers' Mobility. A special survey carried out in 2005 aimed to identify the views of EU citizens on geographical and occupational mobility.

The first results of the survey (see Figure 10) show that people in the CR are not too much in favour of geographical migration. In the EU-25 two thirds of the respondents on average are willing to leave their region to find a new job, while it is only a half in the CR (54%). France and the Netherlands have the most willing people to move outside their region for work (almost 80%), whereas in Hungary and Ireland less than a half of the respondents expressed their willingness for inter-regional intrastate migration.

**Figure 10: Share of population willing to move to get a job in the event of unemployment (2005, in %)**




Source: EC – Eurobarometer (2006).

The willingness to move abroad is lower in all countries as compared to intrastate migration. Only 37% of respon-

dents were willing to move to another EU country to take a job in the case of unemployment, which is almost twice as low a figure as compared to intrastate mobility. In the CR the percentage of those willing to move to a foreign country is even lower – 28%. Lower willingness was only expressed by respondents in Hungary, Italy and Austria. On the contrary, Poles show the highest level of willingness in this respect (51%).

On average respondents see insufficient language competencies and problems related to adaptation to a new environment as the most severe obstacle to international mobility (50% and 20% respectively). Access to social security and services is viewed as a barrier to migration by relatively fewer people (15%), and less than 10% see a problem in recognition of qualifications and diplomas, and in work permit acquisition. The issue of a work permit is seen as the most severe problem by new member countries in view of the restrictive measures on free movement of their workforce adopted by most old member countries.

Occupational mobility

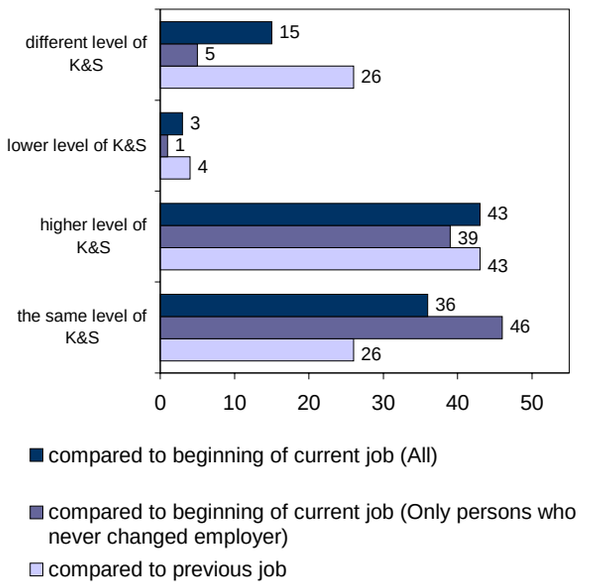
Occupational mobility expressed in terms of the number of jobs was on average 3.9 in the EU-25 and 3.2 in the CR. The lowest number was shown by Austria (2.7 jobs), the highest by Denmark (5.9) and Great Britain (5.7).

Although the Czech population shows a relatively low level of mobility, there is a widespread opinion that it is good to change a job every once in several years. 60% of respondents in the CR believe in the positive effects of frequent job changes, whereas the same is only true of 40% for the EU-25 average.

The low occupational mobility rate in the EU-25 can also be demonstrated by the fact that a full quarter of the respondents never changed an employer, and this proportion does not change significantly in relation to age. 24% of the respondents aged 25-39 had never changed job, in the 40-54 age group it was 20% and 25% in the age group 55+. Nor do Europeans consider the plan for a future change of employer. 54% have given no consideration to changing their job within the following five years. The decisive reason for retaining the current job is satisfaction with their current employment.

According to the survey results the change of employer plays a decisive role as regards the acquisition of new knowledge and skills. A quarter of those who have changed employer had to acquire new knowledge and skills, as compared to a mere 15% of those who stayed with the same employer. However, the change of employer is not normally linked to a higher level of knowledge and skills. The same percentage of people (43%) had to enhance their knowledge and skills in the case of an employer change and in the case of staying with the same employer. People who remain with the same employer for too long have the lowest chance of improving their knowledge and skills. Nearly a half of those who never changed an employer (46%) still use the same knowledge and skills as they did after taking on the job.

**Figure 11: Knowledge and skills needed – difference between current position and first position and between current job and previous job (2005, in %)**




Source: EC – Eurobarometer (2006).

The survey revealed that occupational mobility relates to changes in the knowledge and skills acquired so far, and that these changes further promote mobility. On the other hand, too long a period in one job results in stagnation of knowledge and skills, unless the individual progresses on the corporate ladder towards more demanding posts (see Figure 11).

**Table 1A: Educational attainment of the 25-64 year-old population (2005, in %)**

| | 2000 | | 2001 | | 2002 | | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ISCED | | ISCED | | ISCED | | ISCED | | ISCED | | ISCED | |
| | 3–4 | 5–6 | 3–4 | 5–6 | 3–4 | 5–6 | 3–4 | 5–6 | 3–4 | 5–6 | 3–4 | 5–6 |
| EU-15 | 42.1 | 21.2 | 42.4 | 21.5 | 42.9 | 21.8 | 43 | 22.5 | 43.8 | 23.1 | 44.2 | 24.0 |
| EU-25 | 46.0 | 20.0 | 46.3 | 20.1 | 46.9 | 20.4 | 47.2 | 21.1 | 47.8 | 21.9 | 47.9 | 22.8 |
| Austria | 61.7 | 14.5 | 62.5 | 15.2 | 62.8 | 15.1 | 63.1 | 15.2 | 60.3 | 19.2 | 62.7 | 17.8 |
| Belgium | 31.2 | 27.2 | 31.3 | 27.8 | 32.4 | 27.9 | 33.2 | 28.2 | 33.9 | 29.8 | 34.7 | 30.7 |
| Cyprus | 37.7 | 25.1 | 37.7 | 26.8 | 37.4 | 29.1 | 36.5 | 29.5 | 36.2 | 29.4 | 38.4 | 27.8 |
| **Czech Republic** | **74.6** | **11.5** | **74.7** | **11.6** | **76** | **11.8** | **76.5** | **11.9** | **76.7** | **12.3** | **76.8** | **13.1** |
| Denmark | 54.0 | 25.8 | 53.0 | 28.1 | 51.7 | 29.0 | 50.1 | 31.8 | 50.6 | 32.4 | 49.7 | 32.9 |
| Estonia | 55.8 | 28.9 | 56.2 | 29.8 | 57.8 | 29.7 | 57.7 | 30.4 | 57.3 | 21.5 | 55.5 | 33.6 |
| Finland | 40.5 | 32.6 | 41.0 | 32.5 | 42.2 | 32.4 | 42.7 | 32.8 | 42.6 | 34 | 44.6 | 34.5 |
| France | .. | .. | .. | .. | .. | .. | 41.3 | 23.5 | 41.3 | 23.8 | 41.4 | 24.9 |
| Germany | 57.4 | 23.8 | 59.0 | 23.5 | 60.7 | 22.3 | 59.5 | 24.0 | 59.0 | 24.9 | 58.9 | 24.4 |
| Great Britain | 52.8 | 28.2 | 52.5 | 28.6 | 52.4 | 29.4 | 51.9 | 30.7 | 55.3 | 29.1 | 55.6 | 29.5 |
| Greece | 34.5 | 16.9 | 35.0 | 17.2 | 35.9 | 17.9 | 37.2 | 18.6 | 38.1 | 20.6 | 39.2 | 20.5 |
| Hungary | 55.2 | 14.0 | 56.0 | 13.9 | 57.2 | 14.0 | 58.8 | 15.2 | 58.5 | 16.6 | 59.0 | 17.0 |
| Ireland | 35.7 | 21.6 | 35.5 | 23.4 | 35.0 | 25.1 | 35 | 26.8 | 34.7 | 28.3 | 35.6 | 29.0 |
| Italy | 35.6 | 9.6 | 33.2 | 10.0 | 34.0 | 10.4 | 36.1 | 10.8 | 37.5 | 11.4 | 38.4 | 11.9 |
| Latvia | 65.1 | 18.0 | 60.9 | 18.1 | 63.1 | 19.6 | 64.2 | 18.2 | 64.6 | 19.4 | 62.1 | 21.5 |
| Lithuania | 42.4 | 41.8 | 61.7 | 22.4 | 62.9 | 21.9 | 62.8 | 23.2 | 62.4 | 24.2 | 60.6 | 26.5 |
| Luxembourg | 42.5 | 18.5 | 41.2 | 18.1 | 42.9 | 18.8 | 54.8 | 14.9 | 54.8 | 22.8 | .. | .. |
| Malta | 12.8 | 5.4 | 9.6 | 9.6 | 9.6 | 8.6 | 11.4 | 9.0 | 12.3 | 10.9 | 14.1 | 12.1 |
| Netherlands | 42.0 | 24.1 | 42.9 | 24.0 | 42.7 | 24.9 | .. | .. | .. | .. | 41.5 | 30.3 |
| Poland | 68.3 | 11.4 | 68.3 | 11.7 | 68.6 | 12.2 | 68.2 | 13.9 | 68.1 | 15.3 | 68.1 | 16.5 |
| Portugal | 10.6 | 9.0 | 10.9 | 9.3 | 11.5 | 9.5 | 11.7 | 10.5 | 12.6 | 12.6 | 13.6 | 12.7 |
| Slovakia | 73.3 | 10.3 | 74.3 | 10.6 | 75.0 | 10.8 | 75.1 | 11.6 | 73.9 | 12.8 | 73.7 | 13.9 |
| Slovenia | 59.1 | 15.7 | 61.2 | 14.1 | 62.1 | 14.8 | 60.7 | 17.8 | 60.5 | 18.8 | 60.5 | 20.0 |
| Spain | 15.9 | 22.4 | 16.6 | 23.5 | 17.2 | 24.4 | 17.7 | 25.0 | 18.5 | 26.4 | 20.5 | 28.2 |
| Sweden | 47.5 | 29.7 | 55.0 | 25.5 | 55.0 | 26.4 | 54.8 | 27.2 | 54.8 | 28.1 | 54.0 | 29.5 |

Source: EUROSTAT, Labour Force Survey, 2nd quarter data of the relevant year.

**Table 2A: Mean value changes in mathematics, reading and science proficiency (2003 in comparison with 2000)**

| proficiency | Belgium | **Czech Republic** | Denmark | Finland | France | Ireland | Italy | Japan | Latvia | Hungary | Germany | Poland | Portugal | Austria | Greece | Spain | Sweden | USA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mathematics A | 28 | **17** | -14 | 6 | 7 | 3 | 16 | -12 | 34 | 1 | 14 | 20 | 11 | 5 | -13 | 4 | -12 | 11 |
| mathematics B | 22 | **30** | 10 | 14 | 5 | 5 | 9 | 0 | 37 | 16 | 22 | 33 | 19 | 0 | 6 | 13 | 3 | 0 |
| reading | 1 | **-3** | -5 | -3 | -9 | -11 | -12 | -24 | 32 | 2 | 7 | 17 | 7 | -16 | -2 | -12 | -2 | -9 |
| science | 13 | **12** | -6 | 10 | 11 | -8 | 9 | -3 | 29 | 7 | 15 | 15 | 9 | -28 | 20 | -4 | -6 | -8 |

Note: A–space and shape, B–changes and relations

statistically significantly better than in year 2000

no statistically significant difference in comparison with year 2000

statistically significantly worse than in year 2000

Source: Ministry of Education, Youth and Sports, ÚIV, SVP ÚRVŠ PedF UK, Učení pro život, Výsledky výzkumu OECD PISA 2003 (Education for Life, OECD PISA 2003 research results) in Učitelské noviny 46/2004.

**Table 3A: ICT facilities and use of the Internet in households (2005, in %)**

| | AT | CY | **CZ** | DE | EE | ES | FI | GR | HU | IT | LT | LU | LV | NL | PL | PT | SE | SI | SK | UK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fac. comp. | 63 | 46 | **30** | 70 | 43 | 55 | 64 | 33 | 42 | 46 | 32 | 87 | 30 | 78 | 40 | 42 | 80 | 61 | 47 | 70 |
| fac. Int. | 47 | 32 | **19** | 62 | 39 | 36 | 54 | 22 | 22 | 39 | 16 | 77 | 42 | 78 | 30 | 31 | 73 | 48 | 23 | 60 |
| use of Int. | 55 | 31 | **32** | 65 | 59 | 44 | 73 | 22 | 37 | 34 | 34 | 69 | 42 | 79 | 35 | 32 | 81 | 47 | 50 | 66 |

Note: Three months reference period; 16-74 year-old population. Source: EUROSTAT, Information Society Statistics, March 2006.

## 2. Lifelong learning

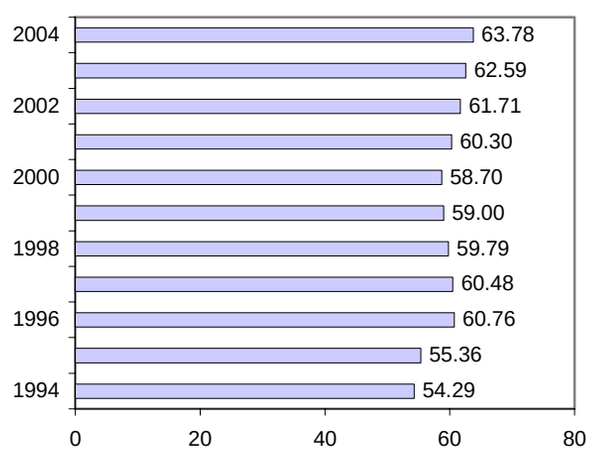
In association with the demands placed by a knowledge-society on individuals, life-long learning, which consists of initial and continuing education, is receiving increasing attention. When analysing it we focus on the participation of young people in secondary and tertiary education, the involvement of adults in continuing education as a whole and in its various forms, and on the expenditure on education.

### 2.1 The initial education of young people

#### Participation in secondary education

In terms of international comparisons the CR traditionally ranks high for the participation of young people in **secondary education** and the proportion of the adult population with upper secondary qualifications. After compulsory education most young people (approx. 95%) continue studying at some secondary school. The drop-out rate at this level in the CR is relatively low as compared to other countries (some 6%). This is the result of a rather well-developed structure of secondary education which makes it possible for students who have failed in a chosen type of school to transfer to a less demanding programme. This is why only some of those who drop out end up without a qualification. There is also a positive trend towards widening access to programmes completed by "maturita". This is particularly due to the development of secondary technical and vocational programmes at this level (ISCED 3A). The proportion of "maturita" programmes increased from 54% in 1994 to nearly 64% in 2004 (see Figure 1).

**Figure 1: Proportions of students in 1st years of secondary programmes with "maturita" (in %)**




Source: The Development of Education and Programme Structure of Students in Secondary and Tertiary Professional Education in the CR and in its Regions 2004/05. NUOV (2005).

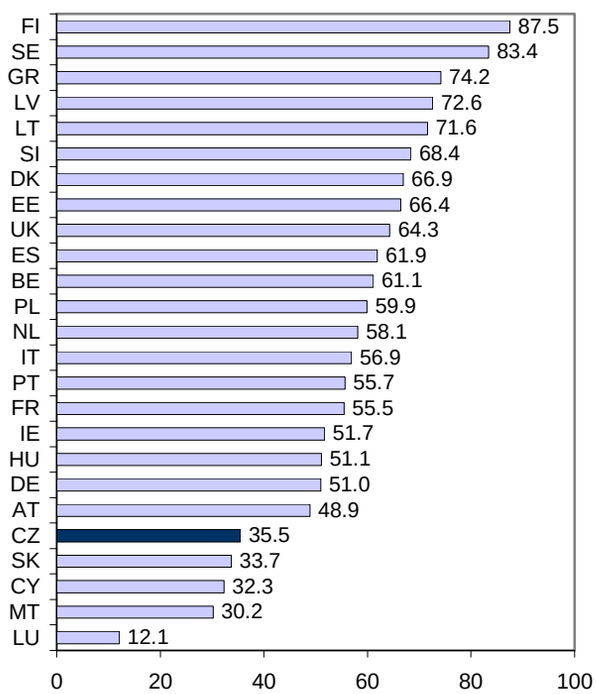
The CR is among the countries where, at secondary level, technical and vocational education largely predominates over general education (*gymnázia*). Except in the case of Prague the proportion of general secondary education in the CR is low (less than 20% of secondary school students). The advantage of the Czech education system is that technical/vocational and general educational paths are considered as equal. When entering tertiary education no distinction is made between "maturita" examinations taken in technical/vocational and general educational programmes.

#### Participation in tertiary education

Participation in tertiary education reflects the proportion of individuals taking part in all forms[2] of this education in the population at an age typical of this education level. The relevant age group varies from country to country and depends on the system of initial education, the age of entering compulsory education, the length of compulsory education and on the length of education that must be completed before entering the tertiary sector.

In 2002 the participation in tertiary education in EU-25 reached 56% on average and ranged from 12% (Luxembourg) to 88% (Finland). The CR with its 35.5% occupied one of the bottom positions with only 4 EU countries ranking lower (Luxembourg, Malta, Cyprus and Slovakia) (see Figure 2). The CR is far below the average of developed countries in terms of the chances to study at a higher education institution. The situation in the CR is only slowly improving, although the relevant age groups are getting less numerous and the capacity of institutions is amplifying.

**Figure 2: The proportion of students in tertiary education in the typical age group, (2002, in %)**

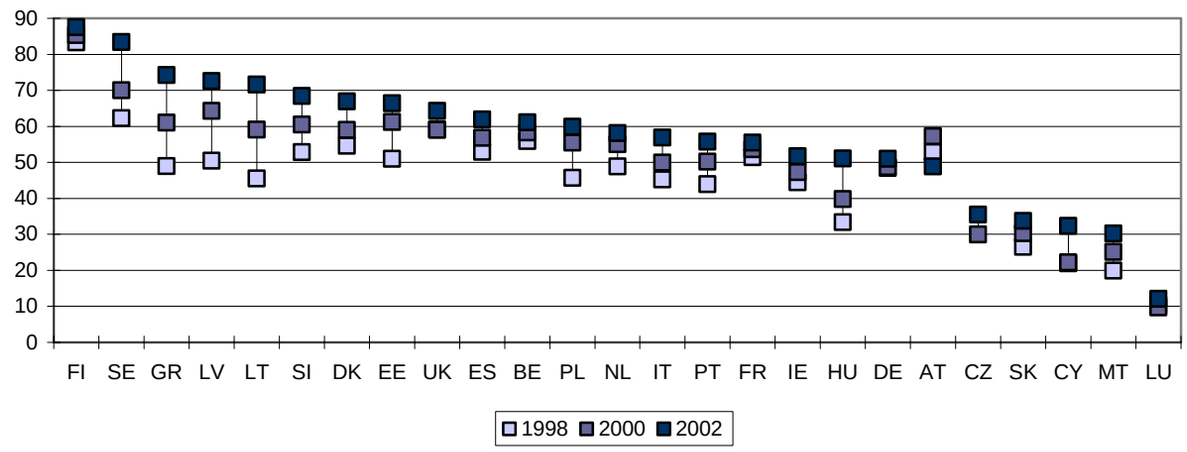



Source: The World Bank – KAM.

European countries seek to establish education policy so as to ensure a wide range of opportunities for their population to acquire tertiary education. With the exception of Austria they have been successful and the participation in tertiary education increased in 1998 –2002 (see Figure 1). The largest increases were scored by Lithuania, Greece and Latvia. In 2002 the rate of participation in tertiary education exceeded 70% in four EU countries (Finland 88%, Sweden 83%, Latvia 73% and Lithuania 72%).

[2] Full-time (daily attendance), distance and combined education.

**Figure 3: Proportions of students in tertiary education in the population at an age typical of this level of education (%)**




Note: Listed according to 2002 data. Source: The World Bank – KAM.

Although the CR is far behind, there was no major increase in participation in tertiary education in 1999-2002. This differentiates the CR from a majority of new EU member countries which have been rapidly enhancing their rankings. Baltic countries and Hungary in particular have made a solid leap forward. For the CR to achieve at least the European average by 2010 it would have to increase participation of young people in tertiary education by 4 pp per annum. This is a great challenge if we consider that, between 2000 and 2002, the year-on-year increase was less than 1 pp. With such dynamics the CR would achieve the EU average as late as 2025 provided that the rate of participation in tertiary education in European countries remained stagnant.

## 2.2 The participation of the adult population in continuing education

Continuing education is mostly understood to mean education which takes place after completion of initial schooling at later stages in the life of an adult individual[3]. The importance of continuing education increases as the process of innovation and technological changes speed up and as their impact on all economic and social activities enlarges. Consequently, the knowledge gained in initial education becomes outdated more quickly. The ageing of the Czech as well as European population has brought about a situation where the need for new knowledge and skills cannot be satisfied only by the generation entering the labour market as in the past, and where the older generations are forced to brush up and update their knowledge.

Continuing education may be analysed using many perspectives. In terms of the form of education there is formal, non-formal and informal education. Formal education is provided by schools and it is analogous to the initial education of young people. Non-formal education takes the form of various training courses, and informal education entails various forms of self-education. This classification is used by EUROSTAT. Our analysis of participation in continuing education is based on data ascertained as part of the Ad hoc module 2003.

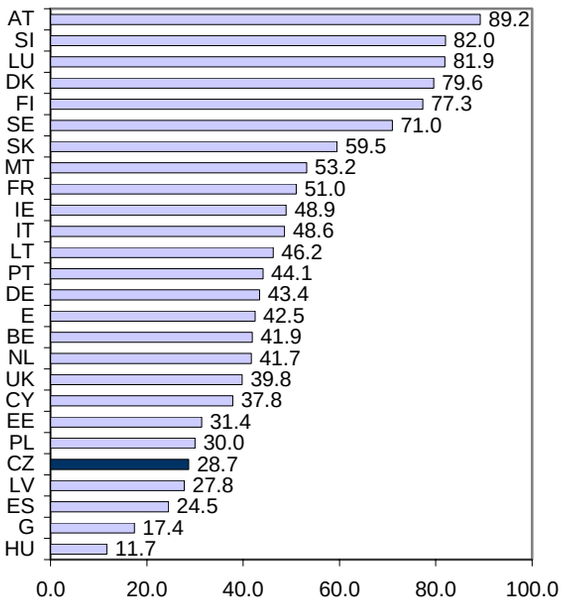
The rate of participation in continuing education in the previous 12 months

There are large differences between European countries as regards participation in continuing education with the rates ranging from 89% in Austria to some 12% in Hungary (see Figure 5). On average some 42% of the population in EU-25 aged 25-64 is involved in some form of continuing education. The rate of participation in continuing education is often related to the individual's level of initial education. A higher level of initial education is a stimulus for further participation in various forms of continuing education. This has been statistically proved in most countries. Nordic countries, which rank among those with the highest educational attainment, also have the highest rates of adults' participation in continuing education. In Sweden, Finland and Denmark continuing education is being undertaken by some three quarters of adults. However, there are exceptions to this rule. These include, for example, Austria and Slovenia where almost the entire population (80-90%) is involved in continuing education although (or perhaps exactly because of this) only a small proportion achieved tertiary qualifications as part of initial education (only some 18% which is below the EU average).

The CR is among the countries with a very low rate of participation in continuing education CR – ranking 21st among the EU-25. The results show that in other countries people pay much more attention to updating their qualifications, even in countries whose socio-economic conditions are comparable or worse. Economic factors are less important in this case and they are outweighed by personal initiative and flexibility. The range and structure of educational opportunities and the existence of systemic support for participation in continuing education may also play a role.

[3] This concept of continuing education takes account of the individual's age. This means that any education of an adult individual, i.e. also part-time education at school (including distance education), is considered to be continuing education. This concept is used in the LFS – ad hoc module statistical surveys. However, there is another definition of continuing education which takes account of the provider. In this case continuing education is only education which takes place outside school – i.e. in courses provided by institutions on a commercial basis and training provided by enterprises.

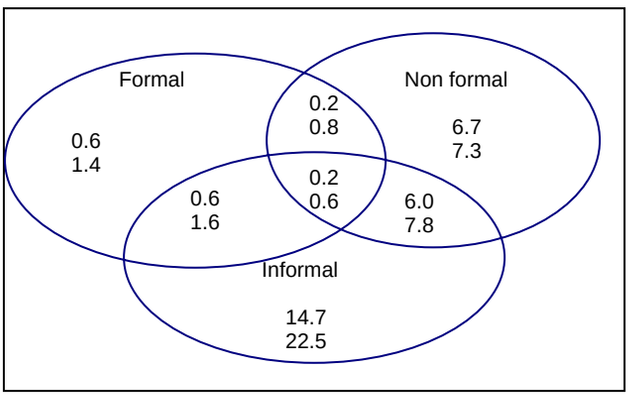
**Figure 5: The participation of the population aged 25-64 in all forms of continuing education (2005, in %)**




Note: Participation in education in the previous 12 months. Source: EUROSTAT, LFS. Ad hoc module on lifelong learning 2003 (2005).

Various forms of continuing education complement or substitute for one another. This is illustrated in Figure 6 which shows participation in various forms of continuing education and their combination as an EU-25 average and in the CR. Formal school education normally excludes participation in non-formal education. Only a few people go to school and attend a course at the same time (in the EU-25, out of the 16.8% of people undergoing courses of non-formal education, only 0.8% also study at school). On the other hand, school attendance is often accompanied by various forms of self-study, and self-study is even more frequently complementary to non-formal education courses. Nearly a half of those undergoing non-formal education courses are involved in self-study (7.8% out of the 16.8% undergoing non-formal education). The proportion of people who are engaged simultaneously in all forms of education is very low (only 0.6%). In the CR there are similar relations between the forms of education, except in the case of the combination of formal and non-formal education which is less common compared to the EU. It may be said that the mutually exclusive relationship between these two forms is stronger in the CR.

**Figure 6: Percentage of population 25-64 years old involved in education and training in the CR and EU-25**

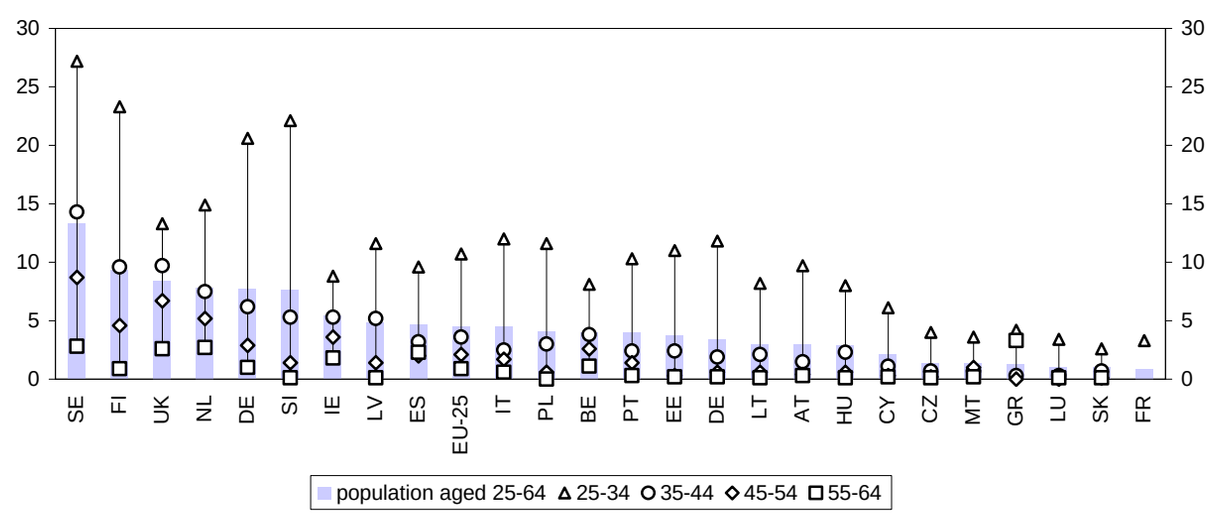



Note: The top figure is for the CR, the bottom one is for the EU-25.
Source: EUROSTAT, LFS, Ad hoc module on lifelong leaning 2003.

## Participation of adults in formal education

Adults' participation in formal school education is relatively rare. In the EU-25 it is on average 4.5% of people aged 25-64. Although most national education systems provide for various part-time forms of study, the programmes last several years and often saddle the learner with a heavy time burden. Lack of time may be coupled to decreased or eliminated income during studies, which for people with family obligations further complicates the situation. This educational path is more often opted for by younger people (see Figure 7).

**Figure 7: Participation of adults in formal education by age (%)**



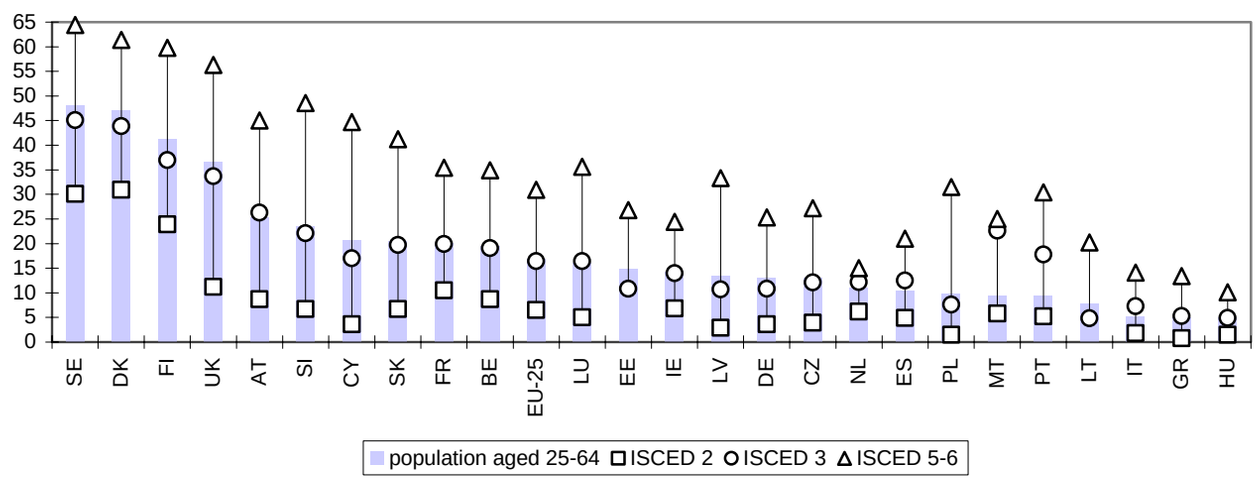

Source: EUROSTAT, LFS, Ad hoc module on lifelong learning 2003.

Higher participation in formal education (between 8% and 13%) is seen in Nordic countries, Great Britain and the Netherlands. Formal education in these countries is attended by 20-27% of the population aged 25-34. The rate of participation of the other age groups, including pre-retirement, is also above the average. For example, in Sweden, the Netherlands and Great Britain the participation of the oldest age group ranges between 2.6% and 2.8%, which is double the average participation of the entire population in the CR. This testifies not only to successful education policy in these countries which stimulates schools and other institutions to adjust to the needs and means available to the adult population, but also to the use of effective instruments promoting participation of adults in learning.

In the CR the rate of participation in formal education is only 1.4%. Older and middle age groups over 45 virtually do not participate (0.1 %-0.2 %). Even the youngest age group (26-34) undertakes formal education only sporadically (4% compared to 11% in the EU).

In terms of qualification groups there is a low proportion of people with basic and secondary qualifications seeking to achieve a certificate of more advanced education. If we consider that there are only 11% of people in the CR with only basic or lower secondary education, the low participation in continuing formal education is not surprising. Negative is the fact that only a small portion of the very numerous group of adults with upper secondary qualifications in the CR (nearly 77% of the 25-64 age cohort) pursues tertiary education. The figure is 1.1%, which is five times lower the EU average for this group (see Table 1A). People with secondary qualifications in the CR also differ considerably from tertiary degree holders. They behave more like low-skilled groups which sets them apart from their EU counterparts.

**Figure 8: Participation of adults in non-formal education according to educational level (in %)**




Source: EUROSTAT, LFS, Ad hoc module on lifelong learning 2003.

## Participation in non-formal education

**Non-formal education** consists of various courses, short-term training programmes or lectures at the workplaces or elsewhere both during working hours and in free time. There are large differences among countries as regards involvement of the population in this form of education. On average 17% of the EU population aged 25-64 participates in non-formal education. In the CR the figure is 13% which is not such a dramatic lag as compared to other forms of education.

Those with secondary and low qualifications attend non-formal education less often than people with tertiary qualifications (see Figure 8). This is generally true of most EU countries. The CR shows one favourable feature - small differences in participation between groups with various qualification levels. The rates of participation of the groups with the highest and the lowest qualifications is slightly lower in the CR than in the EU (roughly by 1 pp). This is probably linked to massive investment in revitalisation of production plants and the inflow of foreign investment. Due to the introduction of new technologies employers must also arrange for the training of low-skilled workers who work with them.

In the CR the participation of women in non-formal education is lower than that of men. This is particularly true of the youngest age group (25-34) and the oldest one (55-64) where the participation of women is almost 4 pp lower compared to men. This pattern is not common in the EU and demonstrates a relatively lower willingness to undergo further education on the part of Czech women at an age when families are typically established and before retirement. To a degree this also reflects the attitudes of employers who organise a major part of non-formal education. On the other hand, the engagement of Czech women in self-education is almost the same as with men.

The number of hours spent in non-formal education is far lower in the CR than in the EU (50 hours and 84 hours per year respectively). This does not so much concern people with tertiary qualifications, who can compare with the EU average, but people with lower qualifications. They are only involved in short courses totalling some 25 hours per year which, as in Slovakia and Poland, is the lowest figure of the entire EU (87 hours per year).

In most developed countries of the EU-15 the higher the level of education, the shorter the duration of non-formal education courses. People with low qualifications spend many more hours in non-formal education than people

with tertiary qualifications. This reflects the fact that people with low educational attainment must absorb significantly larger chunks of knowledge than people with the most advanced qualifications. This link does not occur in new member countries. On the contrary, individuals with the highest level of education spend the largest amount of time in non-formal education, while those with the lowest qualifications spend the lowest number of hours. This is also true of the CR. It appears that the short duration of courses undertaken by low-skilled people corresponds to the needs for acquiring simple skills for line production which, in terms of technology, predominates in the CR.

Retraining

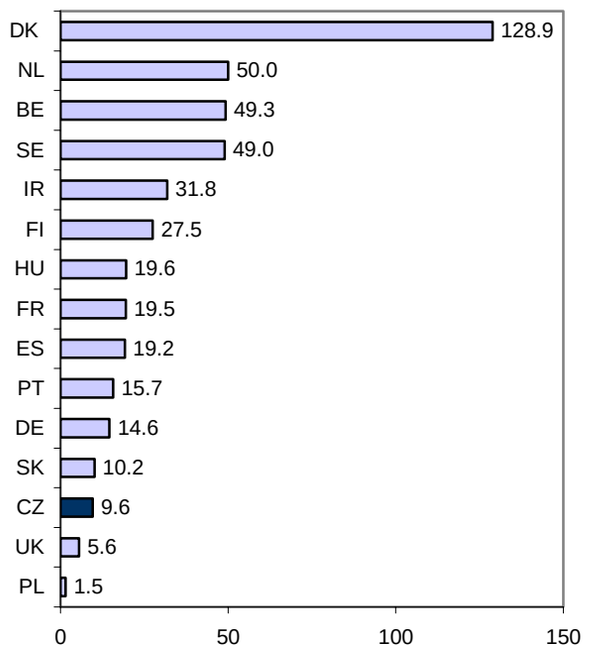
Retraining began to develop in the CR after 1990 in parallel with the development of employment services. The numbers of those retrained per year did not exceed 18 thousand until 1998, and after this year began to grow to almost 47 thousand per year in 2005. However, in relation to unemployment figures their proportion did not exceed 10% (except in 1992), which is a very low figure in view of the long-term structural mismatch between the skills of the workforce and the employers' requirements. The employers' unsatisfied demand for many professions and the overall large rate of unemployment opens up considerable room for retraining. However, its implementation comes up against barriers the elimination of which is slow and difficult.

The obstacles to retraining include a low supply of vacancies reported to labour offices and the personal characteristics of job seekers – low interest in retraining. This interest lessens along with growing age and lower qualifications. In 2005 nearly a third of all registered job seekers were classified in the category of auxiliary and non-skilled professions. This on the one hand points to a severe need for continuing training, particularly in view of the fact that only 16% of the jobs on offer do not require a vocational qualification. On the other hand, the total number of vacancies reported to labour offices only corresponds to one tenth of the overall number of job seekers, which narrows the room for specific retraining targeted to specific jobs. This facilitates a larger range of non-specific retraining which does improve the quality of the workforce but fails to prepare them for direct entry into the employment. A higher age is also a barrier to retraining. The fact is that some 25% of the unemployed are older than 50 and the two limiting factors (i.e. age and low qualifications) are often combined in this very group.

Statistical data of the Ministry of Labour and Social Affairs show (see Table 2A) that a large group undergoing retraining is young people up to 25. They are, above all, graduates of schools on various placements where they acquire practical experience. This type of retraining has the highest rate of efficiency expressed in terms of taking on a job within 12 months of retraining completion. The rate approaches 70% while the average retraining efficiency is less than 40%. The proportion of women in retraining is growing, but their efficiency is lower (some 35%).

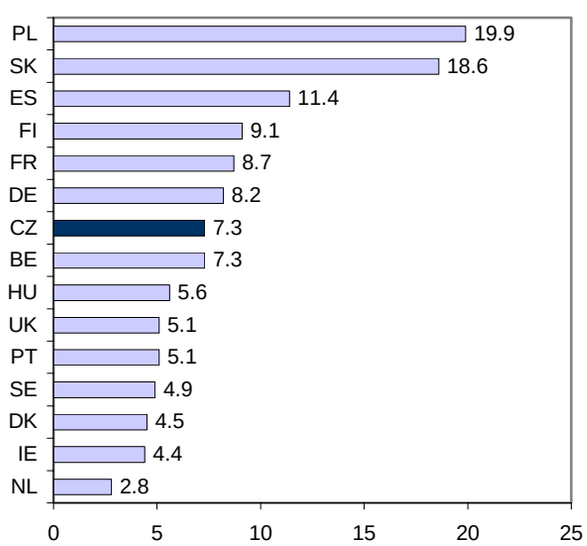
The lower participation in retraining in the CR is evident by an international comparison of the rates of participation of job seekers in retraining. This indicator states the proportion of job seekers in retraining in the overall number of job seekers (see Figure 9). As the situation in the labour market differs from country to country, this indicator should be interpreted in relation to the rate of unemployment (see Figure 10).

**Figure 9: The proportion of job seekers in retraining out of the total unemployed in selected EU countries (2002, in %)**




ource: OECD (2003), Employment Outlook, own calculations.

**Figure 10: The rate of unemployment in selected EU countries (2005, in %)**




Note: Data for 2005. The data for Great Britain and Sweden are preliminary. Source: EUROSTAT, Structural Indicators (2006).

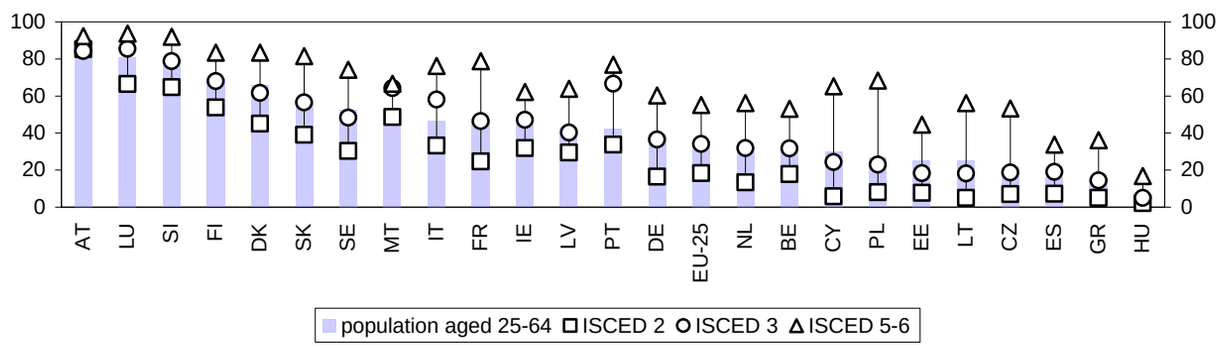
In the group of countries under review the CR is among those with higher rates of unemployment, while it ranks among the countries with the lowest proportion of job seekers in retraining. Poland is worse off than the CR in this respect with the highest rate of unemployment and the lowest proportion of the unemployed undergoing retraining. Conversely, Denmark, for example, has the highest number of retrained job seekers and low unemployment.

### Participation in informal education

Informal education covers a wide variety of self-study methods from visits to educational centres and lectures through the use of the Internet to following professional programmes in the media. In the EU-25 every third adult on average is involved in self-education. There are enormous differences among countries in terms of the rate of self-education, ranging from some 86% in Austria to 4% in Greece.[3] The CR is in the bottom group where only every fifth adult undertakes self-education (see Figure 11).

Self-study often complements other forms of learning – at school or in specialist courses. It is therefore true of most countries that the country's rankings in terms of the participation of the population in informal education and participation in other forms of education (particularly courses of non-formal education) are very similar. However, the Czech population is involved in self-study far less (21st place) than is suggested by the rate of involvement in non-formal education (15th place).

**Figure 11: Participation of adults in informal education according to educational attainment (in %)**




Source: EUROSTAT, LFS, Ad hoc module on lifelong learning 2003.

As self-education is largely a leisure activity, a low participation rate may suggest preference for personal comfort or, conversely, an excessive workload (some international surveys show that the number of hours spent at work in the CR is higher as compared to other European countries). For the sake of completeness of data we should mention a possible distortion of data as the definition of informal education is very broad and it is up to the respondent which activities (including, for example, watching TV) he/she denotes as self-education.

As regards self-education there are considerable differences in the CR between qualification groups. The margin of difference between the rate of self-education in the groups with the highest and the lowest qualifications is on average 37 pp in the EU, while in the CR it is 46 pp. While Czechs with tertiary education practise self-education similarly to their European counterparts, the CR ranks among the lowest for participation of people with basic education.

Larger participation in informal learning is seen in workers in the sector of public services and in more demanding industries of the tertiary sector, but even here participation very much depends on the level of educational attainment. In terms of the field of initial education, it is mainly teachers who learn informally.

## 2.3 Expenditure on education

Expenditure on education is an investment that promotes economic growth, enhances labour productivity and, if equal access to education is ensured, contributes to social cohesion. The level of expenditure on education reflects not only the economic resources, but also the importance attributed to education by society, enterprises and individuals. The total expenditure on education consists of public and private expenditure.

It is virtually impossible to assess whether or not expenditure on education is sufficient, as there is no generally valid criterion expressing an optimal level of expenditure per learner. Therefore there is an assumption that higher expenditure renders better educational services and learning outcomes. Although expenditure on education predetermines, to a large degree, the quality of the education system, learning outcomes do not only depend on financial costs. They are the result of a combination of these costs and the related material facilities on the one hand, and modern education policy including timely reforms in the content, methods and organisation of education on the other hand. Last but not least, learning outcomes are also affected by the quality and commitment of teachers and the motivation and willingness to learn on the part of students.

### Expenditure on initial education

Expenditure on initial education depends on a number of inter-linking factors such as the demography of the population, rate of participation in education, GDP levels, wage levels in the education sector and the education system as such.

In terms of EU comparison the CR is not among the countries with a high expenditure on educational institutions as a proportion of GDP (see Table 3A). The CR ranked at the bottom of the scale in 2002 with 4.4%. In this year most money was spent on education in Denmark (8.5% of GDP), the least in Luxembourg and Greece (3.9% of GDP). As Table 3 illustrates, in 1999-2001 the CR failed to narrow the gap from the average levels of indicators with the difference hovering at 0.9 pp. The situation slightly improved in 2002

[4] Hungary showed only a 6% rate of involvement in informal education. However, this result may be influenced by a high proportion of incomplete answers to questionnaires which were assessed statistically as non-participation.

where the gap was narrowed to 0.8 pp. Whether or not this is a signal of further catching up due to a faster growth in expenditure in the CR compared to the average figures remains to be shown by indicators in the following years.

**Table 3: The level of public expenditure on educational institutions as a proportion of GDP (in %)**

| | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|
| EU-25 | 5.0 | 4.9 | 5.1 | 5.2 |
| EU-15 | 5.0 | 4.9 | 5.1 | 5.2 |
| **Czech Republic** | **4.1** | **4.0** | **4.2** | **4.4** |
| difference between ČR and EU-25 | 0.9 | 0.9 | 0.9 | 0.8 |

Source: EUROSTAT – New Cronos, Indicators on Education Finance (2005).

The results of international comparisons change considerably if different purchasing power parities (PPP) are used for education and for GDP to calculate the expenditure. Table 4A clearly illustrates that the use of different PPP affected the level of the indicator in individual countries to a varying degree. It had strong effects in the countries where PPP for education and for GDP differ considerably. The CR ranks among the countries with far lower PPP for education compared to GDP (10.3 vs 16.5). As a result of this public expenditure on education as a proportion of GDP increased statistically in 2002 from 4.4% to 7.1%, and the CR improved its position slightly among the EU countries. From 6$^{th}$ from the bottom it moved up to 9$^{th}$ from the top.

PPP are lower for education than for GDP in all new member countries and this difference reaches up to 50% (e.g. in Estonia, Lithuania and Latvia). Conversely, in some developed countries PPP are higher for education than for GDP – e.g. in Denmark, Portugal and Luxembourg. When the same PPP were used, the old member states showed the highest proportions of public expenditure (Denmark, Sweden), but with different parities they were overtaken by a great margin by new Baltic member states (Lithuania, Estonia, Latvia).

The European Commission urges member countries to increase investment in education, but, in view of limited public finances, it also stresses the necessity of a larger involvement of private resources, particularly where there is a high level of individual and corporate return on such investment. The level of private expenditure on educational institutions reflects not only the importance attributed to education by individuals and private enterprises, but also the proportion of private education in the education system as a whole and the degree of co-funding in the case of public education. Important also is the impact of legal regulations which foster indirect instruments for encouraging private investment in education (tax allowances, etc.).

Private expenditure on education as a proportion of GDP is less than 1% in all countries under review. In the CR this indicator is below the EU average and this difference deepened in 2002 when it reached 0.3 pp (see Table 5A).

Year-on-year differences may also be influenced by the methods of research, since private expenditure is identified at the level of individual educational institutions which may not always be willing to report all private revenues, and this may result in figures that understate the levels involved.

## The effectiveness of expenditure on education

One of the ways of comparing internationally the level of effectiveness of educational expenditure is to compare cumulative expenditure per pupil aged 6-15 with the average level of literacy of 15-year-old pupils (see Chapter 1). Figure 12 below bears out the fact that learning outcomes are not merely directly dependent on expenditure on education and that lower expenditure does not automatically produce lower literacy level.

The graph breaks the countries (17 EU countries, the USA and Japan) down into four groups according to national levels of selected indicators related to the average for 17 EU countries. The smallest is the group including the CR, Ireland and Germany. These countries are typical for below-average expenditure on education and an above-average level of literacy. The second group, which is the largest, consists of six countries where both expenditure on education and the level of literacy are above the average (e.g. Finland, the Netherlands). Another group of five countries shows above-average expenditure on education and below-average level of literacy (e.g. Portugal, Italy). Finally, the last group is made up of five countries with both expenditure and literacy levels below the average (e.g. Slovakia, Poland).

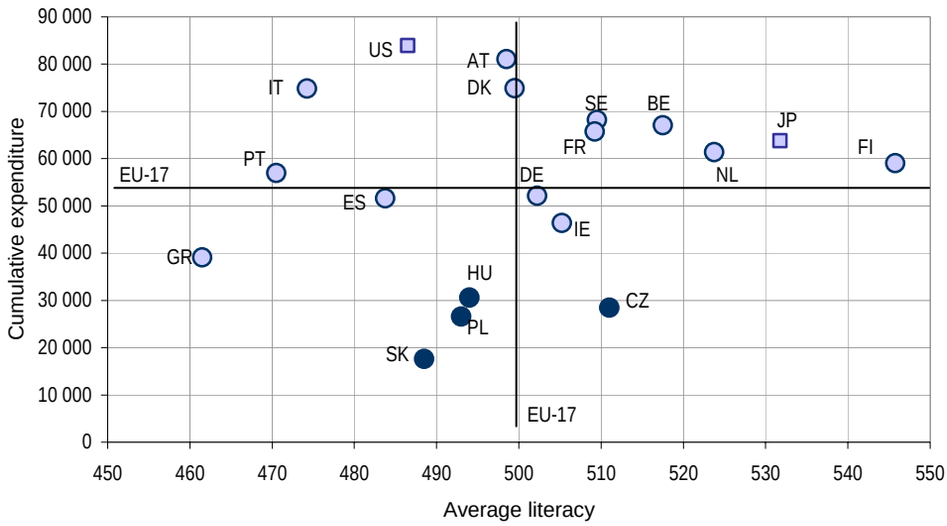
## Corporate expenditure on the training of employees

The training costs of enterprises depend on the scope and structure of the training provided. The governments of developed countries normally acknowledge the importance of a well-educated workforce and therefore adopt policies and instruments which aim to stimulate training in enterprises.

The analysis of the training expenditure of enterprises is based on a EUROSTAT study of 2000 which relates to 1999 (CVTS 2 – Continuing Vocational Training Survey).

In terms of corporate training expenditure comparison the old EU countries are positively in the lead, which is the result of their higher economic level and a more stable position of enterprises. The total costs per one course participant depend on company size and the nature of the industry. The CR ranks among the countries where the total costs per learner and year grow along with company size. In small enterprises (10-49 employees) the costs per one employee in the CR were 575 PPS, in medium-sized companies (50-249 employees) it was 597 PPS and in large companies (over 250 employees) it was 608 PPS (see Table 5). In terms of EU comparisons the CR is among the countries with the lowest training costs per employee (see Table 7A).

**Figure 12: The relationship between the average level of literacy of 15-year-old pupils (PISA 2003) and expenditure per pupil aged 6-15**




Note: The average level of literacy is calculated as a non-weighed average of mathematical, reading, scientific and problem-solving literacy. The expenditure per pupil aged 6-15 was calculated using data on expenditure on education for 2002 and it is expressed in USD using PPS. Source: OECD – Education at a Glance 2005, own calculations.

**Table 5: Total training costs of enterprises calculated per one participant (PPS, 1999)**

| | | CR | EU |
|---|---|---|---|
| Number of employees | 10-49 | 575 | 1325 |
| | 50-249 | 597 | 1436 |
| | 250 and more | 608 | 1329 |
| Branch (NACE) | Manufacturing (D) | 416 | 1298 |
| | Wholesale and retail sale (G) | 651 | 1124 |
| | Financial intermediation (J) | 1449 | 1799 |
| | Real estate, renting (K) | 1436 | 1955 |
| | Other community, social and personal service activities (O) | 589 | 1122 |
| | Other | 529 | 1171 |

Note: The EU average is calculated as a non-weighed average. Source: Continuing Training in Enterprises in Europe, European Commission, 2005. Own calculations.

It is clear from Table 5 that enterprises in the CR lag far behind the EU average. The training costs in small enterprises only amounted to 43% of the EU average, and the situation is similar in medium-sized companies (42 %). Large companies were the closest to the EU average (46%), which is linked not only to the fact that large companies have more resources, but also to the fact that they are usually owned or co-owned by foreign capital which brings about the introduction of systems for human resources management that are similar to those in the home countries.

In terms of branches, companies concerned with financial mediation are doing well in terms of international comparisons (their training costs reach 81% of the EU average), and so are companies dealing with real estate, renting and business activities (some 73%).

The total training costs of enterprises consist of three components: (a) direct costs, (b) wages of participants during their training, and (c) the difference between payments and revenues from funds designated to support continuing training. As distinct from all other countries (except Lithuania) enterprises in the CR do not contribute to a specific fund designated for the development of continuing training. However, they do obtain public resources for the training of their employees. In 1999 these subsidies (calculated per one trainee) ranked among the lowest (see Table 6A). Czech companies got 4 PPS per one employee in training, which was approximately 1% of the direct costs.

The proportions of direct costs and wage costs vary considerably from country to country. They range from 78 : 22 in Great Britain to 38 : 62 in Spain. In the CR direct costs and wage costs account for 61% and 39% of the costs respectively. The large differences in the proportions of these types of cost among countries are mainly the result of varying national approaches in terms of the distribution of costs between enterprise and individual, and the education structure of the trainees which influences the level of wage costs per trainee.

In all countries the largest chunk of the direct training costs were payments to external training organisations and trainers. In the CR these costs made up 60% of the total costs, while travel, accommodation and board costs accounted for 10% of the total costs. In terms of these proportions Czech companies compare to the EU average, but differ considerably in terms of the proportion of the wages of internal trainers and the costs of rooms, facilities and equipment. The wages of internal trainers in the CR account for 10% of direct costs, while the EU average is 20%. This reflect the fact that pedagogical work in the CR is underestimated both in initial and continuing education. On the other hand, the CR shows a high proportion of the costs of facilities etc. (19%) as compared to the EU average which is only 7% (see Table 6A).

**Table 1A: Participation of adults in formal education according to educational level (in %)**

| ISCED | SE | DK | NL | FI | ES | UK | IE | DE | BE | SI | IT | AT | PT | HU | PL | FR | **CZ** | EE | GR | SK | LV | LT | EU-25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 6.8 | 6.2 | 3.3 | 2.9 | 2.1 | 2.0 | 1.6 | 1.4 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 0.4 | 0.3 | 0.2 | **0.1** | | | | | | 1.4 |
| 3 | 11.4 | 7.7 | 7.9 | 10.8 | 7.0 | 7.9 | 5.2 | 4.0 | 3.5 | 8.0 | 8.0 | 3.1 | 13.0 | 3.1 | 3.0 | 0.6 | **1.1** | 3.2 | 2.3 | 0.8 | 4.5 | 2.4 | 5.2 |
| 5-6 | 20.8 | 8.6 | 13.2 | 12.0 | 9.0 | 14.1 | 10.9 | 3.6 | 8.6 | 14.2 | 9.7 | 5.4 | 16.2 | 6.6 | 14.3 | 2.4 | **4.3** | 5.9 | 2.1 | 2.9 | 9.8 | 6.0 | 8.5 |

Source: EUROSTAT, LFS, AHM 2003.

**Table 2A: Retrained job seekers by age, sex and educational level**

| | | total | age | | | | gender | education (ISCED) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 15 - 24 | 25-34 | 35-49 | 50+ | women | 0-2 | 3c | 3a,b | 4-6 |
| 2001 | persons | 43,560 | 15,602 | 12,867 | 12,136 | 2,955 | 25,000 | 5,928 | 14,680 | 20,354 | 2,594 |
| | in % | 100 | 35.8 | 29.5 | 27.9 | 6.8 | 57.4 | 13.6 | 33.7 | 46.7 | 6 |
| 2005 | persons | 46,772 | 13,157 | 13,084 | 14,440 | 6,091 | 28,042 | 6,068 | 16,977 | 20,599 | 3,113 |
| | in % | 100 | 28.1 | 28 | 30.9 | 13 | 60 | 13 | 36.3 | 44 | 6.7 |

Source: MPSV – http://portal.mpsv.cz/sz/stat, own calculation.

**Table 3A: Public expenditure on educational institutions as a percentage of GDP**

| | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|
| EU-25 | 5.0[s] | 4.9[s] | 5.1[s] | 5.2[s] |
| EU-15 | 5.0[s] | 4.9[s] | 5.1[s] | 5.2[s] |
| Austria | 5.8 | 5.6 | 5.7 | 5.6 |
| Belgium | .. | .. | 6.1 | 6.3 |
| Cyprus | 5.6[i] | 5.6[i] | 6.2[i] | 6.8[i] |
| **Czech Republic** | **4.1** | **4** | **4.2** | **4.4** |
| Denmark | 8.1[i] | 8.3[i] | 8.5[i] | 8.5[i] |
| Estonia | 6.1[i] | 5.5[i] | 5.4 | 5.6 |
| Finland | 6.3 | 6.1 | 6.2 | 6.3 |
| France | 5.9[i] | 5.8[i] | 5.7[i] | 5.8[i] |
| Germany | 4.5 | 4.5 | 4.5 | 4.7 |
| Greece | 3.6[i] | 3.7[i] | 3.9[i] | 3.9[i] |
| Hungary | 4.6 | 4.5 | 5.1 | 5.5 |
| Ireland | 4.5 | 4.3 | 4.3 | 4.3 |
| Italy | 4.7 | 4.5 | 4.9 | 4.7 |
| Latvia | 5.7 | 5.4 | 5.7 | 5.8 |
| Lithuania | 6.1 | 5.6 | 5.9 | 5.8 |
| Luxembourg | .. | .. | 3.8[i] | 3.9[i] |
| Malta | 4.4 | 4.5 | 4.4 | 4.5 |
| Netherlands | 4.7 | 4.8 | 4.9 | 5 |
| Poland | 4.8[i] | 5.0[i] | 5.5[i] | 5.6 |
| Portugal | 5.7[i] | 5.7[i] | 5.9[i] | 5.8[i] |
| Slovakia | 4.4[i] | 4.1[i] | 4.0[i] | 4.3[i] |
| Slovenia | .. | .. | 6.1 | 6 |
| Spain | 4.5 | 4.4 | 4.4 | 4.4 |
| Sweden | 7.4 | 7.3 | 7.3 | 7.6 |
| United Kingdom | 4.5[i] | 4.5[i] | 4.6 | 5.2[i] |

Note: s – EUROSTAT estimate; i – DK: Expenditure at post secondary non-tertiary levels of education is not available; FR: Without French Oversea Departments; CY: Includes financial assistance to students studying abroad; LU: Expenditure at tertiary level of education is not available; Imputed retirement expenditure is not available; PL, SK: Including child care expenditure at pre-primary level of education; GR, PT: Imputed retirement expenditure is not available; PT: Expenditure at local level of government is not available; UK: Adjustment of GDP to the financial year that is running from 1st of April to 31st of March. Source: EUROSTAT – New Cronos, Indicators on Education Finance (2005).

**Table 4A: Purchasing Power Parity and public expenditure on educational institutions as a percentage of GDP in 2002**

| | Purchasing Power Parity | | Share of Public Expenditure | |
|---|---|---|---|---|
| | Education | GDP | equal PPP | specific PPP |
| Austria | 1.227 | 1.056 | 5.6 | 4.8 |
| Belgium | 1.157 | 1.023 | 6.3 | 5.6 |
| Cyprus | 0.5564 | 0.5073 | 6.8 | 6.2 |
| **Czech Republic** | **10.26** | **16.53** | **4.4** | **7.1** |
| Denmark | 11.121 | 9.759 | 8.5 | 7.5 |
| Estonia | 4.052 | 8.838 | 5.6 | 12.2 |
| Finland | 1.258 | 1.12 | 6.3 | 5.6 |
| France | 0.967 | 1.043 | 5.8 | 6.3 |
| Germany | 1.494 | 1.11 | 4.7 | 3.5 |
| Greece | 0.6448 | 0.785 | 3.9 | 4.7 |
| Hungary | 78.5 | 132.9 | 5.5 | 9.3 |
| Ireland | 1.216 | 1.161 | 4.3 | 4.1 |
| Italy | 1.0172 | 0.9554 | 4.7 | 4.4 |
| Latvia | 0.1453 | 0.2949 | 5.8 | 11.8 |
| Lithuania | 0.76 | 1.658 | 5.8 | 12.7 |
| Luxembourg | 1.875 | 1.135 | 3.9 | 2.4 |
| Malta | 0.254 | 0.2838 | 4.5 | 5.0 |
| Netherlands | 1.087 | 1.067 | 5.0 | 4.9 |
| Poland | 1.304 | 2.114 | 5.6 | 9.1 |
| Portugal | 1.0006 | 0.7625 | 5.8 | 4.4 |
| Slovakia | 9.81 | 18.77 | 4.3 | 8.2 |
| Slovenia | 161.6 | 167.1 | 6.0 | 6.2 |
| Spain | 0.7881 | 0.8603 | 4.4 | 4.8 |
| Sweden | 11.37 | 10.85 | 7.6 | 7.3 |
| United Kingdom | 0.8392 | 0.7066 | 5.2 | 4.4 |

Source: OECD, Purchasing Power Parities and Real Expenditures, 2002 Benchmark Year, 2004. EUROSTAT, New Cronos, Structural Indicators (2005), own calculation.

**Table 5A: Private expenditure on educational institutions as a percentage of GDP**

| | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|
| BE | 0.3 | 0.4 | 0.4 | 0.4 |
| **CZ** | **0.5** | **0.4** | **0.4** | **0.2** |
| DK | 0.2[i] | 0.2[i] | 0.2[i] | 0.2[i] |
| FI | 0.1 | 0.1 | 0.1 | 0.1 |
| FR | 0.5[i] | 0.4[i] | 0.4[i] | 0.4[i] |
| IE | 0.5 | 0.4 | 0.4 | 0.3 |
| IT | 0.5 | 0.5 | 0.3 | 0.4 |
| CY | 1.8 | 1.8 | 1.3 | 1.5 |
| LV | 0.8[i] | 0.7[i] | 0.7[i] | 0.7[i] |
| HU | 0.6 | 0.6 | 0.6 | 0.6 |
| DE | 1 | 1 | 1 | 0.9 |
| NL | 0.5 | 0.5 | 0.5 | 0.5 |
| PL | 0.2 | .. | .. | 0.7[i] |
| PT | 0.1[i] | 0.1[i] | 0.1[i] | 0.1[i] |
| AT | 0.3 | 0.3 | 0.3 | 0.4 |
| GR | 0.3[i] | 0.3[i] | 0.2[i] | 0.2[i] |
| SK | 0.1[i] | 0.1[i] | 0.1 | 0.2 |
| SI | .. | .. | 0.9 | 0.9 |
| ES | 0.7 | 0.6 | 0.6 | 0.6 |
| SE | 0.2 | 0.2 | 0.2 | 0.2 |
| UK | 0.8[i] | 0.8[i] | 0.8[i] | 0.9[i] |
| EU-25 | 0.6[s] | 0.6[s] | 0.5[s] | 0.5[s] |

Note: s – EUROSTAT estimate; i – FR: Without French Oversea Departments; PL: Private expenditure at tertiary level of education; DK, GR, LV, PT: Payments from other private entities (i.e. firms, non-profit organisations etc.) are not available; UK: Adjustment of GDP to the financial year that is running from 1st of April to 31st of March. Source: EUROSTAT – Structural Indicators (2005).

**Table 6A: Contributions and subsidies to/from public training fund/institutions and total direct costs of CVT courses and their structure in 1999**

| | Expenditure in PPS | | | Structure of direct cost (in %) | | | |
|---|---|---|---|---|---|---|---|
| | Contr. | Subs. | Dir.c. | Ext. | Overh. | Wages | Facil. |
| AT | 2 | 18 | 701 | 64 | 14 | 13 | 9 |
| BE | 89 | 28 | 654 | : | : | : | : |
| **CZ** | **0** | **4** | **372** | **60** | **10** | **10** | **19** |
| DE | 3 | 10 | 869 | 51 | 14 | 24 | 11 |
| DK | 44 | 42 | 1,249 | 63 | 19 | 6 | 11 |
| EE | 1 | 5 | 725 | 73 | 13 | 10 | 4 |
| ES | 197 | 114 | 549 | 49 | 12 | 32 | 8 |
| FI | 18 | 55 | 623 | 61 | 18 | 15 | 6 |
| FR | 261 | 112 | 770 | 57 | 6 | 35 | 1 |
| GR | 166 | 158 | 671 | 46 | 21 | 24 | 9 |
| HU | 319 | 23 | 483 | 80 | 7 | 8 | 5 |
| IE | 19 | 38 | 893 | 53 | 5 | 39 | 3 |
| IT | 5 | 144 | 1,508 | 63 | 9 | 22 | 6 |
| LT | 0 | 3 | 386 | 67 | 16 | 11 | 6 |
| LV | 1 | 9 | 500 | 65 | 18 | 10 | 6 |
| NL | : | : | : | 72 | 6 | 18 | 4 |
| PL | 1 | 1 | 386 | 60 | 19 | 16 | 4 |
| PT | 2 | 83 | 740 | 67 | 9 | 20 | 5 |
| SE | 6 | 49 | 819 | 64 | 11 | 20 | 4 |
| SI | 1 | 17 | 311 | 69 | 13 | 16 | 3 |
| UK | 86 | 61 | 984 | 32 | 9 | 43 | 16 |
| EU-20 | 61 | 49 | 710 | 61 | 12 | 20 | 7 |

Note: Contr. - Contributions PPS, Subsidies PPS, Direct costs PPS, External PPS, Overh. - Travel, accommodation, alimentation; Wages - Wages of internal trainers; Facil. - Rooms, equipments, utilities.

Source: Continuing Training in Enterprises in Europe, EUROSTAT (2005), own calculation.

**Table 7A: Total costs of Continuing Vocational Training courses per participant by size class and NACE (in PPS)**

| | Employees | | | NACE | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10-49 | 50-249 | 250 and more | D | G | J | K | O | Others |
| Austria | 1,020 | 1,104 | 1,232 | 1,189 | 930 | 1,807 | 1,383 | 582 | 1,052 |
| Belgium | 1,651 | 1,765 | 1,592 | 1,553 | 1,596 | 1,800 | 2,019 | 1,316 | 1,462 |
| **Czech Republic** | **575** | **597** | **608** | **416** | **651** | **1,449** | **1,436** | **589** | **529** |
| Denmark | 1,879 | 2,297 | 2,163 | 2,083 | 1,499 | 3,019 | 3,388 | 2,311 | 1,948 |
| Estonia | 1,278 | 1,306 | 732 | 678 | 1,641 | 1,727 | 2,286 | 305 | 691 |
| EU-22 | 1,325 | 1,436 | 1,329 | 1,298 | 1,124 | 1,799 | 1,955 | 1,122 | 1,171 |
| Finland | 1,381 | 1,311 | 1,418 | 1,433 | 1,128 | 1,975 | 1,734 | 1,027 | 1,326 |
| France | 1,238 | 1,373 | 1,751 | 1,524 | 1,036 | 1,980 | 2,104 | 1,614 | 1,720 |
| Germany | 1,003 | 1,548 | 1,736 | 1,601 | 949 | 2,614 | 2,394 | 909 | 1,059 |
| Greece | 1,512 | 2,935 | 1,165 | 2,371 | 1,637 | 1,131 | 1,974 | 1,216 | 869 |
| Hungary | 1,390 | 1,317 | 1,057 | 1,000 | 1,224 | 1,246 | 2,089 | 1,042 | 1,150 |
| Ireland | 1,620 | 1,319 | 1,453 | 1,538 | 1,144 | 1,454 | 1,614 | 1,142 | 1,472 |
| Italy | 2,913 | 2,430 | 1,927 | 1,979 | 2,471 | 2,737 | 3,708 | 2,823 | 1,658 |
| Latvia | 524 | 672 | 676 | 510 | 602 | 761 | 914 | 230 | 749 |
| Lithuania | 1,037 | 649 | 656 | 402 | 864 | 813 | 1,365 | 403 | 786 |
| Luxembourg | 1,603 | 1,174 | 1,930 | 1,630 | 896 | 2,554 | 2,218 | 1,010 | 877 |
| Netherlands | 1,467 | 1,954 | 2,462 | 2,072 | 1,430 | 3,628 | 2,666 | 1,543 | 1,856 |
| Poland | 735 | 494 | 609 | 555 | 799 | 523 | 715 | 618 | 558 |
| Portugal | 1,105 | 1,208 | 1,473 | 1,125 | 854 | 2,382 | 2,723 | 1,424 | 1,413 |
| Slovenia | 859 | 530 | 481 | 376 | 368 | 1,013 | 1,087 | 788 | 631 |
| Spain | 1,352 | 1,380 | 1,590 | 1,569 | 1,116 | 2,098 | 1,390 | 1,473 | 1,483 |
| Sweden | 1,229 | 1,263 | 1,544 | 1,398 | 1,034 | 1,423 | 1,894 | 1,183 | 1,424 |
| United Kingdom | 1,768 | 2,971 | 991 | 1,544 | 853 | 1,436 | 1,914 | 1,127 | 1,059 |

Source: Continuing Training in Enterprises in Europe, EUROSTAT (2005), own calculation.

## 3. Human resources for a knowledge-based economy

Human resources for a knowledge-based economy are analysed from two perspectives. The first is the proportion of technology-intensive manufacturing industries and the knowledge-intensive service industries in overall employment, and the demands they place on scientists, technicians and people with tertiary education. An international comparison of the representation of skills-intensive and ICT professions in the economy is also made.

The second perspective is the supply of human resources for a knowledge-based economy with an exclusive focus on graduates of tertiary programmes, as issues related to R&D workers are part of the chapter on innovation. Specific attention is paid to graduates of science and technology programmes. A quantitative international comparison is complemented by evaluation of the higher education quality.

### 3.1 Employment structure

One of the characteristics of developed economies is a strong representation of R&D-intensive industries in the economy. These are technology-intensive manufacturing industries and knowledge-intensive service industries. Employment in these industries provides an overall picture of a knowledge-based economy development degree.

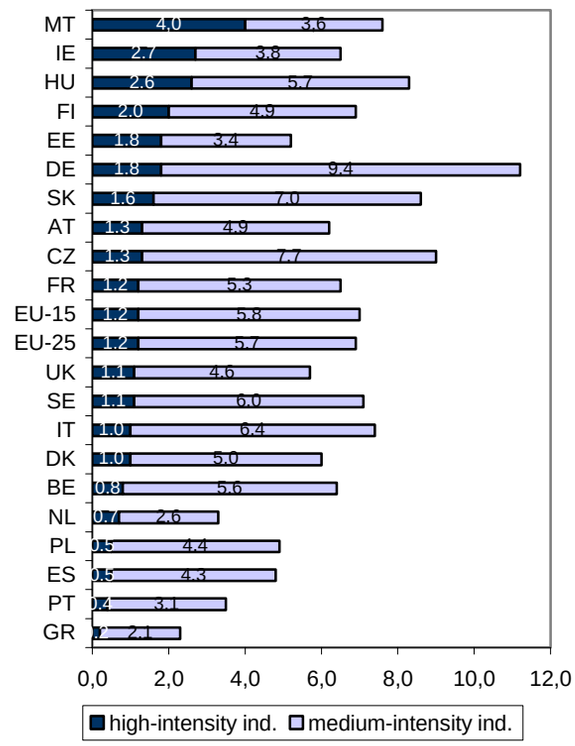
Technology- and knowledge-intensive industries in various countries may differ significantly in terms of their real intensity – i.e. R&D intensity. It is therefore impossible to state clearly that higher proportions of these industries in overall employment imply a more technologically developed economy. For more accurate conclusions it is advisable to add an indicator of the structure of employment according to educational attainment and the representation of skills-intensive professions. A higher proportion of these employees points to a higher technology and knowledge intensity of the particular industry. Labour productivity also has an influence that is not negligible.

#### Employment in technology-intensive manufacturing industries

According to OECD and EU statistics technology-intensive manufacturing industries include high-intensive ones (NACE 30 - Manufacture of office machinery and computers, 32 – Manufacture of radio, television and communication equipment and apparatus, 33 - Manufacture of medical, precision and optical instruments, watches and clocks) and medium-intensity industries (NACE 24 – Manufacture of chemicals and chemical products, 29 – Manufacture and repairs of machinery and equipment, 31 – Manufacture of electrical machinery and apparatus, 34 – Manufacture of motor vehicles, trailers and semi-trailers, 35 – Manufacture of other transport equipment).

The CR ranked among EU countries with the highest employment in technology-intensive industries. In 2004 it was 9% in overall employment – only Germany scored higher (11.2%). Although in 1998-2004 this proportion in the CR would not always increase year-on-year, the overall increase was 2.5 pp. This was mainly due to direct foreign investment which, however, continues to flow into the car industry especially – i.e. an industry with a medium technology intensity. Investment in highly technology -intensive industries, such as the production of TV sets, is also targeted to so-called "lower intensity levels" – i.e. assembling.

**Figure 1: Share of technology-intensive manufacturing industries in overall employment, 2004 (in %)**




Source: EUROSTAT (2004).

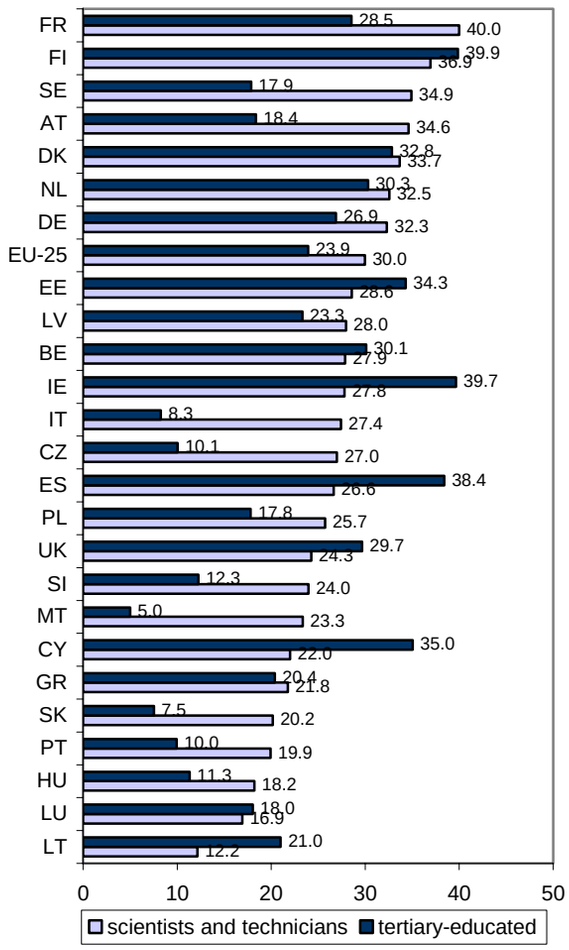
The high proportion of employment in technology-intensive industries in the CR is influenced, above all, by employment in medium-intensive industries which, in 2004, accounted for 7.7% of total employment, whereas it was only 1.3% for highly-intensive industries. The highest proportion of high-intensity industries in employment in 2004 was shown by Malta (4%) and Ireland (2.7%), for medium-intensity industries it was Germany (9.4%) and the CR (7.7%).

In 2004 scientists and technicians[5] accounted, in EU-25 average terms, for almost one third (30%) of employment in technology-intensive industries. The differences between countries illustrate the degrees to which these industries are advanced. From this perspective the most advanced technology-intensive industries are in France and Austria where the proportion of scientists and technicians reached 40% and 34.6% respectively. The CR tends to have less intensive activities, as is documented by a below-average level of this indicator (27%).

The number of scientists and technicians employed in technology-intensive industries increase over time. The year-on-year pace of growth in 2000-2004 was on average 0.4 pp in EU-25 and slightly lower, 0.3 pp, in the CR. These relatively low dynamics reflect the fact that the representation of these professions did not always show a year-on-year increase and there were also downturns.

[5] ISCO 2– Scientists and professionals, ISCO 3 – Technicians, healthcare personnel and teachers.

**Figure 2: Share of scientists, technicians and people with tertiary qualifications employed in technology-intensive manufacturing industries, 2004 (in %)**




Source: EUROSTAT (2004).

Figure 2 clearly shows that in most countries the proportions of scientists and technicians are higher than those of people with tertiary qualifications. The margin of difference in favour of scientists and technicians in 2004 was 6 pp in EU-25. Only 9 countries had a larger proportion of people with tertiary qualifications, and in three countries (Denmark, Luxembourg and Greece) the proportions were nearly identical – the difference oscillating around 1 pp in both directions. A relatively strong prevalence of people with tertiary education over scientists and technicians was identified in Ireland, Span and Cyprus (some 12 pp). This difference show that people with tertiary qualifications in these countries occupy, to a large degree, other positions than those of scientists and technicians, particularly the positions of senior officials and managers (ISCO 1).

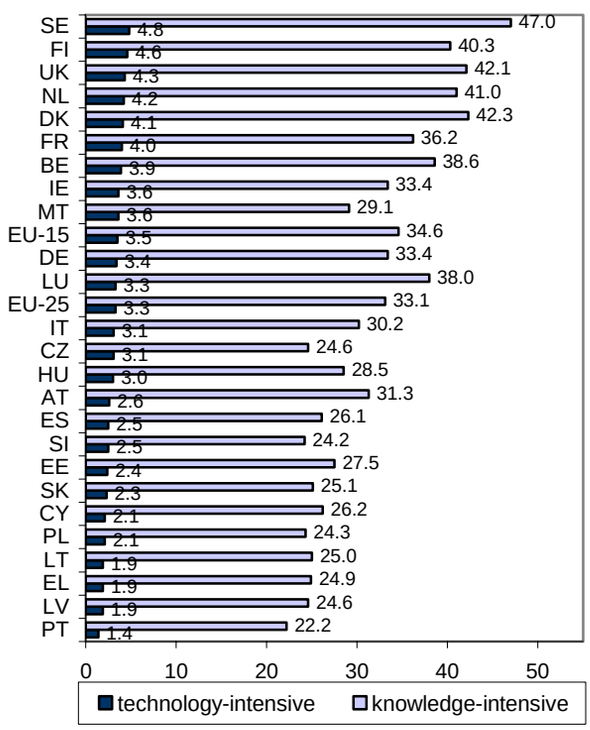
The CR ranks among the countries with a relatively large difference between the proportion of scientists and technicians on the one hand and the proportion of people with tertiary qualifications on the other hand. Individuals with tertiary education only account for 10.1% of overall employment in technology-intensive industries, which is 17 pp less than the proportion of scientists and technicians. Only Italy and Malta showed a larger difference, while the figures are comparable in Austria and Sweden. The differences testify to the fact that the professions of scientists and technicians are, to a large degree, practised by people with lower than tertiary education, which reflects not only international differences in educational attainment, but also a varying intensity of industries and differences in education systems. To acquire certain qualifications only secondary education is required in some countries, while in others one needs to complete shorter tertiary education.

## Employment in knowledge-intensive services

Knowledge-intensive services consist of 14 industries which are grouped into (a) technology-intensive services (NACE 64 – Post and telecommunications, 72 – Computer and related activities, and 73 – Research and development), (b) market services, (c) financial services, (d) other knowledge-intensive services.

Employment in knowledge-intensive services as a proportion of overall employment was one third in EU-25 in 2004 (33.1%) (see Figure 3). Sweden showed the highest level of advancement in this area (47%), Portugal ranked the lowest (22.2%). The CR was among the countries with this proportion approaching one fourth of the overall number of employed persons (24.6%) – i.e. countries that are underdeveloped in this respect.

**Figure 3: Share of knowledge- and technology-intensive services in overall employment, 2004 (in %)**




Source: EUROSTAT (2004).

Although a high level of development of knowledge-intensive services is an important feature pointing to high economic standards of a country, what is even more relevant in this respect is the proportion of technology-intensive services – i.e. post and telecommunications, computer and related activities and research and development. As the figure above illustrates, these three service industries accounted for some 3.3% of overall employment in EU-25 in 2004.

There are quite strong differences in the EU with this indicator ranging from 1.4% in Portugal to 4.8% in Sweden. The countries with higher proportions of knowledge-intensive services normally also show a higher proportion of technology-intensive services. The largest proportions are seen in old member states (except Portugal and Greece), the lowest in new member countries.

The proportion of technology-intensive services in the CR in 2004 was slightly below the average at 3.1% of overall employment, which is 0.2 pp less than the EU-25 average. Over the last five years (2000-2004) there was no major improvement in the CR. The proportion of technology-intensive services ranges between 3.0 and 3.2%.

The proportion of technology-intensive services in total employment in knowledge-intensive service industries in the CR was 13% in 2003, which was the largest figure in terms of EU-25. The proportions of other components of knowledge-intensive services were as follows: market services – 20.1 %, financial services – 8.5 %, other knowledge-intensive services – 58.4 % (see Table 1A). The comparison with average figures for developed EU countries demonstrates that the CR has an underdeveloped sector of market and financial services.

As technology-intensive services as well as technology-intensive manufacturing industries include activities with varying levels of intensity, it is advisable to look at the occupational and education structure in these sectors. The proportion of scientists (ISCO 2) and technicians (ISCO 3) in employment in technology-intensive services increased in EU-25 from 42% to 49.9% between 1999-2004. The CR with its 50% ranks slightly above the EU average (see Figure 4).

The representation of people with tertiary education is slightly lower than that of scientists and technicians. In EU-25 average terms their proportion was 39.3% in 2004, which is 10.2 pp less compared to the proportion of scientists and technicians. The proportion of people with tertiary qualifications increased in 1999-2004 (by 6 pp). However, the increase is slower in comparison with scientists and technicians (by 7.9 pp).

The larger proportion of scientists and technicians than that of people with tertiary qualifications reflects, as in the case of technology-intensive manufacturing industries, the fact that these professions are practised with lower qualifications. This is typical of most EU countries, only in nine countries is the opposite true. The largest prevalence of individuals with tertiary qualifications over scientists and technicians was in Ireland (12.7 %).

In the CR people with tertiary education accounted for 26.6% of employment in technology-intensive services in 2004, which is far less than the EU-25 average (by 12.7 pp). This is the result of a generally lower proportion of people with tertiary education, and the differences in education systems, the impact of which has been already mentioned in relation to technology-intensive manufacturing.

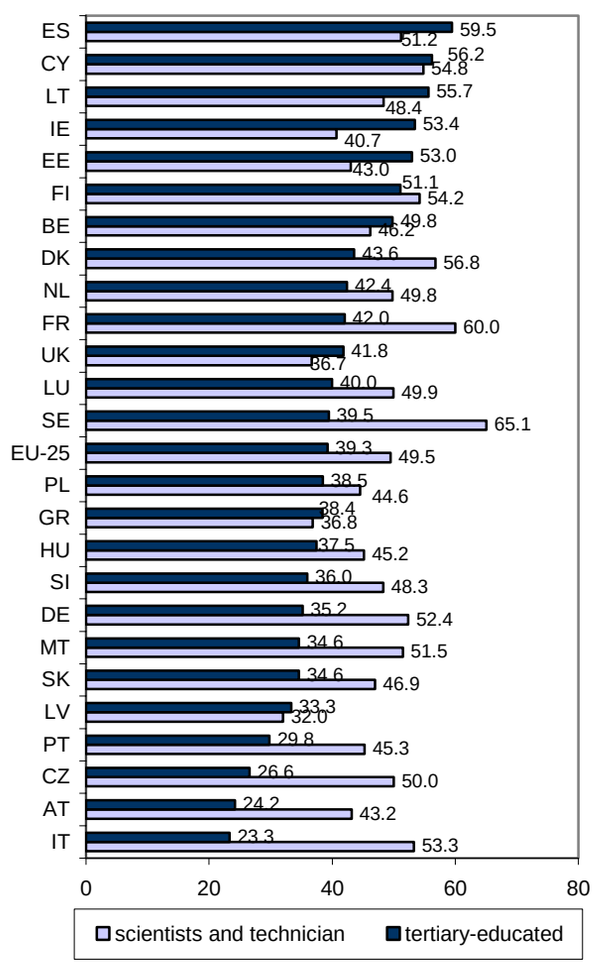
### Scientists and technicians in the economy

The development, application and use of modern technologies in the economy is mainly the job of scientists and professionals (ISCO 2) and technicians (ISCO 3). Their proportion in overall employment in EU-25 exceeds one fourth. In 2005 it was almost 30%. The largest proportion of these professions was in Sweden (39%), the smallest in Portugal (16.9%) (see Figure 5).

In 2000-2005 the proportion of these professions in overall employment in EU-25 increased slightly (from 27.3% to 29.7%). Some countries report a stable increase (Sweden, Germany), others show periods of year-on-year increases alternating with periods or years of downturn. In the course of 2000-2005 the highest increase in the proportion of scientists and technicians occurred in Austria (6.5 pp) and Slovenia (6.1 pp). A negative trend was reported from only one member country, Finland (decrease of 1.3 pp).

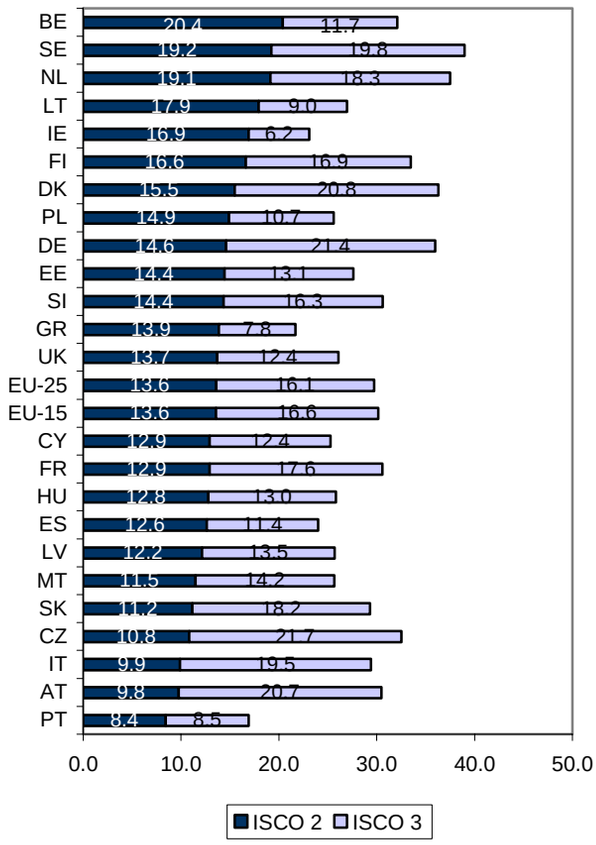
In the CR scientists and technicians accounted for nearly one third of employment in 2005 (32.5%). In 2000-2005 the level of the indicator hovered around both the EU-25 and EU-15 average, the overall increase was 3 pp. As Figure 5 clearly illustrates, the CR's favourable international ranking for the proportion of scientists and technicians is the result of a large share of technicians (ISCO 3), i.e. less demanding positions. Their proportion in overall employment in 2005 was 21.7%, which was the highest in the EU. Conversely, the representation of scientists (ISCO 2) in the CR in 2005 was below the average (2.8 pp difference). It is evident that the Czech economy still cannot be denoted as knowledge-intensive.

**Figure 4: Share of scientists and technicians and people with tertiary education employed in technology-intensive services in overall employment in these services, 2004 (in %)**




Source: EUROSTAT (2004).

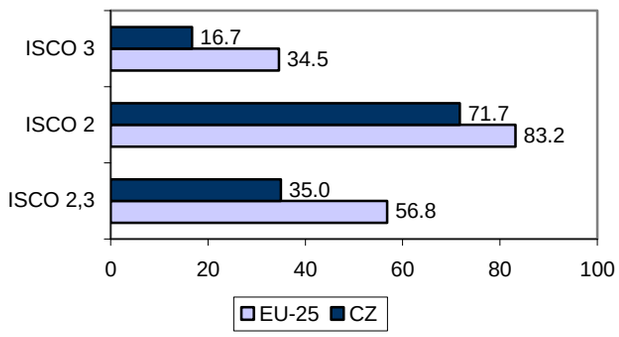
**Figure 5: Share of scientists and technicians , 2005 (in %)**




Source: EUROSTAT (2005).

A similar conclusion may be drawn from a comparison of the education structure of those who hold the positions of scientists and technicians. In these professions the CR has a below-average proportion of people with tertiary qualifications (see Figure 6).

**Figure 6: Share of tertiary educated working as scientists and technicians, 2005 (in %)**



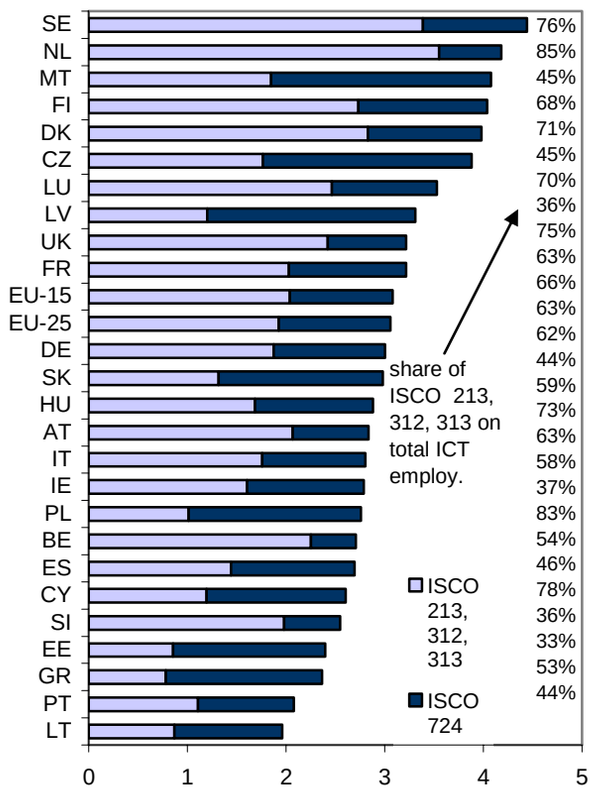

Source: EUROSTAT (2005).

This below-average proportion of tertiary educated people employed as scientists and technicians in the CR is directly linked not only to the overall below-average representation of people with completed tertiary education, but also to the lower qualification requirements of these professions. There is also an influence of differences in education systems. In the countries where the relevant vocational knowledge and skills are acquired as early as secondary education, the proportion of tertiary qualification holders is lower than in the countries where similar professions require lower tertiary qualifications. While in EU-25 the proportion of people with tertiary qualifications in the positions of scientists and technicians is some 57% on average, it is only 35% in the CR (see Table 3A).

## ICT professions in the economy

The OECD publication "Science, Technology and Industry: Scoreboard 2001" defines ICT professions using the following ISCO categories: 213 – computing professional, 312 – computer associate professionals, 313 – optical and electronic equipment operators and 724 – electrical and electronic equipment mechanics and fitters.

**Figure 7: Share of ICT jobs in overall employment and share of ICT jobs with high skills intensity in total ICT employment (in %)**




Source: EUROSTAT, LFS. Data for 2nd quarter of 2004.

The proportions of ICT professions in employment in the CR and the EU are shown in Figure 7. The CR with nearly 4% ranks 6th among European countries. This proportion is above the EU average (1 pp), which suggests a stronger potential for ICT support for the economy and society development compared to other countries.

ICT professions may be broken down into those with high skills-intensity (ISCO 213, 312 a 313) and those with lower skills-intensity (ISCO 724) (see Figure 7). In terms of comparison with other EU countries the CR has a lower proportion of high skills-intensity professions which deal with the development of new hardware and software. These only account for 45%, while mechanics and service engineers predominate (ISCO 724).

The largest proportion of ICT professions requiring high skills in EU terms can be seen in the Netherlands and Belgium (over 80%). The EU-25 average is 63 %.

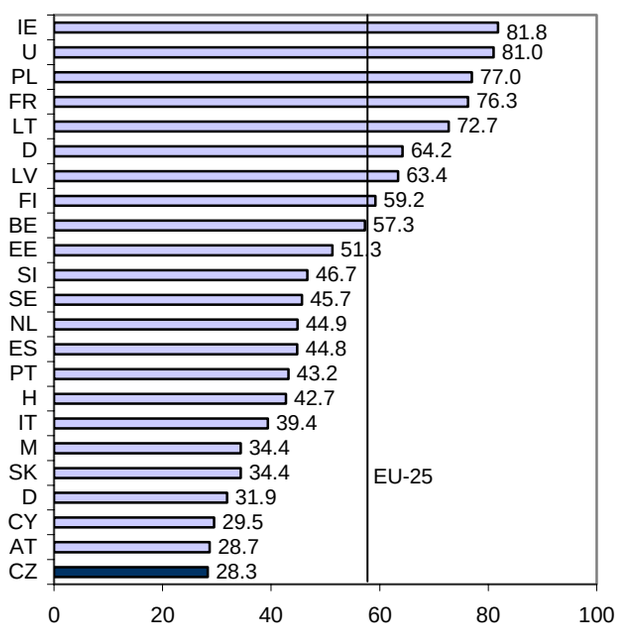
## 3.2 Preparation of human resources at tertiary level

A high number of students in tertiary education is a precondition for implementation of R&D, innovation and their practical application. People with tertiary education contribute not only to the society development as a whole, but also face less severe difficulties finding employment. They are also more willing to learn throughout their lives.

The scope of training of young specialists for skills-intensive professions can be expressed in terms of the number of graduates of tertiary programmes in relation to the age group which typically completes this education (20-29). In the CR tertiary education can be obtained in ISCED 5B programmes lasting 3 years (in healthcare disciplines 3.5 years). These studies are practically focused and provided, in the CR, by tertiary professional schools (*vyšší odborné školy*).

Higher education institutions (*vysoké školy*) provide programmes at ISCED 5A level. They include bachelor programmes the standard length of which is at least three and at most four years. They are focused on training for various occupations. There are also master programmes following on upon bachelor programmes and focusing on acquisition of theoretical knowledge, its application and the development of creative skills. They normally last one to three years. There is a specific type of master programme which does not follow from a bachelor programme and lasts four to six years. Doctoral study programmes (ISCED 6) are concerned with scientific research and independent creative activities. They normally last three years.

**Figure 8: Tertiary education graduates per 1,000 population aged 20-29, 2003**

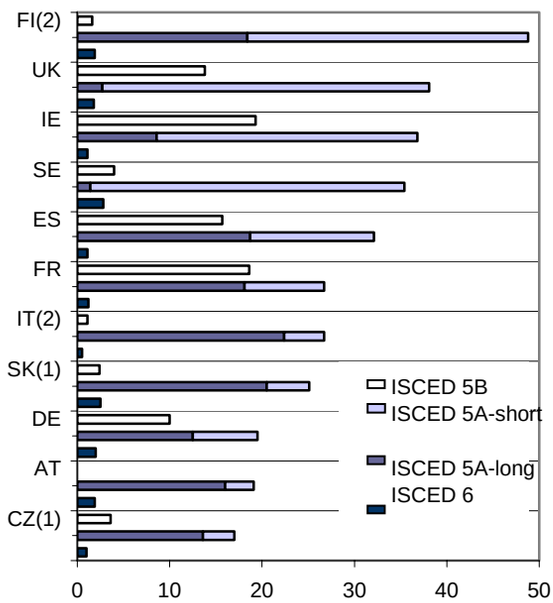



Source: EUROSTAT, own calculations.

The sources of inflow of young specialists into qualified professions are insufficient in the CR. As Figure 8 shows, the proportion of graduates in the age group mentioned above was far below the EU-25 average in 2003. While the average proportion of graduates in the EU was some 5.3%, it was only about 2.8% in the CR.

The number of graduates of study programmes of various lengths differs from country to country. In most old EU countries the internal differentiation of tertiary education occurred much earlier and its scope was larger than in the CR. At present, young people in the CR achieve tertiary education mostly in longer (i.e. 5-6-year) master programmes. The proportion of graduates of these programmes in the relevant age group is comparable with that in Germany, it is higher than, for example, Ireland, and compared to Great Britain, it is higher by fivefold. In these countries graduates of shorter programmes predominate. (see Figure 9).

**Figure 9: Share of tertiary education graduates, 2003**




Note: (1) proportions of graduates may include a double calculation of graduates of tertiary studies of A and B type; (2) the data relates to the year 2002. Source: Education at a Glance, OECD 2005.

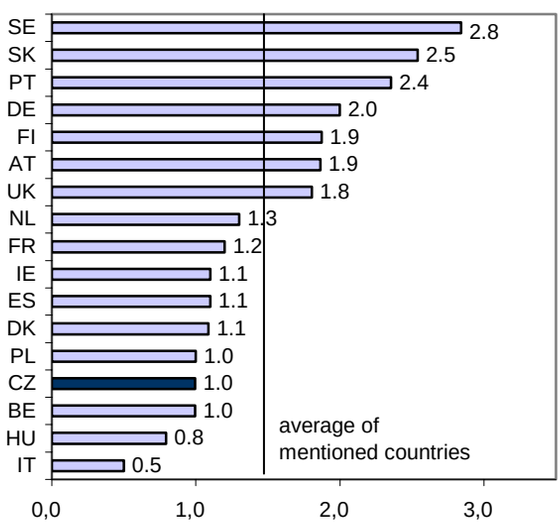
In 2003 the scope of shorter forms of tertiary studies was much less extensive in the CR than in other countries. The proportion of graduates of ISCED 5B study programmes, in the population group representing a typical age for completion of such tertiary education, was twice to three times lower as compared to Germany, Great Britain and Ireland. In the CR a stimulus for the expansion of the range of shorter tertiary programmes was an amendment to the law on higher education institutions of 2000 which has established a more solid framework and timetable for the transfer of Czech HE institutions to structured studies. While before the amendment was enacted the proportion of students admitted to the first years of bachelor programmes oscillated between 20% and 30% (immediately before its adoption it even dropped), after the amendment was passed the proportion experienced a steep growth rate to the current 75%. The educational path through tertiary education has become more flexible and students can complete its shorter part. However, most institutions design bachelor programmes as a first cycle of master studies rather than as an independent, practice-focused education. This is why most students continue studying the follow-up master degrees. The real transformation of higher studies into a binary education system still requires further development.

The production of specialists in shorter tertiary programmes, practically focused bachelor programmes in particular, is falling short of prompting a solid improvement in the inadequate qualifications structure in the CR. A shortage of these specialists cannot be offset by qualifications at the secondary level, as the requirements for the practice of various professions are increasing, tertiary education is demanded even in the jobs where secondary qualifications have until now sufficed.

### Graduates of doctoral study programmes

As regards the preparation of specialists for research and development, it is important how HE institutions address the training of doctoral students. The number of graduates of doctoral studies in the CR has experienced a steep increase – it doubled between 2000 and 2003. Despite this the rate of participation in doctoral studies, as a proportion of graduates in the population of typical age for completion of this level of education, is about two thirds of the European average. Similar unfavourable rates can be also seen in Poland and Belgium.

**Figure 10: Share of doctoral programmes graduates, 2003 (in %)**




Notes: A net rate of graduates is calculated as a sum of the rates for individual age groups, with the exception of France and Italy. Source: Education at a Glance 2005, OECD.

Slovakia, which until recently showed similar characteristics as the CR (see Figure 10) achieved a far larger participation in doctoral studies than the CR in 2003. The highest proportion of graduates of doctoral programmes in the relevant age group was in Sweden, the lowest in Italy.

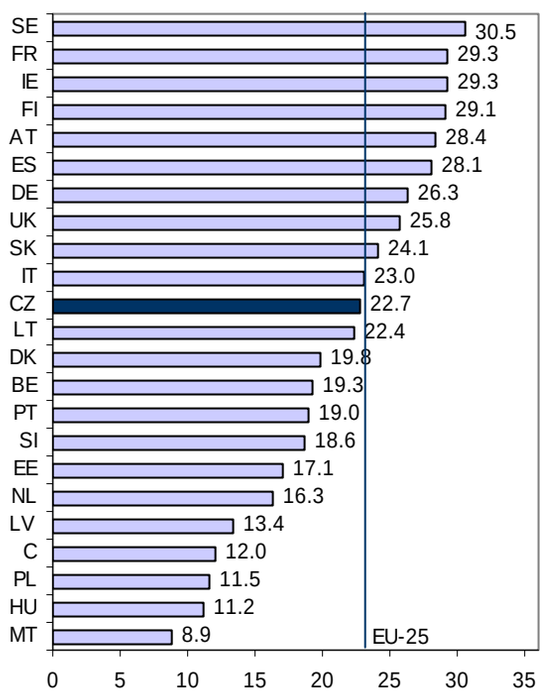
### Graduates of science and technology

Graduates of science and technology programmes (S&T) at tertiary professional schools and higher education institutions, and graduates of doctoral studies in these disciplines constitute the largest potential for the development and application of new findings.

In terms of the proportion of graduates of S&T programmes in all graduates of tertiary studies the CR ranks 11$^{th}$ of 23 EU countries (Greece and Luxembourg not included). In 2003 the level of this indicator in the CR was 22.7%, which is only 0.6 pp less than the EU average (see Figure 11). Among the new member states the CR, together with Slovakia, achieved the best results. The CR was 1.4 pp behind Slovakia.

The average level of this indicator hides considerable differences between various countries. In Sweden graduates of S&T programmes accounted for nearly one third of all graduates of tertiary studies, which reflects a favourable situation both in terms of the capacity of schools providing education in these disciplines, and the interest shown in these fields and the study success rate as compared to other fields of study. Conversely, the least favourable figure was scored by Malta, followed by Hungary.

**Figure 11: Share of science and technology programmes graduates, 2003 (in %)**




Source: EUROSTAT (2005), own calculations.

What is unfavourable is the finding that the overall proportion of S&T graduates in the CR has decreased slightly in recent years (see Table 1). In 1998 it was nearly 25% making it only 1.4 pp behind Sweden, which in the same period expanded the range of these programmes and in 2003 topped the EU list with 30.5% of S&T.

The number of graduates of doctoral programmes in S&T as a proportion of the 25-34 population is 0.5 per thousand in the CR, which is only some 40% of the EU-25 average. This proportion has been increasing but the pace of growth is slower than in both EU-15 and EU-10. This leaves the CR increasingly behind both groups of countries.

**Table 1: Share of science and technology programmes graduates (in %)**

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| EU 25 | 24.4 | 24.1 | 23.5 | 23.4 | : | 23.3 |
| EU 15 | 26.1 | 26.2 | 25.9 | 26.3 | : | 26.1 |
| EU 10 | 15.3 | 14.9 | 13.8 | 12.8 | : | 13.6 |
| CZ | 24.6 | 24.0 | 24.4 | 22.0 | 23.2 | 22.7 |

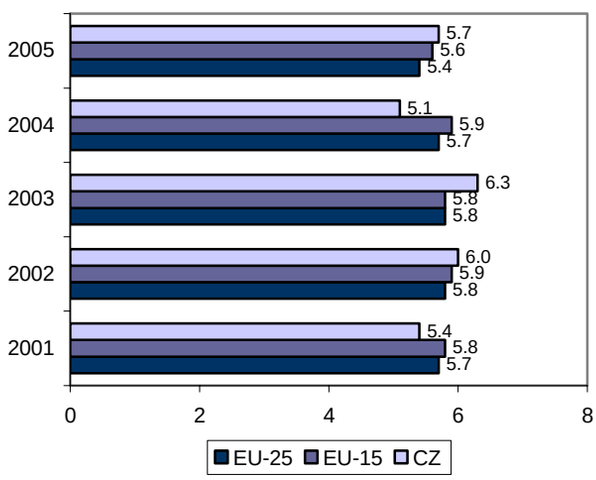
Source: EUROSTAT, own calculations.

The proportion of graduates of doctoral studies in S&T in the CR is quite favourable – 53% of the total number of doctoral graduates. It is roughly 11 pp more than the EU-25 average. However, there has been a relative decrease in interest in doctoral studies in these disciplines. Between 1998 and 2000 the proportion of graduates of doctoral programmes in these fields was higher (57%).

### Quality of tertiary education

Besides the quantitative view of tertiary education, the aspects of quality are also important. The quality of higher education institutions is conducive to the competitiveness of the labour force in the given country, and it is one of the key parameters investors consider when deciding on investments with a high value added allocation. Good quality education entails not only the capacity to take over technological innovations, but also the capacity to take active part in their development.

**Figure 12: Quality of tertiary education in 2001-2005**



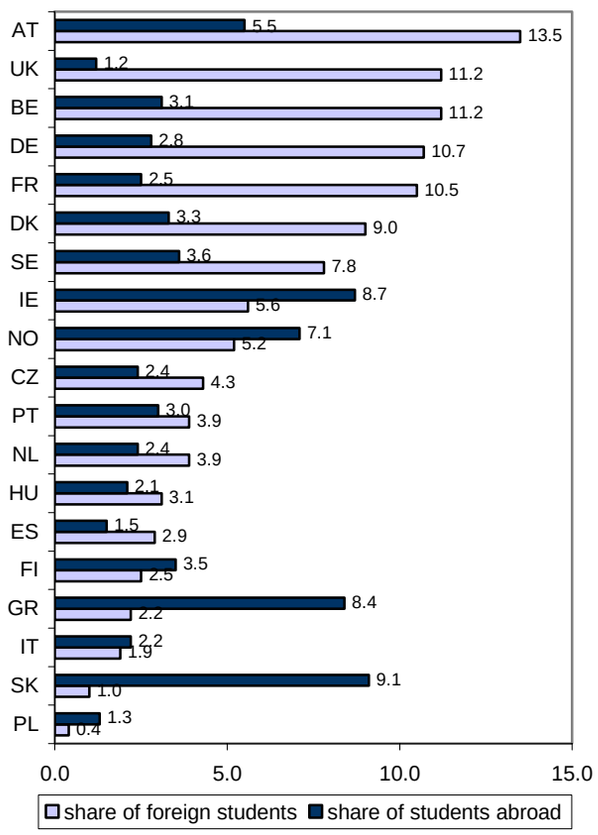

Source: IMD – International Competitiveness Yearbook, 2005.

Evaluation of the quality of tertiary education is a subject of research by the Swiss International Institute for Management Development which carries out annual surveys via questionnaires involving domestic and foreign experts and domestic executive officials. The respondents answer the question "How does the quality of higher education meet the needs of a competitive economy"? The quality of tertiary education is assessed on a 0-10 scale. The higher the number of points, the better the quality meets the needs of a competitive economy.

The CR ranked slightly above the EU-25 and the EU-15 average for the quality of tertiary education in 2005 (see Figure 12). Finland topped the scale for the quality of tertiary education keeping this exclusive position throughout the entire period for which the data are available – i.e. 2001-2005. A problem attached to surveys via questionnaires is the level of objectivity. Although changes in the quality of tertiary education occur slowly and over a longer period, it is clear from Figure 12 that the year-on-year ratings in this period relatively fluctuate. The quality of tertiary education in the CR in the period under review was for three years above the EU-25 and EU-15 average, and for two years below this average (see Table 2A).

Another approach to evaluation of tertiary education quality consists in a ranking of world universities. This approach is used by the Shanghai University; ranking is based on evaluation of pedagogical and research performance of the relevant university. According to these criteria only one Czech institution, Charles University, was rated among the top five hundred. Out of European universities the top 500 included 42 British, 12 Dutch, 8 Swiss, 5 Finish, 5 Austrian, and 5 Danish institutions. As regards the new EU members, the list included 3 Hungarian and 2 Polish universities. It is clear from this rating that the research potential of Czech higher education institutions is low not only as compared to advanced world research centres, but also as compared to some Central European countries.

**Figure 13: Share of foreign students, 2003 (in %)**




Notes: DE,NL,PL – without doctoral programmes ISCED 6, PL without tertiary programmes ISCED 5B Source: OECD.

The quality of national systems of tertiary education increasingly reflects the aspect of openness towards foreign students and teachers. The openness of HE institutions brings along not only an increase in the quality of study programmes and instruction methods, but also the possibility of acquiring additional financial resources in the form of tuition fees from foreign students.

As Figure 13 clearly illustrates the openness of Czech HE institutions lags behind the EU average. As compared to European countries which rank the best for admission of foreign students, e.g. Austria, Great Britain, Germany and France, the proportion of foreign students in the CR only accounts for some 40% of the proportions of foreign students in these countries. However, if we compare these data with countries which, similarly to the CR, do not have the advantage of the national language being international, the results compare better.

**Table 1A: Structure of employment in knowledge-intensive services (%, 2003)**

| | high-tech | market | financial | other |
|---|---|---|---|---|
| **CZ** | **13.0** | **20.1** | **8.5** | **58.4** |
| FI | 11.8 | 22.6 | 5.2 | 60.5 |
| IE | 11.7 | 22.0 | 12.3 | 54.0 |
| FR | 11.5 | 23.9 | 8.2 | 56.5 |
| HHU | 11.3 | 20.6 | 6.6 | 61.6 |
| SI | 11.0 | 20.7 | 10.0 | 58.3 |
| AT | 11.0 | 23.1 | 11.6 | 54.3 |
| UK | 10.7 | 22.7 | 10.9 | 55.6 |
| IT | 10.7 | 25.0 | 11.3 | 53.0 |
| SK | 10.5 | 16.8 | 8.2 | 64.5 |
| DK | 10.4 | 18.6 | 6.5 | 64.4 |
| EU-25 | 10.4 | 23.5 | 9.8 | 56.3 |
| EU-15 | 10.4 | 23.8 | 9.9 | 55.9 |
| SE | 10.3 | 21.9 | 4.4 | 63.4 |
| BE | 10.2 | 20.7 | 9.4 | 29.7 |
| DE | 10.1 | 23.0 | 11.5 | 55.4 |
| LV | 9.6 | 19.0 | 5.3 | 66.1 |
| NL | 9.6 | 25.9 | 8.6 | 55.8 |
| ES | 9.1 | 29.0 | 9.4 | 52.5 |
| GR | 7.7 | 26.5 | 11.2 | 54.6 |
| EE | 7.3 | 27.0 | 4.8 | 61.0 |
| PT | 7.3 | 23.3 | 8.7 | 60.8 |
| LT | 6.9 | 15.7 | 3.8 | 73.6 |

Source: CSU.

**Table 2A: Quality of tertiary education**

| | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| EU-25 | 5.7 | 5.8 | 5.8 | 5.7 | 5.4 |
| EU-15 | 5.8 | 5.9 | 5.8 | 5.9 | 5.6 |
| AT | 6.3 | 7.2 | 7.3 | 7.0 | 6.4 |
| BE | 7.3 | 7.1 | 7.6 | 7.6 | 7.0 |
| CZ | 5.4 | 6.0 | 6.3 | 5.1 | 5.7 |
| DE | 5.5 | 4.5 | 4.6 | 5.1 | 5.0 |
| DK | 6.7 | 6.8 | 6.8 | 7.0 | 6.6 |
| EE | 5.9 | 5.7 | 5.4 | 6.1 | 5.5 |
| ES | 5.5 | 5.1 | 5.0 | 4.7 | 4.2 |
| FI | 8.2 | 8.9 | 8.7 | 8.2 | 8.0 |
| FR | 5.3 | 6.3 | 6.1 | 6.0 | 5.7 |
| GR | 4.6 | 3.9 | 4.3 | 4.3 | 4.1 |
| HU | 7.0 | 7.0 | 6.7 | 6.1 | 6.4 |
| IE | 8.1 | 8.0 | 7.6 | 7.6 | 7.5 |
| IT | 3.9 | 4.3 | 4.3 | 4.1 | 3.8 |
| LU | 3.0 | 3.4 | 4.5 | 4.0 | 3.5 |
| NL | 6.8 | 7.0 | 5.3 | 6.2 | 6.6 |
| PL | 4.4 | 3.9 | 4.7 | 5.3 | 4.3 |
| PT | 4.2 | 3.9 | 4.2 | 4.9 | 4.0 |
| SE | 6.0 | 6.3 | 6.0 | 6.6 | 6.0 |
| SI | 4.7 | 5.0 | 4.5 | 3.8 | 3.3 |
| SK | 6.2 | 6.4 | 5.9 | 5.7 | 5.2 |
| UK | 5.4 | 5.4 | 5.2 | 5.0 | 5.2 |

Note: 0 – lowest level; 10 – highest level. Source: IMD: International Competitiveness Year Book.

.**Table 3A: Educational structure of scientists and technicians (%, 2005)**

| | ISCO 2 + 3 | | | ISCO 2 | | | ISCO 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ISCED | | | ISCED | | | ISCED | | |
| | 0-2 | 3,4 | 5,6 | 0-2 | 3,4 | 5,6 | 0-2 | 3,4 | 5,6 |
| EU-25 | 5.5 | 37.7 | 56.8 | 1.5 | 15.3 | 83.2 | 8.9 | 56.6 | 34.5 |
| EU-15 | 6.3 | 36.3 | 57.4 | 1.8 | 14.9 | 83.3 | 10.0 | 53.8 | 36.2 |
| Austria | 4.8 | 55.5 | 39.6 | 1.6 | 12.9 | 85.4 | 6.4 | 75.6 | 18.0 |
| Belgium | 6.7 | 23.9 | 69.4 | 2.3 | 12.4 | 85.2 | 14.4 | 43.9 | 41.7 |
| Cyprus | 4.5 | 23.6 | 71.9 | 2.2 | 2.2 | 95.6 | 6.8 | 45.5 | 47.7 |
| **Czech Republic** | **0.6** | **64.4** | **35.0** | **0.0** | **28.3** | **71.7** | **1.0** | **82.3** | **16.7** |
| Denmark | 4.2 | 29.3 | 66.5 | 1.4 | 12.5 | 86.1 | 6.3 | 41.8 | 51.9 |
| Estonia | 0.0 | 33.9 | 66.1 | 0.0 | 21.8 | 78.2 | 0.0 | 47.4 | 52.6 |
| Finland | 7.0 | 26.3 | 66.7 | 2.7 | 20.3 | 77.0 | 11.2 | 32.3 | 56.5 |
| France | 9.6 | 30.2 | 60.2 | 4.0 | 15.1 | 80.9 | 13.7 | 41.3 | 45.0 |
| Germany | 6.2 | 44.0 | 49.9 | 1.4 | 16.6 | 82.0 | 9.4 | 62.7 | 27.9 |
| Greece | 0.7 | 22.3 | 77.0 | 0.0 | 5.8 | 94.2 | 2.0 | 51.5 | 46.5 |
| Hungary | 1.3 | 42.0 | 56.7 | 0.0 | 8.9 | 91.1 | 2.6 | 74.5 | 22.9 |
| Ireland | 5.2 | 19.8 | 74.9 | 2.8 | 14.3 | 82.9 | 11.9 | 34.7 | 53.4 |
| Italy | 7.6 | 54.2 | 38.2 | 1.7 | 19.3 | 79.0 | 10.5 | 72.0 | 17.5 |
| Latvia | 0.0 | 41.5 | 58.5 | 0.0 | 23.8 | 76.2 | 0.0 | 57.4 | 42.6 |
| Lithuania | 0.0 | 31.1 | 68.9 | 0.0 | 20.2 | 79.8 | 0.0 | 52.6 | 47.4 |
| Malta | 21.6 | 29.7 | 48.6 | 0.0 | 12.5 | 87.5 | 38.1 | 42.9 | 19.0 |
| Netherlands | 5.7 | 35.4 | 58.9 | 1.7 | 14.1 | 84.2 | 9.9 | 57.7 | 32.4 |
| Poland | 0.0 | 41.4 | 58.6 | 0.0 | 16.0 | 84.0 | 0.0 | 76.8 | 23.2 |
| Portugal | 17.7 | 22.1 | 60.2 | 2.3 | 6.7 | 91.0 | 33.1 | 37.5 | 29.4 |
| Slovakia | 0.0 | 59.5 | 40.5 | 0.0 | 28.2 | 71.8 | 0.0 | 78.8 | 21.2 |
| Slovenia | 0.0 | 47.1 | 52.9 | 0.0 | 8.1 | 91.9 | 0.0 | 81.7 | 18.3 |
| Spain | 7.7 | 15.7 | 76.5 | 0.9 | 2.8 | 96.4 | 15.3 | 30.1 | 54.5 |
| Sweden | 4.8 | 35.8 | 59.4 | 2.4 | 21.3 | 76.3 | 7.1 | 49.9 | 43.0 |
| United Kingdom | 1.7 | 31.2 | 67.1 | 0.6 | 19.4 | 80.0 | 2.9 | 44.3 | 52.8 |

Note: Data for 2nd quarter of 2005. Source: EUROSTAT. LFS.

## 4. Conclusion

The quality of human resources in the CR is not very favourable in terms of international comparisons. An improvement in the comparative position of the CR as part of the EU is a long-term process, nevertheless appropriate measures must not be put off. These measures must concern both the supply of and demand for high qualifications.

### Knowledge and flexibility of population

The development of new knowledge and its practical application place great demands for the **educational attainment** of the labour force. In 2005 the CR had the largest proportion in the EU of the population aged 25-64 with at least upper secondary education (90%), and the lowest proportion of people with nothing but basic (and lower) education (10%). This favourable qualification structure is the result of a structured supply of upper secondary education and a relatively good transferability within this type of education. This is why most young people complete upper secondary education with success, although in some cases in a less demanding programme or even type of school. Early school leaving is less frequent than in other countries, although there has been a slight increase in recent years.

On the contrary, the CR ranked 4$^{th}$ from the bottom for the proportion of people with tertiary qualifications in EU-25 in 2005 (13%). This unfavourable situation is the result not only of a limited capacity of institutions, making it impossible to satisfy in full the demand for these studies, but also of the differences in national education systems. In some countries including the CR it is possible to acquire a vocational qualification as early as secondary level, while in other countries tertiary education is required. The representation of people with tertiary qualifications in the Czech population is slightly increasing, but the increase is too slow to boost the CR's international position.

The growing demands for knowledge on the part of the economy are linked to growing **educational mobility**. The CR ranks the lowest of all EU countries for the rate of educational mobility. The proportion of the population with tertiary qualifications entering the labour market in the CR in 2005 was only less than 4 pp higher compared to the total population leaving the labour market, while in EU-25 the average is 15 pp.

In terms of the economic development of society and the personal development of an individual it is not only the level of education achieved that is important. Important is also the quality of the knowledge and skills acquired. As regards an international comparison of literacy levels **the fifteen-year-old population** in the CR fared very well in 2003 in mathematical, scientific and problem-solving literacy. It achieved better results in these types of literacy that the OECD average. However, in reading literacy the results were below the average. What is alarming is that in between 2000 and 2003 this level even slightly decreased.

As with the fifteen-year-old population, the **adult population** (16-64) ranked much better in quantitative literacy as compared to prose and document literacy. Among the EU countries which took part in the survey better average results in quantitative literacy than the CR were only scored by the population in two countries, four countries ranked better than the CR for document literacy and five countries for prose literacy. It is clear that the inadequate attention paid in Czech education to an active work with texts has negative effects throughout the entire lives of individuals.

The competitiveness of companies and the population is increasingly being linked to the use of ICT. It places great demands for **computer literacy** on the part of the population. Its importance is equal to other components of the comprehensive literacy concept. Further development of computer literacy requires that households be equipped with PCs and an Internet connection. The level of ICT facilities in the CR in 2005 was below the EU average. In EU-25 over a half of households had a PC (58%), while in the CR it was less than a third (30%). Almost half of households in EU-25 had an Internet connection (48%), while in the CR it was less than one fifth (19%).

The lower level of ICT facilities, the less extensive range of Internet-based services and the low rate of employment in professions using the Internet result in a below-average proportion of the population using the Internet. In EU-25 an average of 51% of the population aged 16-74 used the Internet during the three months prior to the survey in 2005, while in the CR the figure was only 32%. This lag behind the EU is smaller compared to the lag behind European level of ICT facilities in households. It means that population uses very often other access points than households – i.e. cafes, libraries, schools, etc.

One important precondition for holding a good position in the labour market throughout one's life is **flexibility**. The flexibility of the population in the CR in 2005 was rated as above-average in relation to the EU. An important feature of flexibility is occupational and geographic mobility. The Czech population is less willing, in the case of unemployment, to move out of their region (55%) as compared to the EU-25 average (66%). The willingness to migrate out of the country is even lower in the CR (28 %), but it is also lower in EU-25 average terms (37 %). The CR also shows a lower occupational mobility as expressed in the number of jobs performed (3.2 jobs) in comparison with EU-25 (3.9 jobs).

### Lifelong learning

Lifelong learning is a basic condition for improving the quality of human resources. It includes both initial and continuing education.

In international terms the CR traditionally ranks very high for participation of the young population in **upper secondary education**. This is partly the result of the large variety of educational programmes at this level. The attractiveness of secondary education increased due to the fact that during the last ten years the proportion of "maturita" programmes has been considerably expanded. Maturita examination opens the door to the tertiary education as well as to the good jobs in the labour market. In 2004 over 90% of the Czech population aged 22 had a upper secondary qualification. However, the CR is not succeeding as regards a further increase in participation of young people in secondary education. On the contrary, there has been a slight decrease. As this proportion is considerably increasing in most other European countries, it is clear that the

young generation in the CR will lose this favourable position over some time.

Most European countries try to open **tertiary education** to the largest possible number of young people. In 2002 tertiary programmes were attended by 56% of the population of typical age for this type of studies, while in the CR it was only 35.5%. The situation in the CR is only slowly improving, despite the fact that the relevant age groups are weakening and, at the same time, the capacity of HE institutions and tertiary professional schools is gradually expanding.

Neither is the participation of the adult population in continuing education in the CR in line with current European trends. In EU-25 there are on average 42% of people aged 25-64 involved in some form of continuing education – in the CR it is only 29 %. The CR lags behind not only developed EU-25 countries, but also most new member states. It ranks among the bottom group of EU countries for participation of adults in **formal education** (1.4%). The age groups over 45 virtually do not participate in this form of education in the CR at all, and there is also a very low proportion of people with upper secondary qualifications participating in formal education – only 1.1%, which is five times less than the EU average.

The **non-formal education** of adults takes the form of participation in various courses at the workplace as well as outside it. On average 17% of the population in the EU take part in this form of education and some 13% in the CR. The lagging behind the EU average here is not so severe as in other forms of education. The differences in participation rates of various qualification and occupational groups are lower than in other EU countries.

The length of courses of non-formal education is considerably shorter in the CR (50 hours per annum) compared to other EU countries (84 hours per annum). Low-skilled workers in particular only take part in very short training courses (25 hours per year), which is, similarly to Slovakia and Poland, the lowest figure in the entire EU (87 hours per annum). The short length of courses apparently corresponds to the need for acquisition of simple skills for line production which so far prevails in the CR in terms of technology.

The rate of participation of women in non-formal education in the CR is lower than that of men. This is particularly true of the youngest and oldest age groups (25-34 and 55-64 respectively). This pattern is not common in the EU. It points not only to a relatively lower willingness of Czech women of a typical age for having a family and before retirement to embark on further learning, but also to the attitudes of employers who organise a major part of non-formal training. On the other hand, self-education is pursued almost equally by Czech women as Czech men.

**Retraining** is less extensively implemented in the CR compared to developed EU countries. Of the total number of unemployed only less than 10% undergo retraining, while in most countries it is two to four times as many. The causes of this low proportion are linked to a large degree to the attitudes of the job seekers, but there are also financial, organisational and legislative difficulties in the implementation of an active employment policy.

**Informal education** consists of a wide variety of self-education modes. On average in EU-25 terms every third adult pursues self-education, while in the CR it is every fifth person.

In terms of creating conditions for increasing participation of the population in education, **funding** is an important issue. The CR does not rank among the EU countries with a high level of public expenditure on education as a proportion of GDP. With its 4.4 % it ranked at the bottom end of the scale. When comparing the expenditure levels internationally, it is important to take into account the influence of purchasing power parities (PPP) used. When using different PPP for GDP and education the indicator for the CR increased to 7.1%, which also entails a more favourable position in international terms (a move from 6$^{th}$ place from the bottom to 9$^{th}$ place from the top on EU-25 scale).

The CR does quite well as regards evaluation of the effectiveness of public expenditure on initial education. The expenditure on the education of pupils aged 6-15 is below the EU average (data were available for 17 states), but the level of literacy of Czech 15-year-olds is above this average.

The level of **corporate expenditure on education** in the CR does not even reach a half of the EU-25 average, but it is more favourable in terms of a comparison with new EU members. Developed countries consider company training to be an important factor in the competitiveness of the economy, and this is why most of them encourage enterprises to invest in training. There is no system for supporting training in companies, there are only separate programmes funded from the state budget or co-funded from European structural funds.

### Human resources for a knowledge-based economy

One of the features of a knowledge-based economy is a large proportion of R&D-intensive industries in the economy. These are technology-intensive manufacturing industries and knowledge-intensive service industries.

Employment in **technology-intensive manufacturing industries** in the CR was one of the highest in EU-25. In 2004 it accounted for 9% of overall employment. Only Germany had a higher percentage. High employment in this sector in the CR is influenced by employment in medium-tech manufacturing (7.7%). Evidence of the higher representation of less R&D intensive activities is also provided by a lower representation of scientists (ISCO 2) and technicians (ISCO 3), who accounted for almost one third of employment in this sector in EU-25, and only for 27% in the CR. In most EU countries the proportion of scientists and technicians was higher than the proportion of people with tertiary qualifications. The difference was 6 pp in EU-25 average terms, in the CR it was as many as 17 pp. This testifies to the fact that in the CR these professions are, to a relatively large degree, practised by people with lower than tertiary education.

In economically developed countries employment is gradually shifting from manufacturing to services. Employment in **knowledge-intensive services** as a proportion of overall employment was about one third in EU-25 in 2004 (33,1 %). The CR with 24.6% ranks among underdeveloped countries in this respect.

One important characteristic of the economic development of a country is the representation of **technology-intensive services** – i.e. communications, computing and research and development. These three service industries

accounted for 3.3% of overall employment in EU-25 in 2004, in the CR it was only 0.2 pp less. The proportion of scientists and technicians totalled 50% and it hovers very slightly above the EU average. The proportion of people with tertiary qualifications is about twice as low (26.6%), which is far less than the EU-25 average (12.7 pp). The reasons are similar as with technology-intensive manufacturing industries.

The development, application and use of modern technologies is particularly the job of **scientists and technicians**. Their proportion in overall employment in EU-25 exceeds one fourth – in 2005 it was almost 30%. In the CR it was 32.5%. This high proportion was achieved thanks to a high representation of technicians, whose share was the highest in the CR of all EU countries (21.7%). On the other hand, the proportion of scientists was lower than the EU average totalling 10.8%. These figures prove once again that the Czech economy cannot still be designated as a technology-intensive, knowledge-based economy. A similar conclusion may be drawn from the data on the education structure of scientists and technicians. In EU-25 some 57% of individuals in these positions had tertiary qualifications in 2005, in the CR it was only 35%. The reason is the lowest proportion, in EU terms, of people with tertiary degrees in the position of both technicians (16.7%) and scientists (71.7%)

Information and communication technologies (ICT) constitute one of the main stimuli for technological development. The use of ICT potential assumes there is a sufficient number of experts working in this area, as well as enough workers capable of using these technologies. **ICT professions** are divided into those with high skills intensity (ISCO 213, 312 and 313), and those with a lower skills intensity (ISCO 724). The former accounted for 1.8% of overall employment in the CR in 2004, which is only slightly below the EU-25 average (1.9%). However, as part of these highly-intensive ICT professions the proportion of scientists (ISCO 213) was far below the average. Their proportion in the CR was only 18.7%, while the EU-25 average was 32.6%. It is obvious that the Czech economy is still failing to show the features of a technology-intensive, knowledge-based economy.

In order to boost the proportion of skills-intensive professions and the development of skills-intensive activities, it is necessary that the education system should produce the relevant number and structure of young people with tertiary degrees. The scope of their training can be expressed using **the number of graduates of tertiary programmes** per 1,000 population representing a typical age for completion of this education (20-29). In the CR this group consists of graduates of tertiary professional schools and bachelor, master and doctoral programmes at higher education institutions.

The sources of inflow of young specialists into qualified professions are insufficient in the CR. While the average number of graduates in the group described above in EU countries was around 53, in the CR was it was only about a half (around 28). However, unlike most EU-15 countries young people in the CR reach tertiary degrees mainly via long (i.e. 5-6-year) programmes. Although the range of short tertiary programmes both at tertiary professional schools and at HE institutions is expanding in the CR, the number of graduates still falls short of inducing a major positive shift in the qualification structure in this country. As concerns the preparation of young specialists for R&D the development of **doctoral studies** is important. The number of graduates has been growing dramatically in the CR, doubling between 2000 and 2003. Despite this their proportion in the relevant age group is roughly two thirds of the EU average.

The potential inflow of human resources for the purpose of technological development is being monitored via the proportion of graduates of tertiary programmes in **science and technology fields** per 1,000 of the population aged 20-29. The CR with 6.4 graduates ranked 20$^{th}$ among the 25 EU countries in 2003. This is the result of overall low number of graduates of tertiary education in the CR. As regards the disciplines, the CR only shows a slightly below-average representation of graduates of S&T programmes compared to EU-25 (1 pp). The fact that this proportion has decreased slightly in recent years is, however, less positive.

**The quality of higher education** in the CR in terms of passing down knowledge and education provision is, according to an IMD survey, at the European average. In terms of contribution to the development of scientific knowledge and innovation, Czech higher education is far from being comparable internationally.

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# Challenges for the Czech Republic

## The Quality of Human Resources

The results of international comparisons show that, in terms of **knowledge and skills** measured by the education structure of the population, the CR faces the challenge of a low proportion of the population with tertiary qualifications and low educational mobility. One drawback of the Czech education system is insufficient work with texts, which is reflected in a low level of reading literacy of the population. These problems are identified in the relevant policy documents, but their solution is demanding in terms of time. Increasing the number of graduates of short tertiary programmes in particular is linked to the supply of good-quality, practice-focused bachelor programmes. Improving the level of literacy of the population depends on successful curricular reform.

The low levels of occupational and geographical mobility in the CR are influenced by the fact that for some groups of the population it pays to collect welfare benefits rather than work, by housing shortages in the target regions and by an unfavourable relation between commuting costs and income from work. It is necessary to implement radical changes to the welfare benefits system, to lower taxation on work income and, to speed up liberalisation of the housing market and to set up an appropriate system to support larger distance commuting.

**The quality of human resources in terms of the needs of a knowledge-based economy** is not sufficient and its development lacks dynamics. This is true both of the existing resources, and even more of the future resources that are now being prepared in the education system. There must be measures targeted to boost the supply of the workforce with technical qualifications that will stimulate the inflow of technology-intensive investment, and to link the existing investment incentives to this type of investment.

It is necessary to expand access to tertiary studies of technology and science and to enhance their attractiveness by improving their quality, flexibility, material resources and equipment (laboratories in particular) and the links between universities and industrial business sector. Students' co-funding of their studies would certainly reinforce their responsibility for education programme choices and encourage them to complete studies with success. At higher education institutions it is necessary to enhance, above all, the scope and quality of the outcomes of research and their practical application.

The adult population in the CR shows a low rate of participation in **lifelong learning** as compared to their European counterparts. To improve this situation it is necessary to create an environment that would stimulate both the demand for continuing education and the supply of suitable programmes. Important also is the expansion and enhancement of support information and counselling services. On the supply side the challenge is the quality of the programmes which is not, with the exception of school education and retraining, subject to systematic evaluation. It is necessary to inter-link the existing activities concerned with accreditation and certification into a coherent system.

The level of investment in education is not sufficient either in initial or in continuing education. This results in disproportionably low remuneration of teachers, outdated equipment and slow implementation of reforms leading to improvements in the quality of education. Moreover, corporate investment in training in the CR is lower than the EU-15 average. Training of employees, which is an activity of key importance for maintaining the competitiveness of companies, should receive more support – particularly in small and medium-sized enterprises.