

Aspects of Future Skills

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1. Introduction

This note is prepared for the May 2009 meeting of the Danish Rectors Conference – University Colleges Denmark. It is based on a presentation made at the February 2009 Hague Conference of the European Network for Universities of Applied Science (UASNET), a network of 11 national associations.

This note seeks to identify some of the major factors influencing the discussion of future skills. While there is uncertainty in a rapidly changing international economic context there are major and enduring parameters shaping skills needs for to-morrow's world. These include demographic, technological and sectoral change and the changing global economic order.

The detailed prediction of future skills can be hazardous. Lord Leitch in Britain, the author of the influential Leitch Report, *Prosperity for All in the Global Economy – World Class Skills* (4), repeatedly informs us that “no one can accurately predict future demand for particular skill types”. Despite the difficulties of prediction, Governments, Universities, individuals and employers realise the value of attempting to match educational and research output and employee upskilling with future employment and skill needs.

At national level many techniques are used to predict future skill needs. These include foresight exercises, sectoral studies and forecasts, international benchmarking, employer surveys, vacancy reviews and macro-economic qualifications/skills forecasts. The EU using comparative data from member states, attempts, (1), (2), to produce medium term forecasts of employment and skill need across the whole of the EU27. It has launched studies on “new skills for new jobs”. In April 2009 the British Government published “*New Industry –New Jobs*” a strategic vision for Britain's recovery. In future skills forecasts educational qualifications are used as proxies for skill levels - ISCED is related to ISCO.

Education has, however, wider purposes than the economic. These include cultural, social and civic objectives and the intellectual fulfilment of individuals. Education is promoted as a major factor in bringing equity and social cohesion to a society. While economists describe the “graduate dividend” in terms only of the average financial gain accruing to graduates, education confers much wider benefits.

Universal upper secondary secondary and mass higher education are now widespread objectives. In this modern context the following can be widely observed:

- Educational Upgrading, (18), i.e. the phenomenon that young adults have higher formal qualifications than older adults.
- Male comparative underparticipation and underattainment. Education at a Glance 2008, (11), reports an 8 point gap across OECD countries in the male/female upper secondary graduation rates of 2006. It reports a 12 point gap in the male/female entry rates to tertiary education (type A).
- An emphasis by employers, e.g. (22), on the importance of Generic Skills. Generic skills are discipline-independent transferable skills such as communication skills, critical thinking, problem solving skills, self-management and team-working skills, IT skills.

2. Market vs. Supply?

Vital questions in relation to future skills and to pure and applied research programmes are: Who decides? Who benefits? Who pays? To what extent should there be a strategic top-down emphasis with public support and funding driving a “supply push” approach? To what extent should there be a market driven policy with individuals or enterprises who benefit from higher qualifications, professional development or research choosing and resourcing – in full or in part – the courses or research from which they benefit? In the latter case who identifies and addresses market failure? What is the right mixture of supply-push and market-pull?

Some examples:

- The British Leitch Report (4) strongly advocated a market-led approach to its recommendation of the major up-skilling of the British workforce. Leitch says “Under a planned system, the incentives are for providers to continue doing what they have done in the past so long as that meets the requirements of planning, rather than responding flexibly as demand changes”.
- The recent Bradley Review of Australian Higher Education (7) favoured strongly the student market, recommending that resource should follow the student.
- Martin Schlotter’s “Change in Labour Market Skill Needs”, (18), shows that over recent decades Educational Upgrading has coincided with an increase in jobs for high skilled people. “Firms or industries” he says “have an incentive to adopt a technology that coincides with the capacities of the labour markets”. This is supportive of a supply push effect.
- The OECD reports (10) that countries’ mix for fostering innovation in changing. For business R and D there is a shift away from direct subsidies to tax relief “leaving the choice of project to market forces”.
- Writing on the financing of higher education (16) Prof. Nicholas Barr of the LSE states that “the days of central planning are gone” and that “students should contribute to the cost of their degree”. “Mass higher education” he argues “requires a funding system where institutions can charge different prices to reflect different missions”.
- The European Commission in its modernisation agenda for Universities advocates “diversified sources of university income better linked to performance”.

National policies seek the appropriate mix for national and sectoral circumstances of public and private resourcing, of supply and market forces. They seek to identify the roles, rights and responsibilities of the state, institutions, individuals and enterprises. They seek to address long term strategic objectives, shorter term market needs and market failures. Future skill forecasts can assist this process.

3. Macro Forecasts

States attempt to plan future skill needs by making macro-economic forecasts. Using assumptions in relation to educational participation and output and to accumulated evolving sectoral demands for skills an attempt is made to relate educational, research, labour force and economic planning. The examples given below are all pre-recession predictions.

- The EU25 prediction, (1), illustrated in Table 1 show in the period to 2020 a decline in employment for those with low skills (ISCED 0-2). Medium skills (ISCED 3-4) and high skills (ISCED 5-6) show increases. In this prediction high skilled jobs in the EU will form 31.3% of those employed in 2020.

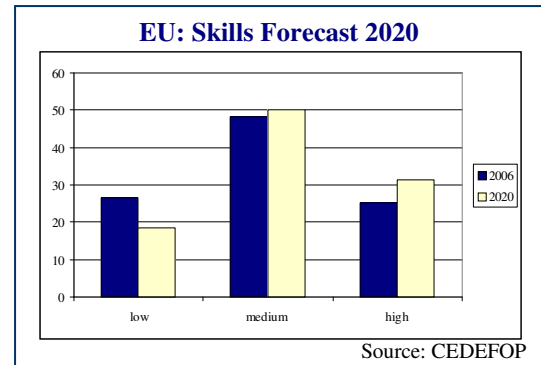


Table 1: Employment EU 25:2006 - 2020

- The EU predicts (Table 2) an increase in employment by 19.6 million new jobs by 2020 in the EU25. (There will also be 85m replacement jobs by 2020.) It predicts a decline of low skilled/qualification jobs by 12.5 million. Medium skilled job will increase by 13.4 million. The largest increase in new jobs will be for those with tertiary education with an additional 18.8 million jobs.

Low	- 12.5m
Medium	+ 13.4m
High	+18.8m
Total	+19.6m

CEDEFOP

Table 2: EU New Jobs 2020

- The EU and national Governments make occupational forecasts. In the EU25 the forecast to 2020 is for an increase in senior officials and managers (+4.2m.), professionals (+5.4m.) and technicians and associate professionals (+7.3m.). Occupations predicted to decline include clerks (-1.7m.), agricultural and fishery workers (-2.2m.) and craft and related trades (-2.4m.).
- In the US the Bureau of Labor Statistics in its 2006-2016 projections (5) wisely informs us that every “forecast has its associated risks”! Its pre-recession forecast for 2016 employment was for an increase of 15.6 million over 2006 with a rise in professional (+16.7%), service (+16.7%) and management (+10.4%) occupations.

- The Leitch Review in Britain (4) was guided by the prediction – illustrated in Table 3 – of qualification level change for the entire British work-force to 2020. Again it predicts a decline in low or no skill occupations. It predicts a historic growth in the highest research-based level 5 (British framework) occupations. It also predicts a sizeable increase in level 4 (graduate and diploma) and middle, level 3, positions. It requires a major upskilling of existing workers.

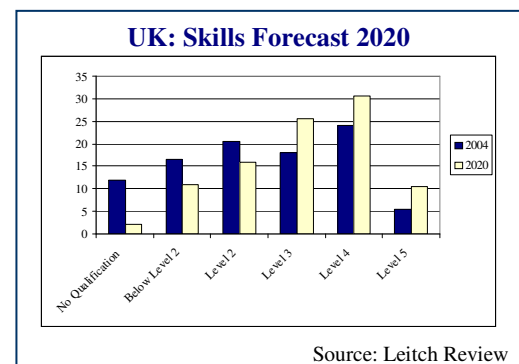


Table 3: UK Skills Forecast

- The Irish Report (3) “To-Morrow’s Skills” (Table 4) also predicts by 2020 a decline in low skill and an increase in high and middle level occupations. The Irish prediction contains an element of “supply-push” – an increase in high level skill is expected to provoke an increase in investment in high level occupations. Ireland is in a process of doubling its Ph.D. output just as Denmark is. Major adult upskilling is recommended.

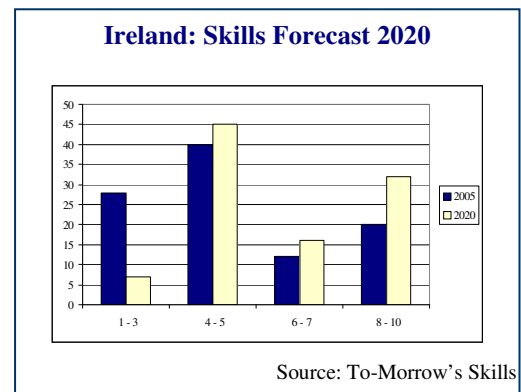


Table 4: Ireland: Skills Forecast

- Australia (7) has set itself a target of 40% of 25-34 year-olds to have at least a bachelor-level degree in 2020 up from 29% to-day. It seeks also to halve the adults without a level III qualification.

The above forecasts refer to the entire workforce. Educational Upgrading means however that the distribution of qualifications amongst young workers is more strongly skewed towards higher qualifications and that tendency in the workforce will grow in time. Commentators, e.g. (18), speak also of a future and growing polarisation of occupations, that is a decrease in middle-level routine occupations with a growth of high-skilled and non-routine low skilled jobs.

The current recession is causing major job losses and economic uncertainty. Short term forecasts are difficult but the longer term forecasts such as those above may retain a large validity. Recession can increase qualification output as students remain in education and many seek higher qualifications in competitive employment markets. In Ireland in 2008/9 intakes to full-time higher education increased by 5.5%. In Britain the 2008 intake through the central UCAS system increased by 10.4% including 11.9% in England. There are other major factors affecting the demand for skills and these are now discussed.

4. Changing Global Order

The description by Herodatus in his *Histories* of extensive trading patterns reminds us that globalisation of trade extends back more than 2,500 years. As the world battles with and emerges from the current economic difficulties there will be a further fundamental shift in the global economic order. Writing in the Jan/Feb 2009 edition of *Foreign Affairs* (17) Roger Altman says that “the financial and economic crash of 2008 is a major geopolitical setback for the United States and Europe”. Has the G20 already replaced the G7 or G8 in importance? This shift will have important implications for all economic and higher educational activity in Europe.

Recent years have seen the emergence of the BRIMICS countries – Brazil, Russia, India, Mexico, Indonesia, China, South Africa – as growing global economic powers with large populations. Their 2007 growth rates, prior to the recession, exceeded those of major “Western” economies – the EU, the US and Japan (Table 5). These countries face major challenges overcoming poverty, population increase and lack of development. Their educational systems are uneven in quality. Some of their growth, however, is being invested in high quality education and higher education. Some of their universities and research is world class.

China	11.9%
India	9.0%
Russia	8.1%
Indonesia	6.1%
Brazil	5.7%
South Africa	5.1%
Mexico	3.0%
EU	3.0%
US	2.0%
Japan	2.0%
(Denmark)	1.7%

World Fact Book 2008

Table 5: Growth Rates 2007

- China, developing elite Universities, is the third biggest R and D spender after the US and Japan.
- India is introducing a ranking system for its Universities in its drive to promote quality institutions.
- The BRIMICS countries now have 16 Universities in the top 200 Universities in the THE world classification (9).

The Economist (14/2/2009) reported, (20), an explosive global growth in the middle class which it defined as those who have at least a third of their income for discretionary spending. The Economist article claims that over half the world’s population now belongs to the middle class. Global purchasing power and economic opportunity is increasing. Significantly, the middle class uses its discretionary spending to invest in its children’s education with major implications for the growth of global quality education.

The Nobel prizewinner Robert Fogel in a 2007 paper, (20), compared global GDP breakdown in 2000 with his prediction for 2040. This prediction showed major comparative decline for “Western” economies i.e. USA, EU and Japan and major comparative increases for China, India and 6 South East Asia Countries (Singapore, Malaysia, Indonesia, Thailand, South Korea and Taiwan).

	2000	2040
USA	22%	14%
EU15	21%	5%
Japan	8%	2%
China	11%	40%
India	5%	12%
SE Asia 6	6%	12%
Rest	28%	16%
Total	100%	100%

Robert Fogel

Table 6: Global GDP 2000/2040

In the changed global order European countries will have to compete with the globalization of innovation. European graduates will compete in an expanding global labour market for high quality graduates and researchers.

A recent British study, (8), from the Economic and Social Research Council on *Education, Globalisation and the Knowledge Economy*, has interesting things to say. The doubling of university enrolments globally in the last 10 years had led to a “massive increase in the global supply of highly educated workers, able to compete on

price as well as knowledge”. Increasingly a growing proportion of high value work is located in low-cost countries the report notes. The increased supply of quality graduates may lead to downward pressure on the income of skilled workers in developed countries – a threat to the “graduate dividend”. The report claims that while skills remain important it is how “the capabilities of the workforce are combined in innovative and productive ways that holds the key”. The report’s international survey of multinational companies reveals a gravitation towards high-skilled low waged economies. Companies stressed “behavioural competencies (soft skills) including initiative, perseverance, time-management and team working” as being of importance. UAS graduates will have to compete in a changing more competitive graduate market.

5. Sectoral Change

Higher education institutions are required to respond to sectoral change in regional, national and international economies. Sectoral change has been ongoing for centuries and in an international global economy the EU predicts (Table 6) ongoing major change in sectoral employment for the larger workforce to the year 2020. The predicted changes in overall employment (+9.6%) and by sector conceal major changes and challenges within each sector.

- While primary production and manufacturing are to lose employment share it is to be expected that increased productivity will cause major increases in the output of both.
- In the Economic Outlook 2006-16 of the Bureau of Labor Studies (5) in the US a decline of 1.1% annually in manufacturing employment to 2016 is predicted. This decline is expected to be offset however by increased productivity with the US predicting an annual growth in output of 2.4%. Creating increased output and productivity is a challenge to European skills.
- In the period to 2020 Construction materials, methods and output are expected to change dramatically. Intelligent sustainable low-energy green buildings will increasingly become the norm. Again the challenge is to produce the skills and technologies and to upskill the workers to enable this transformation.
- The major increases in sectoral employment are predicted in services, marketable and non-marketable. The US similarly is predicting an annual growth term to 2016 of service occupations of 1.3%. Denmark’s highly developed economy has a 75% services sector. A challenge to the strongly service based economy is to effect productivity gains and to effectively use the skills of highly qualified workers.
- The ESRC study (8) of education and globalisation “found evidence that companies are attempting to standardise knowledge work” through processes which they called Digital Taylorism. This involves, they claim, the breaking down of processes and products into constituent components which can be recombined in a tailored automated fashion.

Sector	2006	2020	Absolute +/- %
Primary	5.7%	3.9%	-25.3%
Manufacturing	16.6%	14.8%	-2.3%
Construction	7.2%	6.6%	+3.0%
Dist./Transport	25.7%	25.5%	+8.8%
Busin/Service	21.7%	25.8%	+30.7%
Non-Market Services	23.1%	23.2%	+10.1%
Total	100%	100.0%	
	(204m.)	(223m.)	+9.6%

CEDEFOP

Table 7: Sectoral Employment EU 25

6. Demographic Change

European countries are undergoing major and varied demographic change. The natural change rate in 2008 per 1,000 (Table 7) varies in EU countries from +12.0 in Ireland to -4.8 in Bulgaria. Working populations in all European countries have increasing average ages.

Life expectancy is increasing, raising major issues in relation to dependency, pension provision and the care of the elderly. There are serious higher education implications arising from Europe's demographic projections.

Population: Natural Change 2008 (Births-Deaths per 1000)	
Bulgaria	-4.8
Lithuania	-2.6
Germany	-2.0
Italy	-0.2
Sweden	+2.0
Denmark	+2.0
Spain	+2.3
France	+4.5
Ireland	+12.0
EU27	+12.0

Source: EuroSTAT

Table 8: Natural Change Rate 2008

The economic response to the demographic change is to advocate increased participation in the workforce (above Lisbon targets), increased productivity from those employed and increased persistence in the workforce for older workers. All these three – participation, productivity and persistence – are directly linked to educational qualifications. Table 9 illustrates in its first row the direct correlation between workforce participation and qualification level for adults aged 25 – 64 (11). The second row shows rates of persistence in the workforce by older workers with a gap of participation of 25% between these with low qualifications and those with higher education qualifications. Demographic considerations therefore give a major importance to the upskilling and professional development of workers including older workers.

Employment Rates 2006 OECD Countries			
Age	Low	Medium	High
25 – 64	58.4%	75.9%	84.4%
55 – 64	40.2%	52.4%	65.9%
DENMARK			
25 – 64	62.8%	81.3%	87.4%
55 – 64	41.0%	62.7%	73.9%

Source: Ed. at a Glance 2008

Table 9: Employment Rates 2006

The economics of investing in older worker upgrading needs to be influenced by the value received through increased participation, productivity and persistence. Martin Schlotter (22) writes “It will be crucial that in the presence of ongoing technological change (that) older people can be matched with future skill needs to be able to participate in the labour market”.

Robert Fogel in his 2007 paper (20) predicted a comparative decline in the EU15 proportion of the expanding global population to 2040 (Table 10).

Demographic change underlines the importance to Europe of the immigration of skilled persons. Skill forecasts can inform immigration policies.

The UN classifies countries using the Human Development Index (HDI) a composite index measuring economic, educational and health development. In its 2008 Human Development Report (6) the UN divides countries into those with

Global Population 2000/2040		
	2000	2040
USA	5%	5%
EU15	6%	4%
India	16%	17%
China	22%	17%
Japan	2%	1%
SE Asia x 6	6%	6%
Rest	42%	50%
	100%	100%
	(6.1b.)	(8.7b.)

Robert Fogel

Table 10: Global Population 2000/2040

high HDI (70 countries), those with medium HDI (85 countries) and those with low (HDI) (22 countries). (Denmark is ranked 14th in the 2008 UN Report.) Table 11 gives the annual population growth rate and the expected proportion of the population under 15 in 2015 in the three categories.

The medium countries have population growth rates twice those of high development countries while the less developed countries have growth rates five times that of high development countries. This results in a prediction of 43% as the proportion of people under 15 in low development countries in 2015 as opposed to 26% in the medium range and 18.8% in high development countries.

	Annual Pop. Growth %	Under 15 (2015)
High	0.5%	18.8%
Medium	1.2%	26.0%
Low	2.5%	43.0%

Source: UNDP 2008

Table 11: World Population by Development Status

These stark global population trends raises the potential developmental role of higher education institutions and Universities of Applied Science in particular. The application of knowledge and technology are urgent requirements in developing countries. The full potential of Universities of Applied Science acting alone or in collaboration, including international collaboration, to be instruments of national or European development plans in developing countries should be fully explored. The UAS sector should have major potential in capacity building, applied research partnerships and student/staff exchange with developing countries.

7. Technological Change/Innovation

The globalisation of research and innovation should accelerate technological advance to the benefit of mankind. The economic exploitation of technology will become ever more competitive. Skill-biased technological change (18) “makes higher education workers more attractive for employers and therefore increases the demand for this type of workforce”. In addition to high technological skills competences increasingly required include generic skills “problem solving, complex communication skills, adaptability and systems thinking”, (18).The innovative infrastructure of regions – the capacity to exploit knowledge – and higher education’s role in it become critically important.

The European Union has devised a composite index of innovative capacity (10) and publishes annually an EU Innovation Scoreboard showing comparative innovative country capacities. Amongst the factors contributing to the index are the availability of high skilled people, the number of innovative firms and entrepreneurial efforts and linkages amongst firms and the public sector. Table 12 shows the comparative rankings of countries in the 2008 report. Countries are ranked in 4 categories: leaders, followers, moderate and catching up. (Denmark is ranked as one of the leaders well above the EU27 average. The World Bank in its *Doing Business 2009* report ranked Denmark as 5th in the world for Ease of Doing Business).

This report also compares the EU with the US and Japan. It reports a significant gap, to the EU's disadvantage, between the EU and these two countries but also some narrowing of those gaps in recent years.

Major changes in technologies and economic activity will be driven by the greening of the European economy. Resource scarcity, energy security, climate change and intergenerational justice are driving this change. International agreements and targets, including those expected from the forthcoming Copenhagen Climate Conference, and a strong regulatory framework give an urgency to this transformation.

Economists speak of the new economic opportunities for those who exploit green technologies and the many emerging "green" skills and occupations. Major 'green' change is to occur in areas such as energy production/distribution/conservation, construction, food production, sustainable materials, manufacturing, transport/logistics.

Universities of Applied Science should be to the forefront in the changing technological, greener, innovative Europe. The professional upskilling of employees is urgently required by these changes.

8. Changing the Organisation of Work

In the past major advances in wealth creation and productivity were achieved by the reorganisation of work to exploit, for example, new technologies including information technologies. There are again compelling reasons for the reorganisation of work.

- Populations are becoming more educated through Educational Upgrading. There is, for the first time in history, close to universal upper secondary education and mass higher education participation. Work needs to be reorganised to fully exploit the more advanced educational achievements of workers.
- The global increase in high quality graduates output will put downward pressure on the "graduate dividend" i.e. the average financial gain accruing to graduates. A reorganisation of work to combine the capabilities of highly qualified persons in innovative and productive ways is necessary to preserve that dividend.
- The greening of economic and service activity in the transformation to a low-carbon sustainable society requires its reorganisation to address green issues and the use of energy and resources.
- An economy more dependent on services requires their ongoing reorganisation to increase their productivity and effectiveness.
- Demographic change requires greater participation, productivity and persistence in the workforce. Reorganisation should address these issues and

Leaders:	Switzerland, Sweden, Finland, Germany, Denmark, UK
Followers:	Austria, Ireland, Lux., Belgium, France, Netherlands
Moderate:	Cyprus, Iceland, Estonia, Slovenia, Czech Rep., Greece, Italy, Norway, Portugal, Spain
Catching Up:	Bulgaria, Croatia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Turkey

Table 12: EU Innovation Scoreboard 2008

facilitate older workers where appropriate. Their upskilling should be facilitated.

- The full exploitation of technologies including information technologies should be enabled by work reorganisation. Remote and global 24-hour enterprises should be enabled in the digital economy and society.

9. To-Morrow's Skills

To-morrow's world will be a changing and challenging one and to-morrow's skills address those changes and meet those challenges. The current economic turmoil makes short-term predictions difficult. In the longer term a range of fundamental factors will reassert their influence.

- In a more competitive changing global economic order countries will compete through the quality of their knowledge and innovation infra-structures. The global output of quality graduates is increasing strongly. High quality qualifications organised in innovative and productive ways will be needed to meet this competition. A continuing emphasis on the professional in-service upskilling of adults is required.
- Demographic change will require greater participation, productivity and persistence in European workforces. Participation, productivity and persistence are promoted through high quality qualifications and the professional up-skilling of adults including older adults.
- Technological change will accelerate and be driven by global innovation. The exploitation of this change will require high technological qualifications, innovative capacities and strong generic skills.
- The low-carbon sustainable society of the future requires a range of "green" skills to be embedded in qualifications and the "greening" of economies and organisations.
- Sectoral change will continue and make strong skill demands. Increasing the primary and manufacturing sectors' competitiveness and output while their workforces reduce requires up-skilling. Construction skills must adjust to low-energy sustainable materials and methods. Service skills in developed service economies must continuously address productivity and efficiency gains.
- Employers in a changing context lay strong emphasis on the flexibility of employees and on generic skills i.e. those discipline –independent transferable skills such as strong communication skills, critical thinking, problem solving skills, IT skills, team working skills.
- Skills in the reorganisation of work are of importance to address major issues. These include the growing educational qualifications of the population (educational upgrading), the global growth of graduate output, the exploitation of new and changing technologies including IT, the greening of economic and service activities, the aging of the workforce.
- Despite global economic progress a significant proportion of children continue to live in the poverty of underdevelopment. This raises the question of the full role that Universities of Applied Science can play in national or international development programmes conferring relevant skills and building capacities in undeveloped countries.

Educationalists should welcome their key central role in to-morrow's world in providing to-morrow's skills and the in-service professional development of adults/employees. Universities of Applied Science can be major players in the innovation and knowledge infrastructures of to-morrow's Europe.

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