

OECD/Germany workshop

on

Advancing innovation: human resources, education and training

17-18 November 2008

WORKSHOP REPORT

Monday 17 November

Presentations

Welcome and Session 1: Human resources and innovation: broadening the policy model

The workshop was opened by Mr Klaus Luther, German Federal Ministry of Education and Research (BMBF), who welcomed participants and highlighted some of the issues to be explored over the next two days, also referring to topics that State Secretary Meyer-Krahmer noted in his written greeting. Mr Luther noted that the underlying objectives of human resources for innovation are to speed up knowledge creation and the translation of this knowledge to innovative products, services and processes that can not only stimulate economic growth but also contribute to solving global challenges. This human capital is underpinned by an education system that promotes excellence as well as meeting broader societal objectives, such as assisting the unemployed and those affected by structural change. Innovation in the education system can help achieve these goals, but we must be clear about what is innovation and what is simply “business as usual” reform activity.

Representing the OECD Directorate of Science, Technology and Industry, Dr Dirk Pilat spoke of the changing nature of innovation and the challenges this poses for policy. Dr Pilat outlined the work that had been undertaken in the Directorate in areas such as science and engineering graduates, research careers, women in science and international mobility of highly skilled people. He noted that there is scope for new analysis to broaden the story from “human resources for science and technology” to “human resources for innovation”, in particular, to better understand what skills are required, whether there is a mismatch between supply and demand, and how workplaces shape peoples’ ability to innovate. Dr Pilat concluded that numerous policy challenges remain, such as determining what kinds of education and training systems are needed to maximise innovation and how best to ensure policy coherence across multiple actors.

Mr Dirk van Damme, OECD Centre for Educational Research and Innovation, noted that much is now known about educational attainment and its importance, and that increasing evidence is also available on learning outcomes (for example, PISA and the forthcoming feasibility study of outcomes at the tertiary level). However, deeper knowledge is required, particularly on the types of skills that are important – this could comprise not only basic/foundations skills and transferable skills related to various disciplines, but also creativity, social capital and attitudes. Mr van Damme highlighted that skill acquisition and usage occurs within an environmental context, and so networks, the social milieu and issues of inequality matter. The question of innovation in education is important and should be included in the OECD Innovation Strategy – some relevant issues include what kinds of educational innovation are most relevant for innovation in general and how do you improve/innovate informal learning?

Session 2: Keynote speeches

The first keynote speech, by Professor Luc Soete, Maastricht Economic Research Institute on Innovation and Technology (MERIT), addressed the topic of national human resource strategies within the context of innovation theories. Professor Soete presented two Schumpeterian models of innovation: Schumpeter I, which is an “entrepreneurial model” that focuses on new firms, individual inventors and science-based advances; and Schumpeter II, which is an “incremental innovation model” that focuses on accumulation of knowledge, learning and R&D labs in large firms.

Professor Soete suggested that the two Schumpeterian models imply different models of learning and human resource management within firms and societies. In particular, Schumpeter I is characterised by the dominance of a scientific approach, while Schumpeter II focuses more on learning by doing, using and interacting. In today’s globalised environment, with technological change coming more from flexible, trial-and-error processes, a continuously changing external environment, and the increasing importance of user innovation (especially in services), what should be the preferred approach to learning? It appears that aspects from both approaches are important – elements from the science base are important for firms in all sectors, and skilled research personnel and links to universities and research institutions will be vital, but at the same time, accelerating change calls for interdisciplinary workgroups and employee involvement. Professor Soete noted the traditional view of a UK/European paradox, where some systems that perform well in science do not succeed in innovation, perhaps due to excessive focus on a science/technology mode of learning at the expense of a doing/using approach. However, he suggested the paradox may be changing.

Looking ahead, Professor Soete called for an increased concentration of research in Europe, with differentiation across establishments. He noted that the Schumpeter I model would suggest a greater focus on excellence (albeit with a potential cost to social cohesion), while Schumpeter II highlights the importance of cross-country learning, supported by greater critical mass and specialisation. Professor Soete also suggested that the current financial crisis may lead to greater focus on R&D spending, with firms searching for ways to cut costs, reduce risks and outsource some activities. He speculated whether the new trend towards “financial nationalism” in Europe would see greater efforts to anchor knowledge locally, and suggested “twinning” universities with partner institutions in the South could provide more embedded international partnerships and internationalisation of research.

The second keynote speech, by Dr Shahid Yusuf, World Bank, focused on the innovation and human resource issues of middle income East Asian countries. These countries are seeking to maintain their growth momentum by improving innovation and productivity, and they are spending increasing amounts on R&D as well as expanding tertiary level enrolment. However, Dr Yusuf noted that these approaches are not a panacea – evidence shows that high R&D spending and patent output does not automatically translate into better productivity or growth, and increasing enrolments can have a negative impact on quality of higher education. There is no evidence of a shortage of S&T graduates and their salaries are static. The crucial issue for East Asia may, in fact, be weak demand for innovation. Firms are succeeding in their low cost model of growth, which focuses on cost reduction, quick returns, and technological advance embodied in imported equipment, and there is little incentive to change strategies. As such, incentives for undertaking doctoral and post-doctoral studies are limited and firms’ capacity to absorb new technology is low. Some large domestic firms do undertake R&D activities, but these are the exception, and multi-nationals tend to have limited backward linkages and spillovers into their host countries (partly due to IP concerns).

Dr Yusuf suggested that the quality of tertiary education in STEM (science, technology, engineering, and mathematics) subjects needs to be improved and students need to build stronger analytical and problem solving skills. He also noted the lack of industry-university links and the difficulties in starting new firms, particularly in accessing risk capital. Dr Yusuf pointed to the importance of the environment for innovation

and noted that innovation is typically an urban phenomenon; as yet, few East Asian cities have the desired characteristics, such as industrial diversity, a concentration of research universities and activities, large pools of knowledge workers, and state-of-the-art IT infrastructure. In conclusion, Dr Yusuf suggested that government innovation policies in these countries required rethinking, in particular to increase focus, look beyond short-term targets (“wanting more of everything”) and improve evaluation. In academia, means of raising the quality of teaching are lacking and there is a fixation on short-term output targets and rankings. While these countries have not yet exhausted opportunities in manufacturing and services typical of their level of GDP per capita, they all seek a step-change related to innovation. Dr Yusuf called for greater acknowledgement of the long gestation, culture and institution-bound nature of innovation systems.

Session 3: International experiences: case studies of national strategies

This session examined how human capital issues are included in national innovation strategies. The discussion was supported by country-level examples in Background Paper 1. The first three speakers highlighted their countries’ approaches and experiences, the fourth speaker described a programme funded by the NSF:

- Ms Katharine Campbell, Australia, spoke of the Australian Government’s recent review of innovation “Venturous Australia”, which set people and skills as one of ten key themes. The review supported improving the system for generating human capital, giving a greater focus to the arts and humanities, aligning policy with immigration policy, and supporting alternative pathways to professions. Ms Campbell noted that Australia puts emphasis on skills to use and adapt knowledge produced elsewhere, since Australia is “a 2% economy – 98% of knowledge is produced elsewhere”. Innovation in the public service is an explicit part of the strategy. A White Paper in 2009 will set out the government’s response to the review.
- Mr Hernán Araneda, Fundación Chile, noted that Chile’s challenge is to transform from a natural resource based economy to a knowledge economy. Their innovation strategy has multiple goals, covering economic growth and development as well as social inclusion and equity issues. Human capital is one of the pillars of the strategy, and the aim here is to establish an accessible and top-quality life-long learning system that will increase the amount of human capital in the system and up-skill the existing workforce. Chile is designing and piloting new arrangements and funding mechanisms, and is developing a national competency system, currently focused on 15 economic sectors. This aims to define occupational and employability skills standards, adapt curricula and training, and provide a certification system for students. However, competing policy agendas are regarded as a concern, and institutional change is required to focus attention on human capital.
- Dr Mi-Jung Um, Science and Technology Policy Institute (STEPI) Korea, noted that integrating human capital into innovation strategies is new for Korea, but necessary following the merger of the ministries for education and science and technology after Korea’s recent elections. Dr Um highlighted the governance challenges of combining the two areas, as well as the issues posed by merging two fields with different terminologies. Nevertheless, integrating education, science and technology is important for Korea in meeting the challenges of an ageing population, transiting to a creative service-based economy, and achieving synergies in government. Dr Um noted the main issues for future policy will be curriculum, life-long learning and university quality.
- Dr Soo-Siang Lim, National Science Foundation, described the Science of Learning Centres Program funded by the NSF. This program seeks to enhance knowledge about how people, animals and machines learn and to transfer this knowledge to teachers. Insights from the program are relevant to workforce preparation and training, particularly in training a workforce that can move between disciplines and use knowledge from different fields. The centres are

multidisciplinary and researchers have found it challenging to move back to mono-disciplinary departments when they leave – many retain links with the centres so as to continue to benefit from the wider perspectives multidisciplinary brings.

Session 4: Skills and competences for innovation

This session aimed to identify the skills, competences and training mechanisms that are better adapted to the changing innovation landscape, as well as better ways of analysing them. The first speaker, Professor Bruce Tether, Imperial College London, spoke about his recent research into the relationship between innovation, skills and productivity. He noted that different types of innovation have different implications for skills, but that overall countries have seen increasing demand for skilled workers. Particular industries require particular skills, and the growth of services (now $\frac{3}{4}$ of most developed economies) has raised the importance of soft skills, such as communication, that are harder to quantify and harder to address in qualifications. Professor Tether suggested that the supply of different types of skills can influence the type or mode of innovation seen in an economy (noting that the UK had done well in industries based on a small scientific and technological “elite” workforce and not so well in industries requiring wider workforce participation in innovation). He also suggested that a combination of weak workforce and managerial skills could contribute to a “low skill equilibrium” trap whereby countries compete on price and costs rather than quality and innovation.

Professor Tether recommended improving workforce skills “from the bottom up” – focusing on reskilling people and giving them generic adaptable skills (and ensuring that their qualifications are not “useless”). He did not favour training controlled by employers alone, as they tend to have a short-term outlook. Professor Tether also highlighted the importance of social capital alongside “hard science”, and also pointed to the importance of ensuring the science base is relevant for industry, particularly for economies where services make up the majority of output. A high level of specialisation is a particular challenge. Professor Tether concluded by outlining the “Design London” project, which aims “to broaden the understanding and skills of tomorrow’s business leaders, specialists, engineers and technicians” by linking the Royal College of Art, the Imperial College Faculty of Engineering and the Imperial College Business School.

The second speaker, Professor Gerhard Bosch, University Duisberg-Essen, opened his presentation by noting that formal and informal learning are strongly linked, with higher qualified people having higher participation in informal learning. In Germany, the labour market has strong demand for intermediate skills as provided by the vocational education sector, but this is coupled with practical “on-the-job” experience and an ability of workers to communicate across fields of expertise. The style of vocational training in Germany has shifted, with more orientation towards the project and the customer, rather than towards individual demarcated jobs and products. Professor Bosch stressed that workers still need the same basic skills – new “soft skills” (such as problem solving) and IT skills are an addition, not a replacement.

Professor Bosch pointed to a lack of skills as the main bottleneck for the introduction and diffusion of new technologies and suggested training incentives needed to be internalised in the market. He noted that regulations can stimulate training in some instances, for example, health and safety or employment protection. Professor Bosch closed by posing the question as to whether there is a public responsibility for adult education. Traditionally, the State provided basic initial education and adults took personal responsibility for further training. However, in some European countries, the disappearance of jobs, spillovers from education and the challenges of an ageing society are changing this view.

The third speaker, Dr Christoph Averdung, Director of CPA Systems GMBH, provided an employer’s perspective on the issues of skills and innovation. Dr Averdung’s firm develops software related to geographic information, and requires highly skilled people to create applications. It does not aim at the

mass market and is likely to remain a smaller player. It commercialises products that are “new to the world” every three years, so there is constant “reinvention”. The firm employs graduates and provides continuous training – Dr Averdung considered that graduates need to spend 1-2 years in the firm before they have the right skills. Essential skills for staff, beyond university training, include independence, creativity, teamwork, ability to deal with change and motivation. Dr Averdung noted that it is a challenge to retain staff, as people naturally look for new opportunities and challenges in their work, but that the majority of staff have stayed. This may be partly due to profit sharing arrangements or the high salaries; however, Dr Averdung noted that money is not the only solution (in fact not even a sufficient one) – his firm also allows staff to pursue personal projects on company time, to provide additional motivation and good feeling between staff and management. The firm retains contacts with universities, seeing this as a “reinvestment” that benefits all parties.

Session 5: Wrap up of first day: where do we go from here?

This session was opened by brief comments from two of the OECD’s advisory bodies: the Business and Industry Advisory Committee (BIAC) and the Trade Union Advisory Committee (TUAC). Ms Helen Diedrich-Fuhs (BIAC) set her comments in the context of the German education and training system. She stressed that general education is essential for creativity, noting that the PISA results show action is needed in many countries. Ms Diedrich-Fuhs also stressed that a broad orientation to the labour market is required – school leavers are not all prepared with skills to express themselves, to communicate, or to behave in a disciplined manner. Fostering creativity in all fields of training, and teaching entrepreneurial and economic skills, is important, and this should be complemented by continuous learning and practical experience. Ms Diedrich-Fuhs noted that a shortage of skilled labour was likely in the future and that close co-operation between industry and education is vital.

Mr Roland Schneider (TUAC) urged reflection on “the appealing gospel of skills”, questioning the implicit assumption that the changing environment is leading to knowledge economies with no unskilled jobs and asking what is the implication of internationalisation. Mr Schneider commented that the supply of skilled labour has sometimes outpaced the requirements of economies. He noted the importance of business models and strategies as a driver of skill requirements and suggested that we need to move beyond a supply-side focus on skills to looking at what employers want. This implies a demand-led system where learners and employers have greater influence over skill creation. Mr Schneider pointed to the role of unions in the provision and governance of VET, and spoke of the “Union Learn” initiative in the UK that brokers learning opportunities for members as well as researching learning and skills (see www.unionlearn.org.uk). He suggested an exploration of the Scandinavian experience would be useful, as well as the Scottish experience.

Summary of discussion – day 1

The general discussions that took place within sessions 3, 4 and 5 were wide-ranging and touched on a large number of issues. Key themes were:

The goals of innovation

There was some discussion of whether economic growth should be the primary focus. Participants noted that the OECD Ministerial paper highlighted global and social issues and suggested that perhaps our current conception of innovation, which focuses on growth and productivity, “lacks ambition”. For example, supporting peace was one broader goal mentioned, which could be measured as the number of people suffering from war. In the case of education, social issues such as equity are very important, and this has implications for thinking on innovation. Supporting the idea of broadening goals, it seems that econometric regressions do not yield a clear relationship between economic growth, innovation and human

capital, raising the question of what the relationships would look like if the goal was wider than growth. A key challenge with this, however, is how to formulate such a new approach and make it operational – what measures would be used and what is the analytical framework? Other delegates suggested mixed regression outcomes could be partly due to measuring the “wrong” skills, and highlighted the importance of better measurement of “intangibles”. Another possibility is that the environment the skills are used in – the networks and social context – could explain some of the differences we see in outcomes.

An important question raised was whether innovation is “good” by definition. The current financial crisis was raised as an example – many of the new complex financial products were described as innovative when they were introduced.

Relating the discussion to policy, it was suggested that in addition to policies that allow innovation to appear (and avoiding policies that hinder innovation), countries might want to introduce policies that require innovation, to try to foster success in meeting wider social goals. The question then is, what are these policies? How do we stimulate innovation in “good” areas (e.g. peace rather than war) and in areas that traditionally have been non-innovative? Should policy be proactive rather than reactive?

At the same time, an important question is how people respond to change – fast change may create serious structural and/or adaptation problems and often breeds resistance and fear. This could potentially work against stimulatory policies. Innovation fatigue is a risk. Participants pointed out that, given the risks inherent in innovation, we cannot blame people for being critical and cautious. At a system level, delegates suggested people need to be inspired to make changes rather than prevented from doing things. Some participants noted that individuals who try to be creative in their work are often rejected by the system – they don’t fit in. One comment was “You need a lot of social skills if you want to get through with crazy ideas!”.

Related to the discussion of goals was the issue of public sector innovation, which delegates noted did not seem to feature strongly in all country innovation strategies. It was suggested that countries that explicitly consider public sector innovation put more focus on clients and service delivery and perhaps think about incentives in a different way. This may have implications for human capital and the skills required of them and represent an important difference between older and newer innovation strategies.

How innovation occurs

Participants were interested in the implications of the Schumpeter models, questioning whether model I implies firms make better use of available skills and whether model II was inherently more desirable with its focus on multi-disciplinary and collaborative learning. Professor Soete noted that trade unions have a large impact on how skills are used but that model II does not always imply a better use of skills.

Types of skills

Delegates pointed out that the key challenge for countries is educating people for jobs that do not yet exist. What are the skills required? Social skills, co-operation, teamwork and creativity were seen to be important, yet schools tend not to focus on creativity even though it is this skill that potentially leads to new things. Being able to “take the risk of being wrong” was seen as a useful skill. Also on the theme of skills for the future, delegates discussed how to deal with changing industrial structures. Agreeing that predicting the future is hard, if not impossible, participants suggested that getting fundamental basic skills right is a crucial first step in enabling workers to adapt to change. Broad occupational training that allows people to work in different places and also addresses the needs of the public sector was mentioned, as was multi-disciplinarity. In terms of specific training for displaced workers, delegates felt simply “parking” people in training was not the answer – workers need to be given skills they do not have (perhaps maths or

new languages). Being able to “de-learn” may be another important skill in a changing environment – how do we do this? The importance of ensuring inclusive training systems was underlined – broad participation of women, minorities, the disabled and people from rural areas in education is a necessity to ensure their participation in working life.

Several participants underlined that formal and informal training must be linked, and that training of soft skills must not be separated from normal studies. However, there were a number of unanswered questions related to creativity and similar “soft” skills – can they be learned or are they innate? How do we measure them – how do we know if we are deficient and when we have succeeded in reaching a new level?

The role of basic and intermediate skills for innovation was raised, with delegates noting that capability and creativity of all workers is important. Some participants noted that countries’ innovation strategies (outlined in background paper 1) retained a science and technology focus, and that this signalled an ongoing challenge to understand and account for new skills, as well as basic workforce skills. Participants agreed that basic skills must be the foundation, including that workers “learn to learn”. However, one question is whether even these basic skills are changing along with the changing environment, and in what ways.

Related to this was the issue of life-long learning, which was seen as crucial by almost all participants. Delegates asked why the concept had “lost favour” in the OECD recently. Clarifying what the support of life-long learning means in practice for policy will be important.

Globalisation

An interesting question was raised related to globalisation and outsourcing – should education of the population continue to increase if the value chain remains static due to higher value activities moving offshore? To what extent does globalisation break the link between local education and innovation in a country? It was noted that it takes time to build strong specialised research entities and that the scope for outsourcing this type of activity to emerging economies is probably limited. The example of China was mentioned, where the need for protection of property rights encourages firms to split their activities in different labs (each working on limited parts of the firm’s total activities). In Germany for example, there are apparently an increasing number of firms returning from developing countries because of uncertainties or risks, e.g. lacking quality of management as well as products.

An important issue that arises from increasing globalisation is the level of co-operation versus competition between countries, and how this will be dealt with in the Innovation Strategy. Will there be rules?

Education systems

At a broad level, there was interest in continuing to improve our understanding of learning outcomes, as opposed to qualifications achieved. Such information could help countries improve the effectiveness of their spending on human capital, particularly when accompanied by a better understanding of how people learn and ways of exploiting this in the education system. One participant noted that “schools are boring” and this certainly reduces creativity potentials and learning outcomes. Ensuring that linkages are maintained between education researchers and teachers is vital for improving learning outcomes – this may require some sort of “in-between” community (perhaps similar to the “Science of Learning Centres” discussed by Dr Lim in session 3).

Referring to Schumpeter’s models, there were also comments on the relationship between elite and mass education, with both deemed necessary. There has been an increase in the level of education in most countries, however, there is no automatic connection between these increases and social cohesion.

Participants noted that in some countries (such as the US and Singapore), inequality has increased despite increases in education. Some participants explicitly underlined the need for middle-level skills.

There is a fundamental question about whether there should be a supply or demand focus in education. Many countries are trying to increase their output of graduates, but does this stimulate innovation in the absence of interest by firms (for example, as noted in Dr Yusuf's presentation on East Asia)? Participants agreed that the risk of overshooting (too much education) was less of a concern than undershooting, although it was acknowledged that education has costs that must be borne by individuals, firms and society, and that these costs should not be ignored.

Some participants questioned the role of universities in the innovation system and whether governments set their goals too high in expecting both basic and firm-relevant or commercial research. Others supported "keeping sights high" to give incentives to researchers and contribute to the global diffusion of knowledge. It was noted that the research model of high efficiency and funding of excellence is being exported worldwide.

Some delegates highlighted the differences in vocational education systems across countries and the implications for workers of doing vocational training – in some countries, VET is often seen as a second choice aimed at people who have failed at school, while in other countries it is a highly valued education option for smart, independent students. It was also commented that employers under-invest in education and that European companies had reduced their investments lately. Better links between the labour market and qualifications are required.

Governance

A number of participants pointed to the difficulties of cross-portfolio work on education and innovation issues. Innovation "touches everything" and maintaining coherence is a challenge. Some countries have taken steps to merge policy ministries with the aim of generating greater synergies and coherence, and evaluating the success of these mergers once they have "bedded down" should yield useful lessons for others.

Related to this is whether national innovation strategies are the right "home" for human capital strategies, or whether separate strategies are better. Delegates noted that those countries with public sector innovation included in their innovation strategies also tended to include education in the strategy and had a broader perspective.

Implications for the OECD Innovation Strategy

It was noted that all countries had similar aims and broad approaches/targets, but participants questioned the extent to which countries could learn from one another at the policy level. The OECD's monitoring of country strategies and progress has shown a move away from a supply focus, towards demand (looking at social challenges, commercialisation of ideas, public procurement options and lead market concepts). This policy is still experimental and countries can learn from each other in this area. Nevertheless, it is not possible (or desirable) to have a common innovation strategy for all countries, and the goal should be to identify best practices and apply these to different contexts. In this context, some commented that even though policy decisions must be taken within shorter "political cycles", it is still crucial to undertake evaluation of long-term effects of policies.

It was questioned whether the OECD should be recommending "classic" innovation policies in the Innovation Strategy, or whether there should be a shift to a "2nd generation innovation strategy", which would encompass notions of openness and flexibility, provide supportive conditions, promote innovation

in public services, and look to equity and social issues. It is not clear that “1st generation” policies have worked for all countries and the Lisbon Agenda approach has not yet borne fruit either.

There was a clear call for the OECD to take the lead in changing paradigms. The OECD was urged to better identify and better measure concepts and ideas that are currently hazy or less tangible. The OECD can add value by dispelling or supporting “myths” with robust data and analysis. Participants also encouraged the OECD not to use “boring indicators” – suggesting that use of traditional indicators and measures will not be sufficient. Related to this, participants urged the OECD not to fall into the trap of using “trendy catchwords”. For example, the word “innovation” can be overused – we should make clear distinctions between real innovation versus reforms and changes. Some participants called for the term “social innovation” to be used instead of non-technological innovation.

Some participants felt it would be useful to hold a joint workshop with the OECD’s Directorate of Employment, Labour and Social Affairs to debate employment issues associated with innovation processes. It was also suggested that the OECD undertake a thematic review of transformation processes in eastern-European countries as examples for innovation in society at large.

At a specific level, some participants suggested that the number of small analytical projects within the Innovation Strategy should be reduced.

Tuesday 18 November

Presentations

Session 6: Positioning innovation in education within national innovation strategies

Dr Stéphan Vincent-Lancrin, from the OECD Centre for Educational Research and Innovation, started by underlining that while the workshop on Monday focused on innovation as such, Tuesday's workshop would focus on innovation in education. Dr Vincent-Lancrin stated that while the definition of innovation in the Oslo Manual has limitations, it is a common vocabulary and provides the basis for much data collection, including in health services and education. The countries' answers to the workshop questionnaire illustrated that it enables to collect useful information regarding what is novel in education: to the world, a country, a company or a school. He underlined the importance of education for society (not least as a sector that often accounts for 6% of GDP) and for innovation, and the need for education systems to answer to societal changes. He posed a question as for whether education could be changed once for all, or whether reforms should be a continuous process, and suggested that change can motivate students, parents and teachers. The crucial question is what motivates pupils to learn. Higher education should be innovative regarding new knowledge, but also regarding commercialisation – this is a challenge. Finally he posed the question whether it was true that education was conservative and not innovative, suggesting that perhaps education displayed incremental adaptation rather than radical innovation, and called for measurement of innovation in education, as has successfully been done in health services.

A film by Edutopia on an innovative teaching practice, project-based learning, was presented.

Session 7: Innovation in education and training: country cases of strategies and initiatives

Mr David Jasmin from the National Institute of Pedagogical Research, France presented a primary-school level (3-11 yrs) program for innovative pedagogy in science, "La main à la pâte", started in 1995. At that time, only 3% of classes practised science. The aim of the programme is for pupils to understand through hypothesis testing and experiments. In 2000, the project comprised over 5000 school classes and was positively evaluated. Now more than 30% of primary teachers teach science. The project is also based on co-operation with research centres. At the outset curriculum was revised, and unique teaching material produced in co-operation with the ministry and Academy of Sciences. Resources are provided for teachers, including a web-site. From 2006, an experiment began to have only one teacher for all science subjects in middle high schools. There is now collaboration with other countries – a European program, POLLEN, coordinated by "La main à la pâte", was established in 2006, and is now used in 12 countries, by 1500 teachers and 30 000 pupils. The program comprises pilot centres, which work with local authorities to include new schools.

Important elements are that pupils keep notebooks for their ideas, high quality equipment is available for teachers, extensive internet resources are available, teachers are involved in innovation, there is use of scientific communities, pilot centres assist teachers, there is partnership with non-conventional partners, and there is international co-operation. Training of teachers is practical; they are set in the role of the pupils. The idea is that this changes the way teachers operate, and makes it easier for them to introduce the learning method in class. The project comprises activities open to parents, and in the media the project is presented through well-known scientists. The Web site with teaching material, www.lamap.fr is one of the education pages most visited in France. A related EC book: *Science Education Now* has been launched.

The second speaker, Professor Gábor Halász from ELTE University, Budapest, Hungary, presented the innovation policy of Hungary. The policy is rooted in the Innovation Law (2004) and the government's Mid-term Science, Technology and Innovation Policy Strategy and Action Plan. The science and

technology policy is carried out by a minister of STP without portfolio and the National Office for Research and Technology. The policy framework has created a favourable environment for innovation in all sectors, although innovation in public services is not sufficiently recognised. Innovation in education is not explicitly included in the policy.

Although not much requested, an innovation strategy for the education sector is currently planned as a part of the National Development Plan 2007-2013. In this plan quality in education and access for all are among the goals set. The strategy will be based on the outcome of an evaluation of the current national system and on international comparative analyses. An implicit strategy has existed, however, since the establishment of the legal framework for pedagogical experiments in the 1970s. At that time the loss of belief in large scale reforms to provide quality in education led to radical decentralising. In the 1990s schools were responsible for part of their curriculum. At the same time, international organisations such as the World Bank and the Soros Foundation joined with the government to establish funds to increase innovation and development in schools. Regional innovation funds were also established. Since Hungary became a member of the EU, it also has access to large multi-functional EU programs.

According to Professor Halász, innovation in education faces several challenges in Hungary. The implicitness of the strategy makes it difficult to set clear goals. There are many players, national authorities, schools and professional networks. Their roles are not clear, and information and co-ordination is poor. The educational research community has an ambiguous attitude towards innovation. While the EU is a major potential driver of innovation, the bureaucratisation of EU funded programs may prevent people from applying for funds.

The third speaker, Ms Anneke Boot from the Ministry of Education, Culture and Science in the Netherlands, introduced the audience to innovation in education in the Netherlands from an observer's perspective. A "Finnish model" for innovation was adopted, and includes a broad innovation agenda covering both the business sector and government itself. In a second round social innovation, public/non profit organisations and also brain and cognition sciences are included in the strategy. An innovation agenda for education is expected in spring 2009.

Ms Boot underlined that innovation in education must be understood in the context of emancipation of schools and universities. In secondary vocational education, initiatives for program-related competences had already been taken in co-operation between schools and employers to keep pupils motivated for learning. In secondary general school, an initiative from the authorities for innovation failed. The parents were against it, and there was little support among teachers. The association of primary schools however, have a motto of "learning by innovating". There are several funds for innovation, and projects are monitored.

The Dutch society has several challenges regarding education and development of the workforce. A topic on the social innovation agenda is the challenge of decreasing demand for workers by increasing their productivity. There is a shortage of teachers, which brings into sharp focus the issue of using people who are not fully trained teachers, e.g. nurses, to teach, based on their specialist skills plus a shorter teacher training period. The Netherlands will look at new forms of learning. Perhaps ICT may substitute for a full teachers' education. A knowledge infrastructure for evidence based innovation is currently being built. These are important issues on the innovation agenda for education under preparation. There is hesitancy in schools on many of the issues raised, and Ms Boot regarded the government's role as crucial. A teachers "wiki" for digital material is being prepared via Kennisnet, which is a public support organisation steered by sector organisations. Ms Boot ended her presentation by posing the question if learning innovation was a continuous development or a onetime innovation novel to the world, and answered that it was a continuous development. Teachers need support systems, and help to transfer research to practise.

Although originality is considered a positive element in business innovation, her advice was that there should be limits to variety in public sector services.

Session 8: Innovation in education: The driving forces

Dr Tracy Burns and Mr David Istance from the Centre for Educational Research and Innovation, OECD presented two projects currently being conducted by the OECD.

Dr Burns presented the project on Systemic Innovation in Vocational Education and Training (VET). The objective is to conceptualise innovation in education, look at factors influencing innovation and actual innovation strategies. Dr Burns pointed to the Oslo Manual, which defines innovation as an improvement. She underlined that although the aim of systemic innovation in VET is to introduce changes that improve the operation of VET systems and satisfaction among the stakeholders, this cannot be evaluated before the system is implemented. Focus for the project analysis is on the profile of innovation, the use of an evidence base, the process and dynamic of innovation and finally the role of evaluation. There are case studies from Australia, Denmark, Hungary, Germany, Mexico and Switzerland. The findings so far indicate that economic, social, political and technological needs are drivers for innovation. Barriers, however, are accountability (restricting risk taking), competing policy agendas, lack of consensus among stakeholders and lack of research evidence and evaluations. The report from the project will be published in 2009.

The Innovative Learning Environment project, which was presented by Mr Istance, is not an isolated project, but based on CERi's reflections on "Schooling for Tomorrow", and brings together a wide set of partners. The project focuses on research and concrete innovations, and projects included must be relevant for school-age learners. The focus is on organisation of learning, how students can learn optimally, and how teachers can make a good learning environment. A book: "Innovating to learn, Learning to innovate", discussing these issues, has just been published. Mr Istance suggested that there is an expectation that innovation, also in education, will come from businesses (educational tool companies), and expressed a concern that innovations might be privatised, which eventually would be a loss to the public dimension of education.

Professor Klaus Klemm from the University of Duisburg-Essen, Germany, presented his experiences with educational empirical research in Germany. Over the last 10 years, funds for research have risen considerably, and so many professorships have been established that it is hard to fill the positions. According to Professor Klemm, research focused on data, system monitoring, and educational reports is strengthening the interest of educational researchers. The agenda of educational research is decided by interaction of three groups: the educational researchers, the administrators and the politicians.

Professor Klemm underlined that these groups work according to different frameworks that are difficult to combine. While policy looks at output, researchers are more engaged in processes. Politicians want the same research approaches to be applied several times, to measure change, while researchers want development. The time horizons are also different. Politicians want to use research results in their political dialogue, and focus on their election period, while researchers focus on the period of the project. The concept of autonomous publications is important for researchers, but not valued by politicians. Professor Klemm also noted that the administrators of education (i.e. civil servants in public authorities) are becoming increasingly important. They have the capacity to decide on research funding, and will not support research that they do not like. Some of them are experts on educational research, thus introducing their own ideology and pursuing their own interests. They tend to have a monopoly on interpreting results e.g. on PISA for politicians. Another area of friction between education research and policy is that politicians are looking for causality, but research is often not so clear-cut; for example, statements that German pupils have – or have not – improved since the former PISA evaluation, might both be defended,

which reduces people's trust in research. Based on current developments, Professor Klemm predicts that the upswing of education science will slow down, and the area will be dominated by consultants.

The fourth speaker, Professor Christopher Lubienski, Illinois University, United States, presented the US system of charter schools, dating from the 1990s. The schools were an answer to criticism of the public school system which was considered uniform and had changed little for a century. Parents increasingly chose Christian catholic schools, boutique schools or home schooling. Charter schools were established as an alternative, independent of local authorities though public, with alternative governance structures. Different and innovative teaching methods were one of the rationales for setting them up, which also were the main reasons for teachers to choose these schools. About 4500 schools are now established, in more than 40 states.

However, the schools experienced difficulties in being innovative in teaching: parents showed limited interest in educational innovation (particularly if their children were seen to be "guinea pigs"); it was difficult to measure the quality of the schools; and the incentives for innovation are limited as schools cannot capture the payoffs (they are expected to share the results). Schools avoided high risk and low performing groups and disabled students, while new schools established legitimacy through the use of school uniforms, and standard "back to basics" curricula. Those that attempted more innovation were disciplined by the market. Some of the schools were taken over by for-profit organizations, which also led to standardisation. Some of the more successful schools were those with a close co-operation with local authorities and community, offering standard fare but also using R&D and long term investment and daring to take risks as an "add-on". Professor Lubienski noted that there is currently a study of schools in New Orleans, which opened predominantly charter schools after the hurricane. This will provide an interesting analytical perspective to the debate.

Summary of discussion – day 2

Innovation in education

In the discussion the issue of how to define innovation in education was addressed. There seemed to be an agreement that the Oslo Manual represented a good starting point, but a challenge was also put forward to go beyond this definition, and discuss a particular definition of innovation in education. According to the Oslo manual, innovation is defined as something creating positive changes. In the discussion there seemed to be an agreement that within education, activities labelled as innovation sometimes failed, and also that in many cases this could only be evaluated ex post. It was also commented that there cannot be only one answer to innovation methods in schools. It was also commented that while innovation is regarded as cumulative within an economic framework, this doesn't seem true for education, where changes are made, then entropy drags the system back.

The need for a distinction between innovation and ordinary reforms was voiced, and the challenge of how to apply the distinction between the two Schumpeterian models in innovation models on educational training was presented. The question as to whether there is a continuum between systemic and discrete innovation, was raised, and a participant commented that it might not be a clear cut between them. The need for extending the concept of innovation to include social innovation was mentioned.

There should be a coherent approach from governments to coordinate actors in innovation processes, which should comprise employers, trade unions, parents and students. The roles of the different parties should be clarified.

Separate innovation strategies for education

Countries' approach to innovation strategies for education varied, and questions were raised as for if there is a need for a separate innovation strategy in education to address particular educational needs, e.g. strengthening the education of scientists. Also the opposite question, whether it is possible and useful to include all aspects of innovation, including innovation in education, into one strategy, was raised.

Resistance to innovation

A question was asked if the rather negative experiences on introduction of innovation in secondary general schools in the Netherlands could be explained by the traditional opposition between academic and practical education. Ms Boot answered that politicians were not positive towards innovation in vocational education either, but that the development here is driven by the actors, businesses and students, so it is difficult for politicians to interrupt.

There was an experience that parents were often negative towards innovation in education. It was mentioned that parents are often positive to innovation in the beginning of the school career, but become increasingly negative when the pupils come closer to university entrance. It was commented that this represents a challenge, because the aspirations of parents must be considered when talking about the "user" groups. The forthcoming book from OECD on an innovative learning environment will look at the role of both parents and communities. It is important that changes both reflect educational needs and the view of parents.

It was also commented however that not all novelties are good, so that a certain resistance is often a constructive element.

Teaching and skills

High quality of teachers, autonomy and leadership in the classroom, importance of teaching styles and sympathy for all pupils, were mentioned as important characteristics regarding teaching. The responsibility of universities for teachers training and innovation in this important area was also pointed out.

It seemed to be an agreement that good general skills had to be the basis of all learning, the skills in science and maths were particularly mentioned. The challenge is however to combine good basic skills with innovative skills. There have been slightly different views as for the priority. There was a general agreement on the need for innovation activities in the classroom, but it was also said that there should not be too much innovation at the expense of basic skills of students.

It seemed to be a general agreement that concerning methods of learning, the pupil/learner should be at the centre of concern. It was commented that learning should be put first, before learning outcome. We must care for the talented as well as the disadvantaged as the potentially unemployed. We must invest in lifelong learning. The learning environment is important. It was also underlined that pupils have different needs and ways of learning, which requires use of different learning methods.

Several participants addressed the importance of schools stimulating self esteem, and the question was raised whether this could be considered a soft skill. Self esteem is necessary when entering working life. Several participants addressed the importance of also providing skills that are important for people's personal lives like self esteem and creativity, enabling them to live happily in a changing society. It was commented that such skills are not sufficiently covered in OECD assessments. Measuring of creativity was proposed. In Sweden self esteem is monitored, however there seemed to be different opinions in the workshop to what extent self esteem is possible to measure. There was also a comment that soft skills could not be assessed by numbers, and that assessments in this case might be counter productive.

There are different approaches to innovation, allowing innovation, stimulate innovation or demand innovation.

Some participants expressed a worry because of demographic developments. In Germany the number of years to Abitur was reduced from 13 to 12 to extend the lifetime working period. The number of people not possessing adequate skills for the labour market, and the urgency that they obtained relevant skills, was also stressed.

The borderline between schools and the surrounding world was touched upon, and the questions as to the distinction between fostering a skill and teaching a skill, and also as to whether the education system has a greater responsibility for transferring ideas into practice (business or working life), were posed.