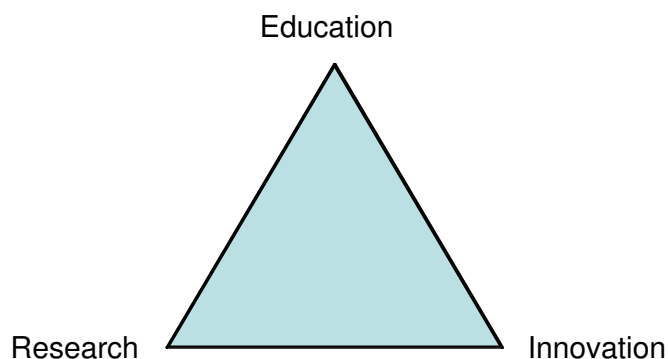


Circling the Knowledge Triangle from the perspective of Education: the added value in better connecting Higher Education to Research and Innovation

This key policy conclusions paper results from a Peer Learning Activity (PLA) which was hosted in Reykjavik 25-27 June 2008 by the Ministries of Education, Science and Culture of Iceland and the Ministry of Education of the Flemish Community of Belgium. The theme addressed by the PLA was concerned with the relationship between the three elements of the knowledge triangle:



The PLA addressed questions regarding the extent to which the relationship between the elements is bi-directional, with particular reference to the impact of research and innovation upon the education element.

The Knowledge Triangle

The Knowledge Triangle is a central theme of the Lisbon strategy, representing the integration of education, research and innovation working together as key drivers of the knowledge economy in delivering sustainable growth. The concept of 'circling' this triangle means improving the interconnectivity between these mutually reinforcing elements.

In discussions, PLA participants supported the usefulness of the knowledge triangle as a tool for describing and understanding the dynamics of education, research and innovation working together. Ample evidence was identified of how education is stimulating research, and of a bi-directional relationship between research and innovation; however, **paths back from research, and particularly from innovation, into curriculum development and educational practice were much more difficult to trace.** In practice, it would seem that the knowledge triangle is largely being implemented in a linear progression or continuum: education leading to research, which in turn fosters innovation.

It was emphasised that the different roles and interplay between education, research and innovation - and their respective weights - will vary depending upon national or regional circumstances, and that the knowledge triangle should not be perceived as a rigid structure. However, in all circumstances **strengthening linkages between the three elements is crucial in ensuring the full benefits are secured from investment in any of the three.** In this way, multiplier and (often unexpected) spin-off effects can be maximised.

The understanding of the specific role and potential of each of the three elements of the knowledge triangle was facilitated by dedicating one of the three working days to each theme in turn.

Education

In examining the role of education as part of the knowledge triangle, PLA participants stressed that education consists (at all levels) of more than just the activities of teaching and learning of specific subject matter. The **wider societal role of universities in the development of rounded individuals was felt to be an aspect often overlooked but nonetheless important**. Education, in the sense of fulfilment of individual potential, is an investment process (in human capital) which realises returns in enhanced standards of living and quality of life achieved through the conversion of knowledge, including in particular through creativity and innovation, into economic value.

Key points of debate and reflection included the following:

- Might increased specialisation of universities as 'centres of excellence' in particular fields be at the expense of being good broad teaching institutions? Can or should all universities be a centre of excellence in something?
- Could the massification of HE lead to a two-tier system, dividing education from research and innovation, and separating engineering technology and applied sciences from the humanities and social sciences
- A cultural change is needed: universities must stop thinking of themselves as apart from business. Most university students will go on to pursue careers in companies rather than in academia. Relationships with business can bring benefits to the university, its students and to the curriculum and should be two-way, (eg. clearly both business and HEIs have a desire to produce employable graduates)

Several of the PLA participants reported significant changes in institutional architecture at national level (including changes in legislation) in the organisation of higher education to align with the Bologna process, to respond to the demands of the massification of HE and to better link policies of higher education and enterprise.

Research

Traditionally, one of the major purposes of academic research has been to add to the body of knowledge and understanding in a particular domain. Increasingly, investment in research which can be commercially exploited, and in particular in engineering and the applied sciences, is also a key priority at institutional and national/regional levels.

The Lisbon strategy calls for higher levels of investment in research and development in the drive to make Europe 'the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth'. The **'Barcelona target' of increasing research and development to 3% of GDP by 2010 was felt by PLA participants to be instrumental in driving higher levels of (public) investment in R&D**.

Several PLA participants gave examples showing how this is reflected at a policy level in science and technology committees chaired by prime ministers, while on the European plane the new European Institute of Innovation and Technology describes itself as 'the first European initiative to integrate fully the three sides of the Knowledge Triangle, aiming to stand out as a world-class innovation-orientated reference model, inspiring and driving change in existing education and research institutions.'

The scale of the task was illustrated by one PLA participant who referenced a recent survey which shows that over 80% of SMEs had no R&D relationship with the HE sector. Several PLA participants gave examples of how incentives are being used to stimulate business collaboration, technology

transfer and growth in research which has the potential for commercialisation. In particular, financial incentivisation at both the institutional level and for individual professors was explored, including the question of who owns the results of research.

The role of individual professors is key: in the learning process through direct and sustained contact with students and by involvement in research either individually or collaboratively (including making contacts with business). Success or failure of bridging the role of academic and entrepreneur rests upon the shoulders of individual professors. Whilst some institutions do provide co-ordinated support (eg. access to advice on patenting) this was felt to be the exception rather than the norm. However, 'best practice' would optimise the interplay between the professors and the support structures.

Innovation/business-related research most often measures its results in terms of registration of intellectual property – patents. Caution was expressed that this may result in perverse effects eg. high numbers of patent applications which may not necessarily be an indicator of good research – or commercially viable innovations. Investment trends in the development of research with little or no immediate commercial application was less clear. Public investment in different typologies of research (and the return to the public purse) was debated.

Key questions raised in discussions on the theme of research include:

- What is the relative value of publications and patents? Are all patents, papers or citations of the same value/rewarded in the same way?
- Some research may have limited or no business potential but nonetheless be valuable in itself or as a pre-cursor to other work. How is it ensured that this type of research is not overlooked?
- How can buy-in from academics be secured? What kind of support is needed?

Innovation

In assessing how to evaluate the role of innovation in the knowledge triangle, PLA participants underlined that different avenues for innovation exist.

Innovation can be defined as the exploitation and application of knowledge, gained through research for use in a commercial sphere ie the commercialisation of research. However, this was felt to be too narrow a definition seeing **knowledge only as a product – not enough attention has been paid to knowledge as an individual ability** and the potential for pedagogical innovation and the promotion of innovation and entrepreneurship amongst students. There was a suggestion that innovation was an attribute innate in children, and the education process has tended to erase this.

We need more knowledge workers with an innovation mindset – PLA participant, Reykjavik

Innovation can, and should, also be seen in the adoption of new approaches in university administration and teaching practice, and links with industry can play a positive role in supporting this process. As one PLA speaker put it: *'Innovation in everything except accounting'*.

Examples of university-enterprise co-operation were examined, including specific initiatives on technology transfer or working on joint projects, to more strategic and long-term partnerships, often with larger companies – such as the creation of innovation parks.

It was widely acknowledged, that it is **difficult to trace a line back from innovation to education**, and particularly how to bring the benefits of commercialisation of research back to the curriculum. There were, however, examples presented where students were required to participate in innovation courses, and where students were likely to be 'infected' by a spirit of innovation.

Discussions on innovation raised the following questions which merit further consideration:

- In the implementation of the Knowledge Triangle, the focus is on knowledge as a product. However, the benefits of innovation far exceed the financial income which can be directly gained from the commercialisation of research. How can universities ensure that the full benefits of innovation (eg. in curriculum design, in university management practice) are realised?
- Should universities be more proactive in the IPR field? And should universities rank (and prioritise) patents in terms of their commercial potential?
- To what extent does collaboration with businesses for the commercialisation of academic research lead to universities chasing short-term gains - at the expense of longer-term strategic direction

Circling the triangle – the added value for education - conclusions

1. The Knowledge Triangle is a useful tool for describing and understanding the dynamics of education, research and innovation working together in a mutually reinforcing way. There was broad agreement on the ingredients needed to connect the three areas of the knowledge triangle, but the recipe is not yet clear - what measure should they be used and how should these vary in light of national or regional circumstances.
2. Strong and fruitful links were found between the three angles of the knowledge triangle, but in practice, the triangle is being implemented in a more linear progression (education-research-innovation). More practical connections which are bi- (or tri) directional need to be made. In particular, further effort to ensure that the benefits gained from innovation are fed back to education is needed. Where such links do exist they may be difficult to assess and measure.
3. Renewed policy impetus, including the Barcelona 3% target, is focussing attention and effort. Already effects can be seen, most notably in the area of research. In choosing the priorities for public funding, national policy makers and HEIs must ensure that the long-term benefits of research (and the commercial exploitation of research) are fed back to education to ensure relevant and dynamic teaching and learning, and a multiplier effect of return on investment for the public purse.
4. The role of individual professors is key: as teachers and facilitators of access to knowledge, sufficient support (and incentives) should be provided to enable them to fully assume this role.
5. There remains a question about the value accorded to other HE fields – the humanities and the social sciences – where are they in the Knowledge Triangle?

This Peer Learning Activity (PLA) was organised on 25-27 June 2008, in Reykjavik, Iceland, in response to the needs of participants in the Cluster on "Modernisation of Higher Education" within the framework of the implementation of Education & Training 2010. Nine countries participated in the PLA: Iceland and the Flemish Community of Belgium (co-hosts); Bulgaria; Finland; Hungary; Norway; Romania; Spain and Sweden. The PLA took place over three days and consisted of presentations, discussions and site visits.