
Measuring innovation in education and training

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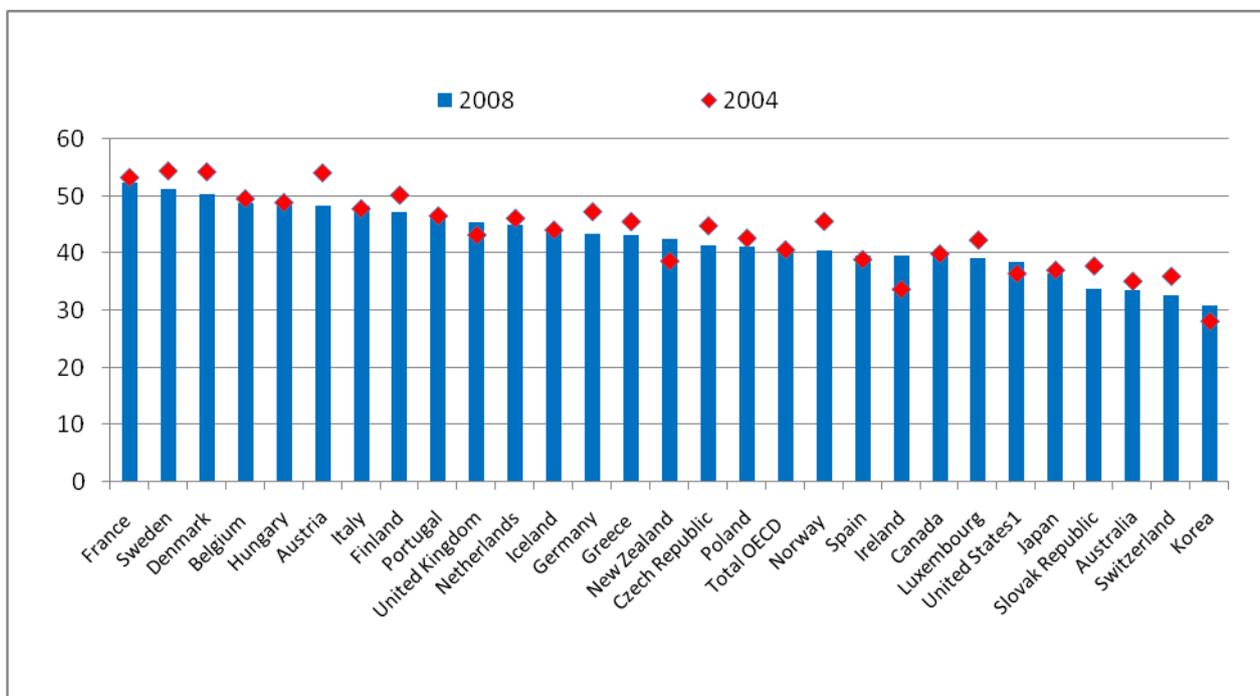
MEASURING INNOVATION IN EDUCATION AND TRAINING

Introduction

1. In the last decades, in OECD countries, innovation has been increasingly regarded as a crucial factor to maintain competitiveness in a globalised economy, breathing new life into slowing stagnant markets, and as a mechanism to enhance any organisation's ability to adapt to changing environments (Damanpour and Gopalakrishnan, 1998; Hargadon and Sutton, 2000). These observations refer primarily to economic contexts (Lekhi, 2007) and to private organisations. These are forced to innovate to keep up with competition by introducing new products or services, rendering their production processes and organisational arrangements more efficient or enhancing the marketing of their activities in order to guarantee their survival.

2. Much more recently, policy interest has focused on spreading out this “innovation imperative” from private organisations to the provision of public services. Governments provide a large number of services in OECD countries and their contribution to the national wealth is considerable.

Figure 1: Total Government Outlays in OECD countries (as a percentage of GDP)



Source: OECD (2008a)

3. As Figure 1 shows, government expenditure in OECD countries represent around 40% of the GDP, contributing in some cases, such as Denmark, Sweden and France, to more than half of the national GDP. Education is a major destination of this expenditure. As Table 1 shows, it accounts for almost 6% of the national wealth on average for OECD countries. As a result, introducing innovation in the public sector in general, and in education in particular, could report significant welfare gains to society.

Table 1: Expenditure on educational institutions as a percentage of GDP, by level of education (2005 or last available year)

	Primary, secondary and post-secondary non-tertiary education	Tertiary education	Total all levels of education
Australia	4.1	1.6	5.8
Austria	3.7	1.3	5.5
Belgium	4.1	1.2	6.0
Canada	3.6	2.6	6.2
Czech Republic	3.0	1.0	4.6
Denmark	4.5	1.7	7.4
Finland	3.9	1.7	6.0
France	4.0	1.3	6.0
Germany	3.4	1.1	5.1
Greece	2.7	1.5	4.2
Hungary	3.4	1.1	5.6
Iceland	5.4	1.2	8.0
Ireland	3.4	1.2	4.6
Italy	3.3	0.9	4.7
Japan	2.9	1.4	4.9
Korea	4.3	2.4	7.2
Mexico	4.4	1.3	6.5
Netherlands	3.4	1.3	5.0
New Zealand	4.7	1.5	6.7
Norway	3.8	1.3	5.7
Poland	3.7	1.6	5.9
Portugal	3.8	1.4	5.7
Slovak Republic	2.9	0.9	4.4
Spain	2.9	1.1	4.6
Sweden	4.2	1.6	6.4
Switzerland	4.4	1.4	6.1
United Kingdom	4.6	1.3	6.2
United States	3.8	2.9	7.1
OECD average	3.8	1.5	5.8

Source: OECD (2008b)

4. Although public services, including education, do not tend to operate within competitive markets and have the same incentives as businesses to innovate (Lekhi 2007), there are important arguments to push for innovation in education as a means to maximise the value of the public investment. First of all, innovations can improve the learning outcomes and the quality of the provision of education, for example by helping the shift out of a 20th century “mass production” mode to a more personalised mode (Albury

2005, Mulgan and Albury 2003). Society is diverse, and education needs are also diverse. Changes in the educational system, e.g. the introduction and use of ICT, can help customise the educational process. Second, public organisations are often under as much pressure as businesses to improve efficiency, minimising costs and maximise the “bang for the buck”. Mulgan and Albury (2003) argue that there has been a tendency for costs in all public services to rise faster than those in the rest of the economy, and education is not an exception. Innovation is then regarded to be the stimulus for a more efficient provision of these services. Third, education should be relevant to society and the national economy. As these are categorised as “hyper-changing” (Barrett, 1998:288), the education sector should introduce the necessary changes that permit to adapt to these needs. Finally, education is also perceived in most countries as a means to enhance equity. Innovations could also help enhance the equity in the access and use of education.

5. Policies supporting innovation both in the private and the public sectors need reliable data. Relevant and reliable indicators help monitor the progress and evaluate the success of policies. They provide evidence on the driving forces, future challenges and potential policy responses. Moreover, if they are standardised they enable international comparisons and benchmarking which facilitates international policy learning. On the contrary, poor data can lead to unreliable research, and then wrong targets can produce weak policy and poor outcomes. Convenient measurements may not capture what matters most and can lead to harmful unintended consequences (NESTA 2008b). Therefore, the development of innovation measures should be carefully planned and implemented.

6. There has been a long-standing effort to develop innovation indicators for the private sector. Indicators generated by R&D statistics and innovation survey are just a few examples of these efforts that have gained collective support. However, measuring innovation and its effectiveness in the public sector in general, and in education in particular, is in its infancy.

7. This short paper aims at highlighting the conceptual and methodological challenges in measuring innovation in education and proposes possible avenues to categorise and measure innovation in education and training. The next section reviews what innovation means in the field of education and the difficulties that this definition may impose for statistical collection purposes. In addition, the paper points out the methodological challenges for the measurement of innovation in education and presents a set of different alternative approaches to address these challenges.

Defining “Innovation in Education”

8. The term “innovation” is more often used than defined although there are dozens of definitions used in different context and disciplines. For statistical purposes, perhaps the most widely accepted definition of innovation comes from the Oslo Manual (OECD/Eurostat 2005) that defines innovation as “the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations”. This definition shares a consistent theme with other available definitions: innovation is typically understood as the successful *introduction* of something *new* and *useful*. In this definition, it is important to highlight that “new” should be interpreted as context-specific, organisation specific, rather than universal or market-wide.

9. This definition has been widely applied to the private sector and it can also be applicable to education. Educational organisations, e.g. schools, universities, training centres, introduce (1) new products and service, e.g. new curricula, (2) new processes for delivering its services, use of ICT in e-learning services, (3) new ways of organising their activities, e.g. ICT to communicate with students, parents, and (4) new marketing techniques, e.g. pricing of postgraduate courses. These new practices are intended to improve the education service in one way or another, and therefore, innovations in education should be regarded as “improvements”.

10. However, the notion of “improvement” in many public services, including education, can be elusive and the use of this definition challenged. The perception of “improvement” depends on the perspective of the stakeholders, who may wear several hats: consumer, citizen and tax-payer (Parston, 2007). Companies in the private sector operate with a single objective and a single bottom line. On the contrary, public organisations count on a multiplicity of objectives, e.g. increase quality, equity, coverage and efficiency, less commensurable, that can even conflict. As a result, improvements in education can be perceived differently based on the respondent, and this has consequences on the perspective that has to be chosen and on the validity and limitations of the information that may be gathered.

11. Moreover, cultural values, social policies and political goals that are deeply embedded in different societies can influence the prioritisation of the different objectives of education. This can change over time as the result of shifts in circumstances and citizens expectations.

Discussion Questions

- Should the Oslo Manual definition of innovation be applied for education? What could be the alternatives?
- In education, would it be necessary to apply different surveys to different stakeholders? Or who should answer the question on the improvements accruing from changes in the education system?
- If the final consideration of an innovation is contingent to the nature of the stakeholder and this embedded in social, cultural and political values, would it be possible to develop internationally comparable indicators of innovation in education?
- The changes over time in the variables determining the value in any specific organisation, would it allow for over time comparisons?

Innovation process in services and in education

12. Evidence-based policy requires measuring innovations as well as those factors driving or hindering its genesis and diffusion.

13. Until recently, most economic innovation studies, both at the macro and the micro level, have focused on analysing innovation in the manufacturing industry. In these studies, innovations rely on the accumulation of capabilities that to a large extent are based on R&D investments. Although it is clear that the importance of R&D would differ depending on the technological intensity of the sector, it was widely accepted that innovation was contingent to the capacity of the firms: (1) to access knowledge flows, and (2) accumulate knowledge stock that would allow them to develop their own innovations and absorb the knowledge generated elsewhere (Hollanders 2007).

14. While education can be regarded as the provision of a service and as such, innovations may come about differently. Innovations in services are rarely the result of R&D investments that generate or help absorb the necessary knowledge that is incorporated in the development of new products that are then introduced in the market. Innovative services find solutions to their consumer's problems or needs, and this may or not imply the use of technology (NESTA 2008b). New organisational arrangements, internally or with the consumers, can be particularly important sources of innovation. In other words, innovation in services may "rely more on knowledge flows, permitting rapid 'catching-up' to best practices" (Hollanders 2007). In these innovations, the role of knowledge stocks is less important.

15. Moreover, the knowledge on which innovations draw on may also be different. R&D can be one source of knowledge creation, but in general it is not the most significant investment in innovation. Accessing the right staff and training and retaining this staff may be more important. According to NESTA (2008A), services firms invest more than manufacturing firms in training, marketing and in acquiring external knowledge.

16. In addition to these characteristics that are shared by all services, the public nature of education also may add additional complexity to the understanding, and therefore potential measurement, of innovation in this sector. Besides the above mentioned challenge related to the definition of innovation in education, measuring innovation in education may pose additional difficulties. A group of researchers at the Public Policy Group of the London School of Economics (2008:8) identify two other specificities: (1) the importance of mandated (non-organic) changes, i.e. changes in organisational practices as a result of legislation or the political process, and (2) the weaker ecological competition, which can make public organisations "immortal" (Kaufman 1976), and therefore, less reactive to incentives to innovate, and where the risk of failure is higher¹. As a result, radical changes in the public sector may follow a policy process of negotiation among stakeholders that may not be related to the generation of any specific knowledge.

17. Moreover, innovation in education may be very different, both in nature and drivers, to innovations in other public services. Innovations in health and education are commonly compared. However, the differences between medical innovations, which may draw heavily on traditional scientific knowledge and where R&D plays a crucial role, and innovations in education, where a more user-driven approach may be more common, can be substantial.

18. Finally, education is composed of many different sectors; e.g. primary education, secondary education, tertiary education, vocational education and training, adult education. Each of these sub-sectors

¹ Although the authors recognise that these factors may also affect the private sector, i.e. need to adapt to standards and regulations, and similarly they may need to conform to the requirements of their holding companies or shareholders, but they believe that to a lesser extent.

may face different challenges and processes. For example, in life-long learning education, the role of private enterprises may be crucial in supporting and triggering innovations, while in primary education, their role may be different.

Discussion Questions

The process of innovation in education seems to follow a sector specific process, different from other sectors. However, many of the features of this process can be similar to other sector, e.g. the provision of business services, and specially the provision of public services. In this context, there is a trade-off between an enhanced comparability across sectors and accuracy in the identification of innovations as well as the factors driving and hindering it.

- Which should be the right balance between comparability and accuracy?
- At which level, should innovation in education be measured?

Measuring innovation in education- indicators

19. Based on the specificities of the innovation process just described, one question that comes up is the nature of the indicators that may be relevant to gain a better handle on both the amount and quality of the innovations in education, as well as of the process leading to it.
20. Measuring innovation in education is in its infancy. Despite the relative wealth of indicators in education, no single indicator has been developed to date to measure the innovation capacity of performance of the education system². This lack of available data can jeopardise our understanding and monitoring capacity of innovations in education.
21. In terms of the nature of the necessary indicators, the literature in business innovation identifies input, output, outcome, impact and framework conditions indicators as those relevant to identify to measure and categorise the innovation process in any given sector.
22. Traditionally, the available data have focused on developing input and output indicators based on a scientific and technology push approach. In this respect, most available data on innovation have centred on R&D measures to proxy innovation inputs, and scientific production and patents for innovation outputs.
23. However, as mentioned in the previous section, these measures may not be the most appropriate ones to measure innovation in education, as the most relevant innovation inputs and outputs may be very different to those traditionally developed until now.
24. The limitations of the existing data to explain the innovation process in all sectors has recently been acknowledged, especially to explain service innovation. However, a number of recent initiatives have aimed at bridging the existing gap and explore the development of better suited indicators. In this respect, organisational innovation and change have gained more attention (Greenan and Lorenz, 2009) and some measurement efforts have already started. Equally, the work of CERI (Foray and Gault, 2003) on knowledge management and the Innovation Index by NESTA are examples of these efforts.

Discussion Questions

- What can we learn about ongoing initiatives that aim at moving beyond traditional R&D, scientific and patent indicators to measure innovation?
- Which should be the most relevant indicators to measure innovations and the innovation process in education?

² See “Education at a Glance”(2008b) for a comprehensive list of indicators of different aspects of the education systems

Measuring innovation in education- methodologies

25. While it is important to clearly and precisely define the data needs, it is also important to consider the possible methodological options available for the collection of these indicators. Many times, the collection of too ambitious indicators may either not be possible or too costly or long. Therefore, it is important to be aware of the available options to collect data. In this respect, five different options could be envisaged: (1) use of Innovation Surveys to the education sector, (2) the application of on-going efforts to measure innovation in the public services, (3) the inclusion of innovation questions in ongoing education system surveys at the system level, (4) the inclusion of innovation questions in school and school/teacher surveys, and (5) the development of an “Innovation in education” survey.

26. Each of these options presents advantages and disadvantages in terms of comparability across sectors (and therefore potential for mutual learning), costs, time to develop indicators and relevance to characterise the innovation process in education.

27. It is important to highlight that these options should not be regarded as mutually exclusive, but rather as complementary. Equally, a short and long term strategy could also be envisaged with the adoption of a step by step approach. The next lines present in more detail these different options

(1) Use of Innovation Surveys to the Education Sector

28. Perhaps, the most extended tool to measure innovation is the Innovation Survey, e.g. the Community Innovation Survey, that provides a measurement of the innovation outputs and the economic success of a firm, the knowledge flows, including their nature, extent and magnitude, that are created around these innovation, or the role of geographical proximity in these knowledge exchanges (Arundel and Constantelou 2006). Although these surveys are not free of criticisms (e.g. the lack of an unambiguous definition of innovation, or the limited time horizon and absence of time lags that when analysing the sources, hampering factors and effects of innovation- Spithoven 2005), their use to measure innovation in the private sector has been commonly accepted among practitioners and policy makers.

29. As a result, one would wonder if this method could also be applicable to measure innovation in education, by adapting the survey to the specificities of the educational sector. This option could provide an important opportunity to obtain information that could be comparable to innovations generated in the private sector and therefore potentially facilitate the learning across sectors. Equally, its design and adaptation could be rather fast.

30. In terms of limitations, the Innovation Surveys could be regarded as instruments better fit to measure manufacturing innovation. Hollanders (2007) argues that these surveys can only partially capture the innovation process within services, because as mentioned in a previous section, they rely on knowledge flows, and not so much in knowledge accumulation. This influences the factors driving and hindering the innovation process and therefore could provide only partial information for policy formulation. Moreover, existing innovation surveys may have difficulties capturing the specificities of the public services in general, and education in particular.

(2) Measuring innovation in the public sector- Nordic Initiative

31. In recent years, there has been an increasing interest in measuring innovation in the public sector. As mentioned in the introduction, the size of the public service in OECD is substantial, and therefore, it can be an important source of innovation. Until recently, there had been very few initiatives to measure innovation in the public services, let alone in education. In 2008, a Nordic initiative to measure innovation in the public sector has aimed at bridging this gap by developing indicators for public services innovation. This ongoing initiative is presented in box 1 in more detail.

Box 1. Measuring public innovation in Nordic Countries: Towards a common statistical approach

The public sector plays a large role in the Nordic countries by providing a large set of “public services. As a result, public sector innovation is increasingly recognised as a vital factor not only to face global challenges but also to sustain a high level of public services for citizens and businesses. However, the lack of quantitative evidence hinders the capacity to understand and promote public sector innovation. In this context, in November 2008, the Danish Ministry of Science, Technology and Innovation, supported by the Norwegian Research Council, Innovation Norway, The Finish Ministry for Enterprise and Employment, VINOVA and the Swedish Association of Locals Authorities and Regions, started a project to develop a framework for measuring public sector innovation.

This project undertakes major activities including the development of a framework and a questionnaire for collecting internationally comparable data on innovation in the public sector. These data can then be used to create a set of indicators that can aid in improving innovation in the public sector and interactions between public and business sectors.

The project is organised in 7 work modules: (1) Conceptual framework, (2) Survey Methodology, (3) Mapping user needs, (4) Feasibility study, (5) Draft of pilot questionnaire, (6) Pilot testing of questionnaire, and (7) Drafting of guidelines. The first four modules are in progress and the five first modules are expected to be completed by November 2009.

For more information, please check the website: www.mepin.eu

32. This initiative aims at adapting innovation surveys to the characteristics of the public sector. It adopts a multi-sectoral approach and therefore can potentially provide certain comparability across sectors. In the potential limitations, it is important to clarify the unit of analysis and it risks not to capture a large range of the sector specificities.

(3-4) Innovation related question in ongoing education surveys at the system level and school and school/teacher surveys

33. Measures of different aspects of the education systems exist. In the last years, a number of expert groups and surveys have been set up, providing crucial data for understanding and comparing the education sector between countries. Some of these education-based expert groups and surveys are: (1) the Indicators of National Education System (INES) project, (2) the Teaching and Learning International Survey (TALIS) and (3) the London School of Economics (LSE) Survey of Headteachers. Box 2 presents some of the characteristics of these three surveys.

Box 2. Education based expert groups

Indicators of National Education System (INES)

INES began in 1988 in response to national policy makers' desire for information that would allow them to compare the performance of their education systems with those of other countries. These data would thus allow them to better assess and monitor the effectiveness and evolution of their education systems. INES is organised in three main networks of national experts that work on three main areas of activity: (1) learning outcomes, (2) social and economic outcomes of education, and (3) structures and processes of schools. Moreover, there is also interest in collecting data more directly on institutional practices and effectiveness.

The network on learning outcomes focuses on gathering information on students' achievements and attitudes in reading, mathematics and science as well as on adult literacy. The network now focuses its activities on identifying data needs (e.g. exploring links between international and national assessments); developmental activities, and analysis, reporting and dissemination.

The network on social and economic outcomes of education focuses on developing indicators on adult learning, transitions from school-to-work, economic outcomes of education, social outcomes of education and the supply of skills in the labour market.

The network on structures and processes of schools has been working on collecting data on school policies and practices to enhance transition, aspects of school functioning, human resources and information and communication technologies.

Teaching and Learning International Survey (TALIS)

TALIS is the first international survey to focus on the learning environment and the working conditions of teachers in schools. It offers an opportunity for teachers and school principals to give their input into education analysis and policy development in some key policy areas, such as school leadership and management, the appraisal of teachers' work in schools and the form and nature of the feedback they receive, as well as the use of outcomes from these processes to reward and develop teachers. Linked to this, it provides information about the professional development of teachers that takes place and how it is connected to the appraisal systems and how the school leaders support it and the impacts these practices have on the classroom practice.

TALIS surveys teachers of lower secondary education and the principals of the schools in which they work. At the moment 24 countries have participated in the first round, which data will be released on 16 June 2009.

LSE's Survey of Headteachers

The LSE is currently developing a school survey to collect new data on leadership practices in schools, covering target setting and monitoring as well as the use of financial incentives to motivate teachers. The objective of these data gathering is to document variation in practices and relate that to variations in school performance, in addition to uncover variation in school practices and identify the uses that school leaders do of the incentive tools at their disposal.

34. These three networks and surveys have different objectives, carry out different activities and use different unit of analysis and respondents to collect data. More precisely, INES brings together national experts in education and statistics that can provide more information at the system level, at a more macro level. Alternatively, TALIS and the LSE survey focus their analysis at the micro level, asking questions to either the headteachers or both the teachers and headteachers themselves.

35. In terms of advantages, although none of these surveys focuses on innovation, they can provide an optimal mechanism to incorporate a number of specific questions related to innovation in education. By doing so, they could provide valuable data on innovation, which could be analysed in conjunction with other educational data to enhance our understanding of innovation and public policy. As some of these surveys are ongoing, the calculation of some preliminary indicators could be relatively fast. Moreover, this exercise could pave the way for further future developments. Regarding the limitations, the number of questions would need to be limited and circumscribed to the target population of reference in the surveys.

(5) Development of a specific survey on "Innovation in Education"

36. The last alternative would be to develop a specific survey on "Innovation in Education". Although there is still limited information on how innovation in education comes about, and which are the factors affecting the innovation process; this method could provide the most accurate data for understanding innovation in education³. However, in terms of limitations, it could represent a high cost in terms of developing and administering a new survey, it could take a long time to reach a consensus on the specific questions to be asked and it could also have limited comparability with other (public or not) sectors.

³ For an initial work on factors affecting the innovation process in Education, please consult the OECD/CERI project on systemic Innovation in Vocational Education and Training (www.oecd.org/edu/systemicinnovation)

Discussion Questions

Based on the above options, a number of questions arise, both at the strategic and operational level:

Strategic questions: Which strategy should be adopted? Which option/s should be adopted? In the short and the long term? In order to answer these questions, it may be needed to address some operational questions.

Operational questions: - To what extent are CIS-type surveys applicable to education? Which information could be obtained?; Can multi-sector initiatives to measure innovation in the public sector be applicable for education?; Would it be possible to use any/all of these surveys to collect information, even if partial, on innovation in education?; If so, given the different objectives, unit of analysis and profile of the respondents, could questions on "innovation in education" be included? (Which could be the specific questions to be asked in these surveys? Which would be their limitations?) Which would be the advantages and disadvantages of the information gathered through these different ways?

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