

Review

Education for innovative and inclusive economic development

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Innovation is a desirable outcome of information-everywhere society. It mainly occurs within firms, which are part of systems where they interact with other stakeholders so that they create and promote knowledge and technology flows. These innovation systems derive from the interweaving of economic, historical and cultural factors, and of course education is a part of them. In order to manage the increasing complexity triggered by this innovation, governments should create synergies between educational policies and economic development. Education plays a basic role in providing high-skilled students, citizens and workers because these effective skills are generated through innovative teaching, which triggers the adoption, absorption and adaptation of technological knowledge. In this view, individuals' skills are related to productivity and labor-market outcomes, so that better education generates better economic performance and more social inclusion.

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INTRODUCTION

In 2013, as requested by the Economic and Social Council (ECOSOC), the UN Commission on Science and Technology (CSTD) suggested two fundamental issues to be developed: "Science, technology and innovation for sustainable cities and peri-urban communities and Internet broadband for an inclusive digital society" (UNCTAD, 2013, 14). It can be so argued that in the current information-society, sustainable economic growth and social improvement increasingly depend on innovation, which can be defined as an idea, practice, or object that is considered as new by a unit of adoption and carried out into practice (Rogers, 2003). Put in this terms, innovation is "the implementation of a new or significantly improved product or process, a new marketing method, or a new organisational method" (OECD, 2007, p. 46). It also includes "incremental adaptation and gradual adoption in different contexts" (Hoidn and Kärkkäinen, 2014, 7), such as the fickle society shaped by the web.

In order to manage the complexity triggered by innovation, new educational policies are required to

foster sustainable development. These policies should not concern simply with the generation of new knowledge, but also with "managing a process of learning, and with creating and developing the competences and capabilities that are required at various levels for such technological learning and to succeed" (UNCTAD, 2011, 9). Desirable outcomes of educational strategies for the "information everywhere society" (Ting, 2011) should be: "fostering long-term retention and knowledge application, developing thinking and creativity skills, as well as social and behavioural skills (problem-solving, critical thinking, motivation, selfconfidence, team work)" (Hoidn and Kärkkäinen, 2014, 6). All these skills should promote the highly interwoven modern economy ecosystem, which includes "a complex set of relationships, synergies and interactions between technology and business, governance and innovation, and production and consumption, which involve different stakeholders and which contribute to economic and social development" (UNCTAD, 2013b, 11). According to this view, "it is how

this ecosystem evolves, rather than the potential of the technology alone, that will determine outcomes” (*ibidem*) for economic development. Education therefore should build high-skilled people who could manage the evolution of this ecosystem.

Innovation in firms and in education

Innovation occurs essentially within firms, but these are not engaged in technological learning and innovative activity by themselves. They are involved in systems “in which they interact with other agents, public and private, that generate and intermediate knowledge and technology flows” (UNCTAD, 2011, 6). These innovation systems are the result of the interaction of several economic, historical and cultural factors, and of course education is a part of them. However, systems' features are not static and “targeted policy actions can profoundly affect the dynamics and effectiveness of a country's innovation system” (UNCTAD, 2011, 6). An investment policy is so highly required to generate an educational strategy which can trigger a productive skill-creation to be exploited by firms. This could therefore induce and empower the sustainable development.

Indeed, both governments and entrepreneurs are demanding “skill sets for innovation such as technical skills, thinking and creativity skills, as well as social and behavioural skills” (Hoidn and Kärkkäinen, 2014, 6). Hence, effective innovation requires a large number of highly educated people equipped with diversified skill sets. It is increasingly acknowledged that future entrepreneurs will require a large range of skills to be able to meet the demands of the changing economy (OECD, 2010). According to Stefano Scarpetta, Director for Employment, Labour and Social Affairs at the OECD, “promoting access to quality job is a key point for inclusive economic growth” (OECD, 2014). The skills of the students/workers are so key element in future (and current) knowledge-based economies (*cf.* Hanushek and Woessmann, 2008) which are featured by non-standard activities (Autor and Brendan, 2013). For this reason, the potential for job creation and skill creation, development and up-keeping should be the main criteria for deciding investment policies “in areas crucial for development priorities, whether technical, vocational, managerial or entrepreneurial skills” (UNCTAD, 2012, 27). In this perspective, an interaction between educational policy and entrepreneurship should strongly occur, but it is complex because it involves several elements of a country's overall economic development and growth strategy: “human resource development, infrastructure, technology, enterprise development, and others” (UNCTAD, 2012, 20).

Teaching the skills

Government authorities should “work coherently towards the common national objective of sustainable development and inclusive growth, and seek to create synergies” (UNCTAD, 2012, 20). Synergic actions must be adopted since the earliest stages of design, as well as the involvement of several stakeholders, including investors, civil society and educational system. It can be so argued that the effectiveness of these policies depends on “the capabilities of institutions charged with the implementation and enforcement of policies and measures, rules and regulations” (UNCTAD, 2012, 23).

Among these institutions, education system plays a basic role in providing students, citizens and workers with skills for innovation, but “a number of important questions remain as to what kind of education teaching can be conducive to the strengthening of skills for innovation” (Hoidn and Kärkkäinen, 2014, 6). In fact, effective skills are generated only if innovative teaching can promote “the adoption, absorption and adaptation of technological knowledge” (UNCTAD, 2011, 9). From these considerations, a huge challenge for teachers is arising. They are required by governments and entrepreneurs to fully develop a variety of innovation skills simultaneously and effectively (Hoidn and Kärkkäinen, 2014). It has been detected that “teaching attributes such as organisation, expressiveness, enthusiasm and rapport/interaction” (Hoidn and Kärkkäinen, 2014, 6) positively affect student's learning and persistence. The following three overlapping sets of 21st century skills for innovation (OECD, 2013) are supposed to be fostered by teachers:

- **Technical skills**, such as disciplinary know-what and know-how. Innovative or creative students/workers “often require specialist skills in their field – both in terms of knowledge and methods” (Hoidn and Kärkkäinen, 2014, 7).
- **Creativity skills**, such as curiosity, critical and argumentative thinking, problem solving and making horizontal connections (OECD, 2013).
- **Social and behavioural skills**, such as “interest, engagement, self-directed learning, self-confidence, organisation, communication, (cross-cultural) collaboration, teamwork and leadership” (Hoidn and Kärkkäinen, 2014, 7).

Some more detailed considerations are here required, to better focus the teaching issue connected to innovation.

Innovation demands for open-minded students and requires them a relentless critical questioning of well established ideas or practices. So teachers should ask students to come up with as many original or unusual solutions he/she can conceived. Then teachers should

assess the quantity and originality of responses to questions that do not demand a specific answer.

Problem solving in technology-rich environments should be considered by teachers as student's ability to originally "use digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks" (Hanushek *et al.*, 2013, 11).

Creativity is generally considered "an important source of innovation, whereas innovating often consists of connecting seemingly unrelated ideas also from different disciplines" (Hoidn and Kärkkäinen, 2014, 7). Teachers should therefore encourage and positively assess unexpected horizontal connections.

Entrepreneurial competences such as self-confidence and long-term vision, is important for designing and carrying through an innovative project. Teachers could help students to develop the ability to plan and manage projects by proposing multi-disciplinary tasks to be accomplished through the use of several skills.

Six principles for effective teaching

Even if innovation issue strictly connects education and economic development, teacher's activity can't be totally oriented by mere market demands. In fact, Ramsden points out six teaching principles (2003, 93-99). According to him, teachers should:

1. Grant high quality of explanation and to spur student on to do something with interest and passion
2. Be concerned and respect students and their different learning processes
3. Adopt an appropriate assessment and feedback, giving helpful comments on students' work and bestowing feedback on students' progress
4. Clearly define attainable goals and challenge
5. Trigger independence, control and engagement
6. Be open to change and to learn from students

By then, following Ramsden's guidelines, it is commonly accepted that "a holistic approach to promote innovation through the inclusion of aspects other than financing, such as technology transfer, linkages between research institutions, business and government, human capital development and infrastructure" (UNCTAD, 2013a, 8) is required to ensure the success of the efforts made to improve educational and economic system (European Commission, 2011). In fact, besides mere economic elements, innovation strongly demands an investment on human capital. The most relevant elements of modern human capital are: "communication skills, including the ability to persuade others, as well as the ability to work with others in a team and coordinate activities" (Hoidn and Kärkkäinen, 2014, 7). In addition,

positive emotions and engagement play a crucial role on human capital growth and on study persistence, which can be seen as a proxy for learning (Pascarella and Terenzini, 1991, 2005; Nelson *et al.*, 2008).

CONCLUSION

Two sectors dealing with innovation must be mutually considered: education and economic development. The former must forge students with strong innovation skills, because they can promote, manage and perform innovation in tomorrow's workplace (Barrett and Moore, 2011; Savery, 2006). The latter demands broader and broader range of skills in the workplace because of a structural shift towards services and skill-intensive jobs (Cedefop, 2010; European Commission, 2010; Hoidn and Kärkkäinen, 2014). This demand should stir education system to generate skills such as: critical thinking, creativity, problem solving and ability to look at things from broad perspectives (Autor and Price, 2013). These skills are required because future workers must "work in teams, communicate their messages effectively and adapt to changing circumstances – interact with their environment instead of working in isolation" (Hoidn and Kärkkäinen, 2014, 7). It has been demonstrated that "higher cognitive skills are systematically related to higher wages" (Hanushek *et al.*, 2013, 20).

It can be so argued that the returns to skills are economically meaningful. However, in order to better analyzed the pattern of returns to skills, individual improvements must be considered in "a more general human capital model" (Hanushek *et al.*, 2013, 6), not only in economic terms. Once an educational strategy has been designed, it is also important to raise awareness concerning innovative skills (UNCTAD, 2013b), which are appreciated by modern knowledge-based economies. In fact, Angel Gurría, president of OECD, recently agreed with this consideration (OECD, 2014), strongly asserting that better education generates better economic performance. Individuals' skills are related to "productivity and labor-market outcomes" (Hanushek *et al.*, 2013, 20). Learning-processes and teaching-methodologies focused on the demands of life and work in the 21st century are therefore required as schools "are currently preparing students for jobs that do not yet exist, to use technologies that have not yet been invented, and to solve problems that we don't even know are problems yet" (Darling-Hammond, 2008, 1-2). In order to provide equitable access to innovative knowledge, the Tunis Agenda suggested to improve "relevant education and training programmes and systems including lifelong and distance learning" (UN, 2005, 90 c). Unfortunately, the theory-practice gap may

exist in many disciplines with students' competences not necessarily meeting the needs of the professional life (cfr. Armstrong and Fukami, 2009; Bennis and O'Tool, 2005; Hoidn and Kärkkäinen, 2014).

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