

Digital Skills For Eco-Innovative Entrepreneurship

Ileana Hamburg

Institut Arbeit und Technik, WH Gelsenkirchen
Munscheidstr. 14, Gelsenkirchen, Germany

Sascha Bucksch

Institut Arbeit und Technik, WH Gelsenkirchen
Munscheidstr. 14, Gelsenkirchen, Germany

ABSTRACT

Eco-innovation refers to the development of products and processes that contribute to sustainable development and significantly decrease environmental impacts. This includes technological, social and institutional innovation. Entrepreneurship is a key driver of economy and social prosperity. Concepts as eco-innovative entrepreneurship emerged in connection with environmental problems. Entrepreneurship education programmes should offer students the tools to be creative, to solve also ecological problems efficiently, to analyze a business idea objectively, and to communicate, cooperate, lead, develop and evaluate projects. Referring digital skills, eco-innovative entrepreneurs should be able i.e. to interact and communicate through digital technologies, to share data and digital content through technology, to solve technical and environmental problems by using ICT, to use social media and e-mail for their marketing strategy, to be familiar with free digital tools and use them for marketing. The paper presents some issues of eco-innovation, literature in the field of entrepreneurship education and competences which are necessary to be an eco-innovative entrepreneur. Examples of projects worked by authors to achieve some competences are given.

Keywords: Eco-innovation, entrepreneurship, education, digital skills

INTRODUCTION

The Competitiveness and Innovation Framework Program (CIP) defines eco-innovation as followed: “eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy” (<http://ec.europa.eu/cip/>).

In this program activities within eco-innovation process are classified as following:

- Activities of traditional eco-industries, which products and services related to pollution prevention and management, or natural resources management, can be considered eco-innovation.
- Special activities where eco-innovation can reduce pollution and/or optimize resources use with a clear benefit for the environment and substantial improvements are eco-innovations.

Eco-innovation refers to the development of products and processes that contribute to sustainable development by using knowledge from environmentally friendly technologies and socially acceptable innovative paths oriented to sustainability in order to achieve ecological improvements (<https://en.wikipedia.org/wiki/Eco-innovation>).

There are some different concepts about eco-innovation. One of them is defined by Peter James (James, 1997) as "new products and processes which provide customer and business value but significantly decrease environmental impacts".

Klaus Rennings (Rennings, 2005) introduces the term eco-innovation addressing explicitly three kinds of changes towards sustainable development: technological, social and institutional innovation.

Eco-innovation is sometimes understood as „environmental innovation", and is also often linked with environmental technology, eco-efficiency, eco-design, environmental design, sustainable design, or sustainable innovation. These terms are mostly used when referring to product or process design, and therefore focus more on the technological aspects of eco-innovation rather than the societal or political aspects.

In this paper we refer eco-innovation both to technological developments as well as to processes with social impact.

As a technological term "eco-innovation" refers to innovative products and processes that reduce environmental impacts in conjunction with eco-efficiency and eco-design. In many industries innovative technologies have been developed in order to work towards sustainability. However, these are not always practical, or enforced by policy and legislation (<https://en.wikipedia.org/wiki/Eco-innovation>).

Eco-innovation should also bring greater social and cultural acceptance. A "social pillar" is necessary because it includes also learning processes and the impact of eco-innovations. This social component means more than a new type of commodity, or a new sector, even though environmental technology and eco-innovation are associated with the emergence of new economic activities or even branches (e.g., waste treatment, recycling, etc.). This approach considers eco-innovation in terms of usage and impact rather than of product. The social component that makes eco-innovation a more integrated tool for sustainable development (<https://en.wikipedia.org/wiki/Eco-innovation>).

The paper presents some issues of eco-innovation, literature in the field of entrepreneurship education and competences which are necessary to be an eco-innovative entrepreneur.

LITERATURE RESEARCH

Eco-Innovation

Three main issues characterize

1) Target referring to the basic focus of eco-innovation. Following the Oslo Manual (<http://www.oecd.org/sti/inno/oslomanualguidelinesforcollectingandinterpretinginnovationdata3rdedition.htm>), the target of an eco-innovation may be

- Products, involving both goods and services.
- Processes, such as a production method or procedure.
- Marketing methods, for the promotion and pricing of products, and other market oriented strategies. Higher potential environmental benefits but more difficult to coordinate
- Organizations, such as the structure of management and the distribution of responsibilities, i.e. institutions, which include the broader societal area beyond a single organization's control, such as institutional arrangements, social norms and cultural values.

2) Mechanism relates to the method by which the change in the eco-innovation target takes place or is introduced.

Four basic mechanisms are identified:

- Modification, such as small, progressive product and process adjustments.
- Re-design
- Alternatives, such as the introduction of goods and services that can fulfil the same functional need and operate as substitutes for other products.
- Creation, the design and introduction of entirely new products, processes, procedures, organizations and institutions.

3) Impact refers to the eco-innovation's effect on the environments and social settings, across its lifecycle or some other focus area.

In connection with differences between eco-innovations and regular innovations, we present four characteristics of eco-innovations which influence investment decisions like the following (Hamburg, 2017):

- Eco-innovations often require high investments and a low operational cost that means a different ROI.
- Eco-innovations could be characterized that the party taking the investment is not the party which receives the correlated benefits.
- Customers interested in eco-innovations are not enough experienced in decisions oriented to eco-innovations, they having often old surviving problems.

ENTREPRENEURSHIP

Entrepreneurship is the art of to be able to turn ideas into action. This implies creativity, innovation, risk taking, and the competence to plan and manage projects in order to achieve proposed objectives.

The entrepreneurship competence is relevant not only for those who would like to start/carry up a business but for all who would like to support changes in individual, collective, economic and social environments ([//www.youthpass.eu](http://www.youthpass.eu)).

Entrepreneurship has been recognized as a major factor for sustainable products and processes (David and Hamburg, 2017) but there is little literature explaining the role of entrepreneurship in supporting sustainability. As environmental problems came more and more into focus, concepts as eco-innovative entrepreneurship emerged (Hamburg, 2017). Eco-innovation is the development and application of a business model, shaped by a new business strategy that incorporates sustainability throughout all business operations based on life cycle thinking and in cooperation with partners across the value chain.

Entrepreneurship is a competence that can be learned and it is necessary to support an innovative entrepreneurship education starting earlier in all EU countries preparing people to be responsible.

In 2005 the European Commission presented a "Proposal for a Recommendation of the European Parliament and of the Council on key competences for lifelong learning" which was adopted in 2006. The framework identifies 8 key competences (<http://lifelonglearning-observatory.eucen.eu/recommendationcompetences>), three of them being digital competence, entrepreneurship and cultural expression (David and Hamburg, 2017). The key competences refer both to young learners as well as to adult learners and the European countries should orientate their education policies toward the achievement of these competences.

Entrepreneurship is a market-based approach, which encourages people to seek out positive rewards, mainly in the form of profit. The way environmental issues are addressed, often involves punishing offenders in order to change people's approach to the environment. Ecological entrepreneurship is a reward-based approach to addressing environmental problems, rather than a punitive approach, and may prove more successful at changing attitudes and practices in the long run (www.Academia.eu).

An "entrepreneur" is someone who thinks of a new idea or opportunity in business and who takes the risks necessary to convert his or her vision into a reality. Entrepreneurs are essential to the forwarding of human progress. An eco-innovative entrepreneur is someone who is driven not only by the possibility of making a profit, but is also driven by environmental and social concerns. They want to make the world a better place by innovative methods for improving the environment.

Business practices fundamentally affect the business world, the environment and lives. Ecology implies community, and eco-innovative entrepreneurs understand the connections between their actions and the greater community as a whole. This domain is socially important because eco entrepreneurs are instrumental in reshaping the way to approach the environment and its relation to business.

Being an entrepreneur requires a different mindset from your average business person. Entrepreneurs have a vision they are so passionate about that they will risk everything to fulfill it; this kind of dedication is not for everyone. They have to take risks, and they have to possess business skills (good planners and managers, and able to ask for help and funding). Eco entrepreneurs have helped the environment and could inspire others to do the same.

Entrepreneurship education

Entrepreneurship education is important: "young people with entrepreneurship education are more likely to set up their own companies. Up to 20% of students who participate in a mini-company programme in secondary school will later start their own company. That is up to five times higher than in the general population. Businesses started by these students are also more ambitious"

(https://ec.europa.eu/growth/smes/promoting-entrepreneurship/support/education_en).

Entrepreneurship education programmes should offer students the tools to be creative, to solve problems efficiently, to analyse a business idea objectively, and to communicate, cooperate, lead, develop and evaluate projects. Students could learn to set up their own businesses if they can test their ideas in an educational, supportive environment.

Hytti and O'Gorman (2004) affirm that entrepreneurship education has three objectives; one of them is to increase the understanding of what entrepreneurship is about.

In this context some of the most important aspects to be considered in entrepreneurship education are the following:

- The entrepreneurial spirit is universal, as it has been shown through the growth of interest in entrepreneurship around the world in the past few years (Zahra et al, 2001)
- The economic and social contributions of entrepreneurs is important (Upton et al, 2001)
- Newly created companies, and family businesses are job creators, support innovation economic and social prosperity

- Ethics and entrepreneurship are a fast growing area of research due to the more recent scandals found in corporations (Kuratko and Golsby, 2004)
- Successfully entrepreneurial strategies have been identified
- Relevant common denominators, issues, and trade-offs between entrepreneurship and strategy [15] have to be found (Hitt et al, 2001).

The second objective of entrepreneurial education is to assure that the potential workforce, i.e., people that do not intend to set up their own company, but work in businesses started by others, know entrepreneurial approaches (Hytti and Gorman, 2004).

It is expected that innovation (in terms of processes, products, services, and administrative routines and structures) and the ability to be successful on the in markets are among the skills that increase influence of corporate performance in the future global economy. Kuratko (Kuratko and Goldsby, 2004) underlines the Relevance of strengthening skills that influence corporate performance:

- The entrepreneurial and managerial spheres are not mutually exclusive, but overlap to a certain extent. Whereas the former is more opportunity-driven, the latter is more resource- and “conversation”-driven (Ireland et al., 2003)
- Corporate entrepreneurship and the need for internal corporate venturing have gained much attention during the past few years (Zahra et al, 2001).

The third objective of entrepreneurial education is to prepare individuals for their future career as entrepreneurs by strengthening their entrepreneurial competencies and attitudes which are needed for managing new businesses successfully (Kuratko and Goldsby, 2004). Some important aspects (Hatak and Reiner, 2011).

- The great variety among types of entrepreneurs and the methods they have used to achieve success have motivated research on the psychological aspects that can predict future success (Kickul and Grundy, 2002).
- Venture financing, as well as other innovative financing techniques, emerged in the 1990s with unprecedented strength, fueling another decade of entrepreneurship and entrepreneurship education (Stepherd, 2004).
- Women and minority entrepreneurs have emerged in unprecedented numbers. They seem to face obstacles and difficulties different from those that other entrepreneurs face (Chagatti and Green, 2002).

Students engaged in entrepreneurship education should acquire besides entrepreneurial competence other competences according to the focus of their learning (European Commission, 2009):

- understanding in setting up a business/enterprise, as well as personal skills and attitudes that define an entrepreneur
- working with distributed (geographically) production or companies
- working in foreign languages
- professional and vocational competence key skills,
- knowledge and understanding like problem solving, working with others, ICT, and health & safety.

Also skills, knowledge and understanding that are related to different occupations and professions (e.g. finance, retail) and environmental issues are important (Hamburg and Bucksch, 2015, 2016):

- communication and social competence key skills, knowledge and understanding in effective communication and interpersonal activities, as well as in ethical, moral, and cultural concerns

- personal competence development of autonomy, responsibility, personal role, own performance and learning

Academia (www.Academia.eu) has begun addressing the relatively new field of eco-entrepreneurship, usually through business schools, economics programs or environmental studies programs. Few majors programs exist for ecological or environmental entrepreneurship. Courses usually focus on environmental sustainability, social equity and justice, and financial profitability. Students learn about the environment and sustainable practices, as well as how to start and run a successful business venture.

Here are some topics for education in eco-innovative entrepreneurship could be:

- Green Organizations: Businesses
- Applied Economic Analysis
- Economics of Environmental and Social Issues
- Critical Thinking for Business Re-design
- Eco-Commerce Models
- Strategies of Entrepreneurial Development
- Ecosystem Services

Job outlook for ecological entrepreneurs is likely to be better in the near future than it ever has been. Michael Schaper, of Greenleaf Publications, writes, "The move to a sustainable business framework provides numerous niches that enterprising individuals and firms can successfully identify and service" (<https://www.greenleaf-publishing.com/>). This does not mean the outlook is highly favorable, though. Like all entrepreneurs, ecological entrepreneurs face many challenges on their way to success, and many are defeated several times before they can even get a business off the ground.

By its nature, eco-innovative entrepreneurship is not really a field with traditional job openings. Most entrepreneurs just start a business themselves or with partners and see how successful they can be.

DIGITAL SKILLS

Despite the rapid advances in technology, digital skills are at many entrepreneurs not enough developed. , unfortunately, haven't kept pace. There is a growing gap between the skills entrepreneurs need and they have. In the position paper, 'Perception and Reality: Measuring Digital Skills in Europe', which brought together the results of studies of digital skills in five European countries it is found i.e. that. In one study, in Austria, 94% of respondents described their digital skills as "average" to "very good", but only 39% managed to perform that well when tested ([ecdl.org/perception and reality](http://ecdl.org/perception-and-reality)).

The problem is particularly relevant for small and medium sized enterprises (SMEs). Research by the European Commission (2009) shows that just 16% of SMEs sell their products and services online. SMEs also often lack sufficient resources to afford regular IT support, and this potential absence of digital skills can have a significant impact.

Being digitally skilled has become essential for entrepreneurs who want their businesses to stay relevant and ahead of the competition. Some tips are the following:

- Marketing business on social media platforms like Twitter, Facebook and Instagram is a smart and cost-effective way to reach target audience. These media are very used and so the entrepreneurs could find out what the clients want from each of these platforms. The entrepreneurs could and so orientate and then market own business accordingly.

- Use analytics–.which often involves studying historical data to research potential trends, to analyses the effects of decisions, to evaluate tools. Analytics show what works and what doesn't so business market could be better (<http://www.businessdictionary.com>).
- Getting emailmarketing i.e. as simple newsletter with everything to be communicated and sending it to the relevant client base.
- Understand Search Engine Optimization(SEO), i.e. 's to identify and use key words to make sure thebusiness comes out on top when people search for information related to this business or industry online. If the content on thewebsite uses certain key words and phrases that people type into a typical Google search, chances are thatwebsite will feature higher up on their search lists.
- Content marketing creation by using digital tools and understand the used content management system
- Familiarize with FREE digital tools, research which apps are available (and often free) to help you're thebusiness. Applications like Hootsuite, Mail Chimp and Canvas can all help optimize thebusiness through online marketing.

ECDL Foundation (ecdl.org) will be launching a new module on Digital Marketing, which will help people to develop and certify their skills in using online platforms, including Facebook and Twitter, to market their business and reach customers in ways that haven't previously been possible.

Examples

The European Erasmus+ project "Supporting PBL in entrepreneurial education and in small and medium sized enterprises through ICT and mentoring – Archimedes" (www.archimedes2014.eu/) developed a framework for organizational problem-based learning - PBL - and corresponding qualification units for the use of this form of learning. Eco-innovation examples of problems to be solved by students are included. It is expected that these PBL approaches will be widely adopted in entrepreneurial education, particularly in higher education institutions and in SMEs (O'Brien and Hamburg, 2014; Hamburg and Vladut, 2016)), The students could achieve digital competences because PBL is supported in Archimedes by an ICT platform (www.archimedes-tiki.eu) which should help the tutor and the participants during the PBL seminars. A screenshot of the platform is shown in Figure 1. The students participate in virtual sessions and learn

- To use of digital tools and innovative digital processes and methods for solving entrepreneurial problems
- To develop digital content i.e. in eco-innovation problems
- To communicate and cooperate to develop eco-innovative strategies
- To develop solutions for solving ecological problems and evaluate them.

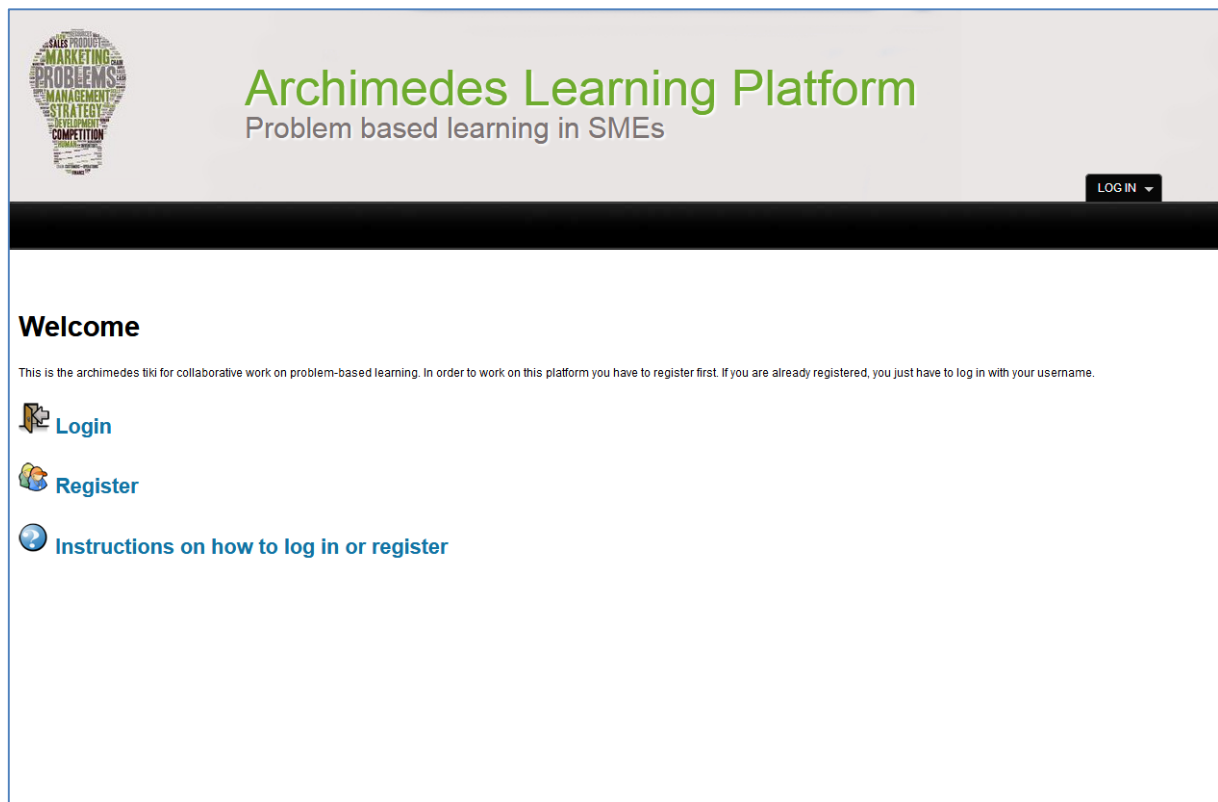


Figure 1 - Screenshot of the Archimedes learning platform

European Region Entrepreneurship Connection – EFEB Network

EFEB Network's (<http://efebnetwork.eu>) main objective is to train, to mentor and to develop entrepreneurial skills of woman involving them in digital connected partnerships (David and Hamburg, 2017). The main tasks of the project are the enhancement of new skills i.e. for eco-innovation and education of women, in order to open up their mind for being an entrepreneur. The project has partners from 5 European countries and answers to the needs of entrepreneurial education, related to the following main topics:

- Place a stronger focus on higher and more relevant skills in the field of female entrepreneurship
- Create a strengthen links between education/training, mobility and the labor market aiming in reducing the unemployment
- Developing eco-innovation modules and including them into the entrepreneurial education.

Some of the basic digital skills that will be train during the project are:

- Interaction and communication through digital technologies
- Sharing data and digital content through technology
- Solving technical and entrepreneurial problems
- Proper use of technology tools for the recovery, evaluation, storage, production, presentation and exchange of information
- Creating digital knowledge and improving digital content
- Participation and networking via the Internet

Figure 2 shows a screenshot of the digital platform, used to train participants in frame of the project EFEB Network.

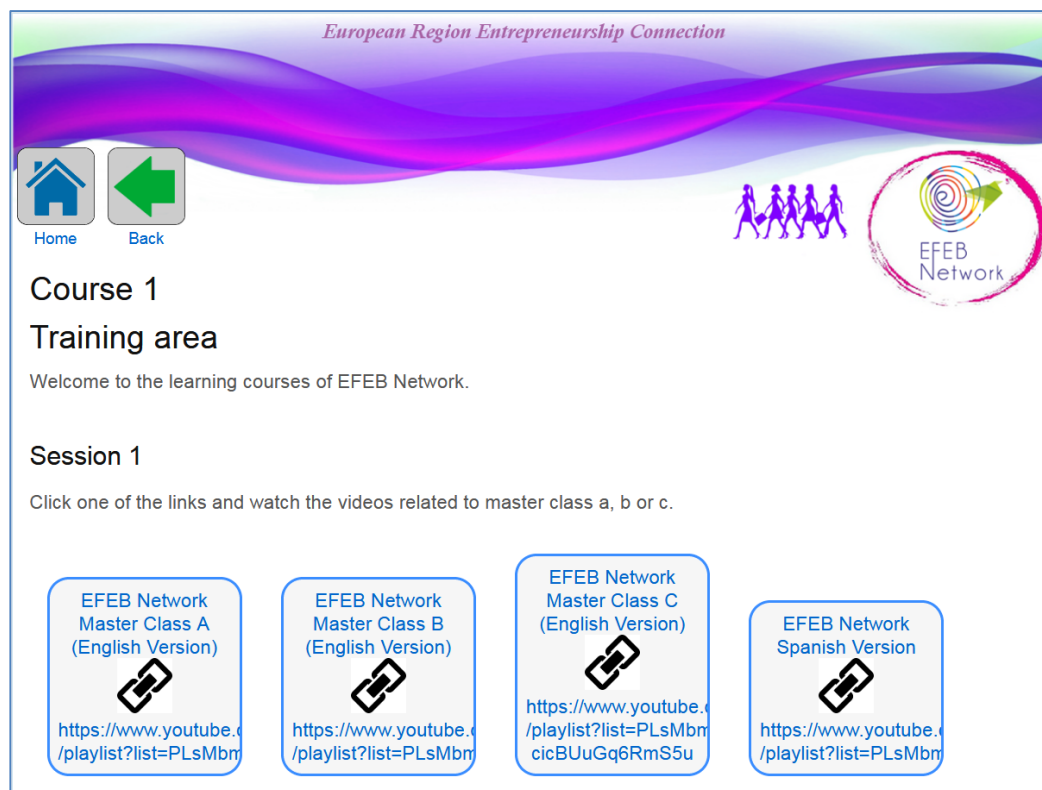


Figure 2 - Screenshot of the digital training platform of EFEB

CONCLUSIONS

Europe needs eco-innovative entrepreneurs with digital skills and so the development of entrepreneurial attitudes should become one goal of education; it requires cooperation of all actors involved. Entrepreneurship education is a lifelong learning process and has an important role in preparing people to be responsible helping them to achieve competences, knowledge and attitudes to realize their objectives and to find a job. The entrepreneurial education should be improve i.e. through a good balance between theory and practice, programmers or activities based on experience and project work, involving students in developing digital content and working also in virtual networks.

The Expert Group (European Commission, 2009) recommends setting up a steering or coordinating committee for active entrepreneurship education in all LLL forms, at national or regional level. It is expected that topics of eco-innovation will be included in curriculum.

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