

# Entrepreneurial Learning and AI Literacy to Support Digital Entrepreneurship

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## ABSTRACT

*The formation of the entrepreneur as a person for digital transformation is important and considered, in a large part, to be due to learning. Entrepreneurship is “a process of new value creation” and digital entrepreneurship is understood as “a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized”. The integration of artificial intelligence - AI into business world can automatize some tasks and make entrepreneurs more “creative” and fulfilled, which would obviously benefit the companies that they work for.” Entrepreneurial learning is a basis for education of entrepreneurs and should support digital entrepreneurship within the process of designing, launching and running a new business within digital transformation. It should include AI courses in the learning and teaching process to achieve AI Literacy competence.*

*The first part of the paper includes results of literature review and of interviews that the author has done with entrepreneurs within some European projects about different forms of entrepreneurship, particularly digital entrepreneurship and the use of AI. A review of literature about entrepreneurial learning and basis components, which characterizes it, is given in the next part including also experience of the author in teaching and training entrepreneurs*

*The last part of the paper presents some new approaches within education by using entrepreneurial learning including AI Literacy oriented to digital workplaces and digital entrepreneurship. Developments within European projects with the participation of the authors are also given.*

**Keywords:** *Entrepreneurship, Digitalization, Digital entrepreneurship, AI, Entrepreneurial learning*

## INTRODUCTION

Digitalization means many transformation processes and implications for entrepreneurs as well as for entrepreneurship; researchers and educators should identify new opportunities on business and new theoretical and practical methods in education and training for entrepreneurs.

The formation of the entrepreneur as an instigator for digital transformation is important and considered, in a large part, to be due to learning from experience (Deakins and Freel 1998, Rae and Carswell, 2001). Many entrepreneurs engage also in formal and informal learning activities,

individually—such as enrolling on university courses (Davidsson and Honig 2003)—or collectively—such as forming peer learning groups (Mäkinen 2002).

Entrepreneurship is “the process of designing, launching and running a new business” (Hsieh and Wu, 2018) with its distinct characteristic of “new value creation” (Hull et al., 2007). Scott A. Shane is the 2009 winner of the Global Award for Entrepreneurship Research. First,

Shane has influenced central aspects of entrepreneurship and has been a leading figure in redirecting the focus on entrepreneurship research itself. Shane’s research improve understanding of entrepreneurship (References). He has contributed to how entrepreneurship research should be conducted. Shane has been a forerunner in examining relevant units of analysis that are difficult to sample; research designs and databases specifically designed for studying entrepreneurial processes; and sophisticated analytical methods. This has contributed to advancing the methodological rigor of the field.

In connection with the developments of technology, other forms entrepreneurship are defined. Ferreira (Ferreira et al., 2016) opts for a broad conceptualization of technology entrepreneurship suggesting that it is a combination of entrepreneurship and technology-based innovation. Beckman (Beckman et al., 2012) wrote that it is a type of entrepreneurship that aims at exploiting opportunities related to advances in science and engineering.

Technology entrepreneurship is an established concept in academia. The digitalization of the “technology” not only changes its properties but also affects the overall technology entrepreneurship process. It also has an impact on entrepreneurial processes in general and on new forms of entrepreneurship.

“Digital entrepreneurship” is understood as “a subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized” (Hull et al., 2007).

The connection between entrepreneurial learning and entrepreneurship was presented first by Schumpeter (1950) and then developed within an evolutionary framework, such as the evolutionary theory of the firm, the competence perspective in the theory of the firm (Foss and Mahnke 2002) and theories of organizational routines (Feldman and Pentland 2003; Becker 2004).

Entrepreneurial learning as a theoretical concept has been studied by many researchers and educators and has played a crucial role in the development of government policies aimed at fostering the ‘knowledge-based economy

([http://eprints.bournemouth.ac.uk/15080/1/241\\_Erd%C3%A9lyi\\_Final%20Paper\\_313\\_The%20Matt%20of%20Entrepreneurial%20Learning.pdf](http://eprints.bournemouth.ac.uk/15080/1/241_Erd%C3%A9lyi_Final%20Paper_313_The%20Matt%20of%20Entrepreneurial%20Learning.pdf)).

It is a basis for education of entrepreneurs and supports digital entrepreneurship within the process of designing, launching and running a new business in the digital era (Hull et al. 2007).

Artificial intelligence (AI) has been used for decades. But due to progress of key technologies like cloud computing and data analytics, AI impacts more the digital transformation. Google, Facebook and Microsoft have been investing in AI in the last years.

A good definition of AI is important because it “is quite a bit of buzz in the marketplace” and it seems that just about any tech company considers itself to be a big player in AI

(<https://www.forbes.com/sites/tomtaulli/2018/05/05/what-entrepreneurs-need-to-know-about-ai-artificial-intelligence>)

Andreas Roell, who is a managing partner at Analytics Ventures gives the following definition of technology: “The way to think about the general concept of Artificial Intelligence is the introduction of smart thinking into computers. Instead of providing them with specific formulas of how to process data and information, computers are fed algorithms to process data, which has general boundaries that lead to desired outcomes.”

(<https://www.analyticsventures.com/managing-partner-andreas-roell-describes-ai-in-forbes/>)

Machine learnings (ML) is a sub-component of AI referring to using computer systems to consistently improve the performance of the outcomes; it often involves image recognition and language translation.

For entrepreneurs AI is an enabler but also a new obstacle. Entrepreneurs however, do not have to get too deep into the details; for them it is important to understand the potential of the technology, how AI works and to focus on realistic results.

After this Introduction, the paper includes results of literature review and of interviews the authors have done with entrepreneurs within some European projects about different forms of entrepreneurship, particularly digital entrepreneurship,

A review of literature about entrepreneurial learning and basis components, which characterize it, are given in part 3.

It also includes the experience of the authors in teaching and training entrepreneurs. The last part of the paper presents some new approaches within education by using entrepreneurial learning oriented to digital workplaces and digital entrepreneurship. Developments within European projects with the participation of the authors are also given.

## DIGITAL ENTREPRENEURSHIP

Schumpeter (1950) started the study of the entrepreneur and entrepreneurship education and underlined that these have a central place in the study of economic growth; entrepreneurs take the risk to introduce innovative products, services and new technology to the economy.

Landreth and Colander (1994, affirmed “...the real source of economic growth is fostered by the activities of the innovative entrepreneur not in the activities of the followers who are risk averse.” Schumpeter (1950) emphasized that an entrepreneur is an individual who is innovative in same time.

An entrepreneur has desire for achievement in any activity that one is engaged in (McClelland, 1961), being proactive instead of reactive (Miller, 1983) being innovative and creative (Drucker, 1985), being able to take risks (Brockhaus, 1980), being an opportunity identifier, moderate risk takers, and having an internal locus of control (Brockhaus, 1982).

Digitalization creates new opportunities for entrepreneurship (cf. Hull et al., 2007), a new business model uses digital potential and entrepreneurs needs to be aware of those opportunities in order to be ready for sustainable innovations. Some of these forms of entrepreneurship are:

Recent developments in the context of entrepreneurship, possible combinations of technology and entrepreneurship which have resulted with digital era.

The following table shows some topologies of entrepreneurship in connection to technology.

**Table 1: Forms of technology and digital entrepreneurship Source Baitetti (2012), Gions (2017)**

Typology	Technology Behind the Opportunity	Key Activities in the Process	Access to Resources and Funding
<b>Technology Entrepreneurship</b>	New products based on breakthroughs in research; science-based advances through specific knowledge in an academic field Example: Graphene	Technology proof of concept; first customer validation; activate a global but niche market (Clarysse et al., 2011)	Public research grants and other soft money sources Venture capital attracted by promising intellectual property (Audretsch et al., 2012; Giones & Miralles, 2015)
<b>Digital Technology Entrepreneurship</b>	New products based on ICT technologies only; making smart devices using the possibilities of Internet of Things Example: Smartphone	Use of existing technologies: market validation, traction, and growth, scalability	Business angels; seed and venture capital; stock market Crowdfunding; reward and equity (Gedda et al., 2016)
<b>Digital Entrepreneurship</b>	New products and services based on the Internet. Services running only in the cloud; using big data or artificial intelligence. Example: Snapchat	Technology as an input factor: high growth ambitions (Wallin et al., 2016); stay ahead of competitors; be the dominant player in the category	Business angels; seed and venture capital; stock market Equity crowdfunding (Tomczak & Brem, 2013)

Digital entrepreneurship can also be considered a reconciliation of traditional entrepreneurship (Le Dinh et al, 2018,) with the new way of creating and doing business in the digital era and also as a form of technology entrepreneurship but we used the classification of Bailetti.

Digital entrepreneurship is a phenomenon, which arose through technological assets like internet and information and communications technology (Le Dinh et al., 2018). Entrepreneurial activity that transfers an asset, service or major part of the business into digital can be characterized as digital entrepreneurship. Products, marketing activities and workplace mark the major differentiation criteria between digital and non-digital entrepreneurs.

The main advantage of digital entrepreneurship is that private business could be managed from anywhere in the world, provided by access to the internet.

Other advantages are:

- More flexible hours
- Cost savings
- Easiness of reaching many people
- Easily scalable business

Big companies recognize the value of AI within digital entrepreneurship i.e. in automating standardized tasks, motivated by cost, productivity and efficiency gains, or the increasing pressure of regulatory compliance rather than employee happiness (Link). They understand that in order to remain relevant and competitive, they must often engage in AI research, introduce AI-based products and services, and implement AI tools and applications.

Modern companies rely on faster, more affordable and more accurate modes of marketing because by using AI in digital marketing practices, entrepreneurs can benefit from higher response value from the target audience and ultimately achieve better results. AI based search engines are now doing a do far better serving searcher intents, using deep learning algorithms to grade relevancy, reader-friendliness, and authenticity before displaying content. Higher quality content should be created since its rankings predominantly depend on how well it addresses its intent to the target audience.

AI integrated search engines respond to user intent signals more authoritatively against predefined algorithms and machine-learning capabilities of search engines allow to gather information and predict, anticipate and influence trends in content marketing. By utilizing AI interventions, online marketers are now able to improve engagement, extend retention, personalize user experience and boost sales. One of the most successful yet underrated techniques is search engine optimization (<https://www.entrepreneur.com/article/324586>).

AI will also have an important role in improving the advertiser-customer relationship by facilitating interaction through deep learning.

Entrepreneurs can use cloud compute, storage as well as modern machine learning as a service on demand with pre-trained machine learning models. As companies continue to integrate machine learning into their businesses there will be inherent benefits to new startups. Smarter CRM tools like Salesforce and Hubspot help drive sales, marketing automation, and customer service. These and other platforms will continue to add value to historic and emerging data, help optimize business timing, maximize resources and minimize waste with well-informed decisions.

(<https://medium.com/@vartoogian/artificial-intelligence-impact-on-entrepreneurship-and-the-ai-literacy-imperitive-7b5e0364509c>).

Research in digital entrepreneurship particularly in integrating AI methods is still at the beginning particularly when talking about the required education to support it. Digital business models, digital entrepreneurship process, platform strategies, education and social digital entrepreneurship are topics to be further researched.

Wind (2008) underlines that digital businesses represent a “shift from traditional management approaches to network orchestration” as networks and communities are crucial for digital entrepreneurs. Digital business models in terms of the appearance of goods and services,

digitalization of the distribution channel, digital communication with stakeholders and internal processes are carried out on a digital basis.

Huang and Cox (2016) conducted research with a case study and Taiwan and mention that the motivation for low-income people to engage in social digital opportunities is an interesting field for further research.

The importance of competences and skills of entrepreneurs required to define and describe entrepreneurship as a competence and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit". It was necessary to:

- develop the reference framework describing its components in terms of knowledge, skills and attitudes
- Provide European citizens with the appropriate tools to assess and effectively develop this key competence.

In this context, the JRC on behalf of the Directorate General launched the Entrepreneurship Competence study (EntreComp – European Commission, 2015) for Employment, Social Affairs and Inclusion (DG EMPL) in January 2015. One of the key objectives of EntreComp was to develop a common conceptual approach, which could support the development of entrepreneurship competence at European level.

The DigComp 2.0 framework (<https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>) identifies the key components of digital competence necessary in digital entrepreneurship:

- Information and data literacy i.e. Articulating information needs, locating and retrieving digital data, information and content, judging the relevance of the source and its content, storing, managing, and organizing digital data, information and content.
- Communication and collaboration i.e. interacting, communicating and collaborating through digital technologies while being aware of cultural and generational diversity, participating in society through public and private digital services and participatory citizenship, managing one's digital identity and reputation.
- Digital content creation i.e. Creating and editing digital content, improving and integrating information and content into an existing body of knowledge while understanding how copyright and licenses are to be applied, knowing how to give understandable instructions for a computer system.
- Safety i.e. protecting devices, content, personal data and privacy in digital environments, protecting physical and psychological health, and being aware of digital technologies for social well-being and social inclusion and of the environmental impact of digital technologies and their use.
- Problem solving i.e. identifying needs and problems, resolving conceptual problems and problematic situations in digital environments, using digital tools to innovate processes and products, keeping up to date with the digital evolution.

## **ENTREPRENEURIAL LEARNING AND AI LITERACY**

The European definition of entrepreneurial learning includes the development of entrepreneurial attitudes, skills and knowledge that enable the individual to turn creative ideas into action. Entrepreneurship is not only related to economic activities and business creation, but more widely to creating value in all areas of life and society, with or without a commercial objective ([http://www.thelearninglab.nl/?dt\\_portfolio=36345](http://www.thelearninglab.nl/?dt_portfolio=36345)).

Entrepreneurial learning:

- Creates conditions for job creation and a healthy economy
- Stimulates innovation and capacities to deal with exponential change and globalization
- Engages and motivates students through relevant learning experiences for education, life and work.
- Empowers people to create value for society and deal with societal challenges.

Peter Erdélyi underlines that entrepreneurial learning is

- An observable phenomenon, something entrepreneurs engage in or are associated with
- A concept that has started to receive increasingly explicit articulation in academic literature in the past decade and which has been implicit in the literature since Schumpeter (1950)
- A core policy objective in developed Western countries implemented through funded programs targeted at entrepreneurs

([https://www.researchgate.net/publication/228419882\\_The\\_Matter\\_of\\_Entrepreneurial\\_Learning\\_A\\_Literature\\_Review](https://www.researchgate.net/publication/228419882_The_Matter_of_Entrepreneurial_Learning_A_Literature_Review)).

Entrepreneurial learning is still a relatively new area of study, presenting more interests since Becker and Knudsen (2009) associated it i.e. with globalization, the spread of new ICTs, and the revival of small business. The confrontation of entrepreneurship studies and organizational learning literature (Dierkes 2001; Easterby-Smith and Lyles 2003), which was done parallel during the past decade, raised the interest in entrepreneurial learning.

Entrepreneurial learning has emerged as an important area of inquiry in relation to both the academic studies of entrepreneurship and the practical development of new entrepreneurs. Theoretical approaches that focus on diverse aspects of entrepreneurial learning are divided into two main groups, depending on their analyzing object: those focusing on the individual entrepreneur and those focusing on the organizational context

([https://www.researchgate.net/publication/228419882\\_The\\_Matter\\_of\\_Entrepreneurial\\_Learning\\_A\\_Literature\\_Review](https://www.researchgate.net/publication/228419882_The_Matter_of_Entrepreneurial_Learning_A_Literature_Review)).

The first approach has as object the personal learning experience and the cognitive capabilities of the „entrepreneurial individuals „, the second sees entrepreneurship „as a collective activity and at various scales, from the single firm and its immediate network until the national system of innovation.

Deadkins and Feel consider entrepreneurial learning a type of management learning to build an entrepreneur and to set up new business; Kolb (1984) uses the theory of experiential learning to describe how entrepreneurs learn from experience; entrepreneurship is a behavior that is learned through experience. The second group defines entrepreneurial learning as a social or collective activity. Some authors (i.e. Gibb, 1997) try to use Learning organization in SME context.

In order to improve the practical character of education and training for entrepreneurs it is necessary to (Gibb, 1997):

- Support understanding of entrepreneurial learning
- Integrate it into teacher/trainer education
- Create strong cooperation between higher education - HE, research and business life,
- Develop a basic education in this context.

Concerning AT, it seems that there is a “mismatch” between the expected potential benefits of AI and its development and implementation due to a misunderstanding or due to the development of AI products, tools and applications which has slowed down through the lack of a “digital culture” and entrepreneurial spirit in the workplace.

Entrepreneurs should be encouraged to use training time on developments in digital technology, particularly in artificial intelligence.

In order to prepare the next generation, schools and universities, AI should have to become a mandatory topic in all of their programs which in other words means a development of AI Literacy. For some classes, the fundamental technological principals like history, philosophy, economics, and ethics of artificial intelligence will be sufficient.

Concerning education and training of entrepreneurs, the lack of a basic agreement of who is an entrepreneur makes the attempt to defining education of entrepreneurship and particularly supporting entrepreneurship, a difficult task. Education to support entrepreneurship has an important role in social and economic developments: by encouraging society to look for opportunities and taking initiative, result in creating jobs and economic prosperity, and providing social value to citizens.

Many educational and training curricula have been developed in this context but there is little focus on sustaining a business beyond its creation.

The importance of digital entrepreneurship increased but teaching and learning of digital entrepreneurship is not only a current hot topic, but should be better integrated in entrepreneurial learning programs.

In addition to the equipment, certain features are essential if someone is willing to learn to be a digital entrepreneur:

- Curiosity: in order to undertake on the internet, one needs to cultivate own curiosity, because only by researching a lot about the market and the behavior of consumers for future business that a solution that adds value to people's lives is to be found.
- Willingness to study/become specialized: reading news about the daily market. Over time the need develops to specialize in one theme that affects your business the most.
- Wanting to help people: "Entrepreneurship is associated much more with identifying problems and opportunities to implement an idea that causes positive impacts than with being innovative and creating something never seen before."
- Knowing the advantages of digital entrepreneurship.

Guthrie (2014) reports her own experiences with using student's themed blogs in a learning project within an e-commerce major in a European business school and provides a set of digital entrepreneurship skills, which are grouped along the phases of digital product life cycle (production, distribution, promotion). Nichols et al. (2017), who described the supportive contribution of academic libraries to entrepreneurship and digital humanities on campus, showed a lack in providing further research opportunities. Le Dinh et al. (2018) suggests possible research opportunities regarding their living lab approach. Further empirical research is needed for the generalizability of the living lab approach, a better understanding of its various options and the inclusion of big data, though clear reference to education of entrepreneurs is missing.

Nowadays education and training of entrepreneurs and undergraduate curriculum do not cover the how and why AI technology can help. Talking to SIRI, Netflix recommendations, smartphones or hailing an Uber are all taken for granted yet there is hidden genius enabling it all. On the surface, it may seem overwhelmingly complex to even explain, yet AI should be viewed as a tool and a prerequisite skill

(<https://medium.com/@vartoojian/artificial-intelligence-impact-on-entrepreneurship-and-the-ai-literacy-imperitive-7b5e0364509c>).

AI literacy should become a standard part of the curriculum to fuel the entrepreneurial minds of tomorrow.

## EXAMPLES

The new economy brings with it many challenges for SMEs.

They more productive than larger organizations, they often remain stagnant (European Commission, 2015). In a recent project Archimedes, SMEs identified the burden of workload trying to sustain a business. They emphasized the need for staff to take initiative and use digital technologies. (O'Brien and Carroll, 2015). Digital technology can provide the capacity to assist SMEs to grow. If adopted correctly it can introduce process efficiencies and reduce costs, it can allow SME to access international customers without having to set up a physical presence but many SMEs struggle in the adoption of digital technology. To facilitate successful adoption of technology it is important that SMEs look for digital business opportunities and identify how technology can support them to afford these. In addition to this, finding skilled staff is a major barrier for SMEs (Muller et al, 2017). In 2018, the authors started the Erasmus + project REINNOVATE, aimed to translate policies to support digital entrepreneurship into practice by focusing on cultivating an entrepreneurial culture in small companies (Hamburg et al., 2018). Prior to the starting the project, the REINNOVATE consortium conducted a survey in Ireland, Germany, Lithuania, Portugal and Romania to determine the challenges and needs of 142 SMEs in Europe in order to be innovative, to grow and to cope with

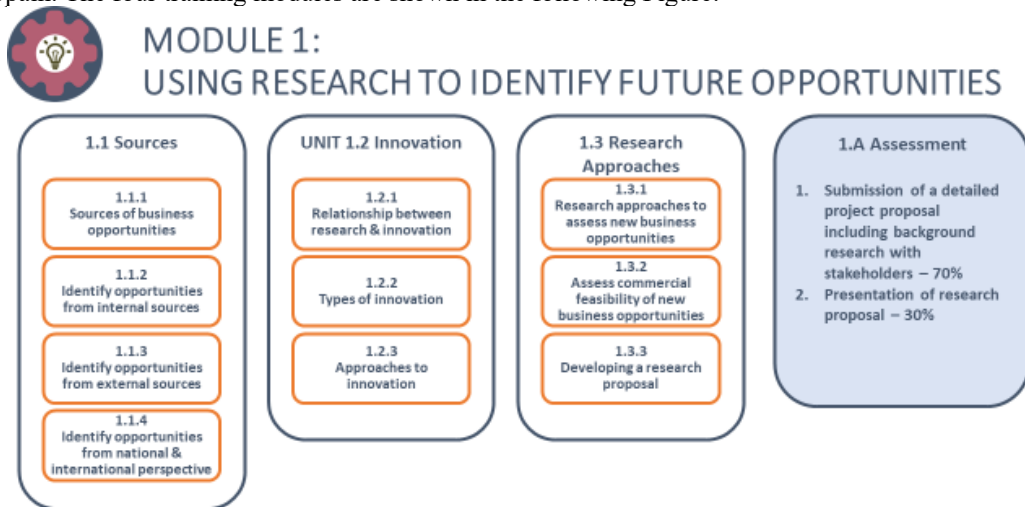
digital changes. It was found that 97% of asked companies want to become more innovative and use digital technology but corresponding competences are missing.

Other barriers to innovation are resources (60%) i.e. specialized equipment, staff. About 38% of SMEs answered that skills to use digital technologies to deliver new products and services or new digital business models are missing. The survey explored the potential of SME collaboration with Higher Education institutes in order to help them to be more innovative. The hypothesis was that leveraging from public research organizations would address the resourcing issues SMEs faced regarding innovation. One of the main concerns SMEs had was that higher education does not understand SMEs business needs or take too long to design and implement solution SMEs can use.

Research skills were seen as significantly important with, 87% of SME identifying research skills as important or very important to their organization, however there is a significant skills gap with 62% of SMEs having no research skills. To address such missing skills gaps the Reinnovate consortium with higher education institutes and research organizations, chamber of commerce and SME representative bodies will develop research skills to stimulate the employees' ability to systematically identify new digital opportunities and manage the implementation of these to improve the performance of the company. Four entrepreneurial learning modules have been developed. After improvements the modules will be offered in national languages to SME staff to help them

- to use workplace-oriented research to identify opportunities from national & international perspectives incorporating digital transformation.
- to gather and analyze the relevant data to allow them to implement a digital business opportunity or an innovative idea in connection with digital transformation.
- to manage an own research project about a digital business model including some AI facilities and evaluate it.

The training process will be mostly by using digital media supported by face-to-face sessions and a mentoring process in partner countries Ireland, Germany, Lithuania, Romania and Spain. The four training modules are shown in the following Figure:







## MODULE 2: SMART METHODS TO GATHER & ANALYSE DATA

### 2.1 Decision Making

Topic 2.1.1  
Decision making within  
an organisation

Topic 2.1.2  
Identify information  
needs for business  
decisions

### 2.2 Gather Data

2.2.1  
Primary data collection

2.2.2  
Secondary data  
collection

### 2.3 Analyse Data

2.3.1  
Managing & analysing  
data

2.3.2  
Data analytics

### 2.A Assessment

1. Clear identification of information need – 10%
2. Secondary data summary (summary of past research) – 35%
3. Primary data – method of how the data will be gathered – 15%
4. Report: Summary of primary data collected; what you found from data & suggested solution/implementable business opportunity – 50%



## MODULE 3: MANAGING YOUR RESEARCH PROJECT

### 3.1 Managing Research Projects

3.1.1  
Managing research  
projects

3.1.2  
Identifying performance  
objectives

### 3.2 Teams

3.2.1  
Leveraging & managing  
internal resources

3.2.2  
Working in teams

### 3.3 Communication

3.3.1  
Principles of effective  
communication

3.3.2  
Types of communication  
& key issues

3.3.3  
Communicating  
Research Results

### 3.A Assessment

- Peer observation of two project meetings and how team interacted (observation criteria will be provided) – 20%
- Report on project implementation – in tab guided questions might be included – 60%
- Oral presentation on project results to all stakeholders – 20%





## MODULE 4: EVALUATING SUCCESS & FUTURE OPPORTUNITIES



Figure 1: Reinnovate Modules.

## CONCLUSIONS

This chapter provides an overview of entrepreneurship forms relevant to sustainable businesses and focuses on offering new products and services in response to digital developments (Hamburg, 2019).

Digital entrepreneurship means creating new ventures and transforming existing businesses by developing novel digital technologies and/or novel usage of such technologies, (European Commission, 2015). Digital entrepreneurship has been viewed as a critical pillar for economic growth, job creation and innovation by many countries including the Member States of the European Union.

However, digital entrepreneurial capacity depends largely on digital entrepreneurial behavior, culture, and strategies to use technologies like AI, as well educational approaches. These are all topics that are less researched. Entrepreneurial learning has emerged as a promising area of research in the interface between learning and the entrepreneurial context with the importance of the specific processes of learning to achieve knowledge i.e. AI literacy, that occur in this context.

In many literature, the focus is more on the many aspects of entrepreneurial learning and the role of learning in the entrepreneurial process, particularly within digital entrepreneurship; this is a future research topic of the authors together with aspects of new curricula, development of a digital culture and employee's behavior in this context.

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