Chapter 7
Digital Innovation and Interactive Technologies:
Educating the Society 5.0

Arianna Fonsati
https://orcid.org/0000-0001-8566-3425
Politecnico di Torino, Italy

ABSTRACT

Is digital innovation helping towards achieving a higher level of education or not? Since the impact of technologies is affecting more of our society, it is also true that its use in education is still limited, even in university education, where it could have the real added value of experimenting with new approaches to didactics. Within this context, the chapter briefly presents digital innovation and the enabling technologies currently in use that are also producing new opportunities for the architectural, engineering, construction, and operation (AECO) sector. Furthermore, the chapter provides two examples of master and bachelor courses related to BIM and algorithmic parametric modelling that integrates several tools and technologies, such as cloud-computing, big data, and machine learning to add value to harnessing technologies so that digital innovation could truly improve the efficiency of the AECO sector.

INTRODUCTION

The impact of digital innovation has been increasing over the last years because of the fast development of new technologies and tools. However, such a growth did not always lead to positive effects in the society. Indeed, digital innovation is so fast that it is very complex for society to stay abreast of the times. The same applies to the education sector. To better understand the situation, it is of paramount importance to analyse the "enabling technologies" that are currently producing radical shifts in markets, business practice and society. Furthermore, it is also important to examine three concepts associated to digital innovation: (i) digitization, as the conversion of something non-digital into a digital representation or artifact; (ii) digitalization, as the improvement of processes by leveraging digital technologies and digitized data, meaning that digitalization precedes digitization; (iii) digital transformation, which

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is actual business transformation enabled or forced by digitalization technologies (Gupta, 2020). The present study analyses part of the digital transformation process for the implementation of methods that involve the use of some of the available "enabling technologies". Such enabling technologies and tools are useful for educational purposes too, in order to prepare students to be competitive within the professional market.

The other side of the coin is represented by attempts to deploy digital technologies that were not successful, resulting in many examples of implementation failures and cost overruns. Such failures tend to be analysed focusing on the technology introduced, rather than on the role played by cultural factors and by organizations' willingness to embrace new approaches and working practice, individual characteristics of team members, team feelings and organizational governance, which result to be as essential to success as deploying the right Information and Communication Technologies (ICTs) (Mahroum, Ferchachi, & Gomes, 2018). For this reason, it is not only a question of choosing the right technologies, but the implementation method of such technologies establishes the real success of one over another.

In the past, the need for innovation required the development of new methods, which in turn involved the invention of new tools. Nowadays, the opposite is often proved, because it happens more frequently that first there is the invention and later new tools are applied to innovative methods in several fields of application. Digital transformation describes the deep-seated changes in industrial and organizational activities, processes, and competencies required to seize the opportunities and respond to the challenges engendered by the new digital paradigm, including a vast array of enabling technologies, such as the Internet of Things, Additive Manufacturing, Big Data, Artificial Intelligence, Cloud Computing, Augmented and Virtual Reality, and Blockchain (Rindfleisch, O'Hern, & Sachdev, 2017). Therefore, the time needed to develop and launch innovative technologies is decreasing the lifecycle of items and services, because customers and users are always looking for flexibility and personalization of products (Li, 2018). Furthermore, digital innovation requires a cross fertilization of knowledge in different fields, forcing users to implement technologies they are not always familiar with in a very short time and to step out of their comfort zone, possibly eliminating previous practices (Saarikko, Westergren, & Blomquist, 2020). Such an integration is paramount when considering the AECO sector, where several different disciplines are involved within the development of construction projects.

Digital innovation is fostered by technologies and innovation management too; within this context people have a leading role because they also have to introduce cultural shifts and transformation to working and educational procedures to succeed. Furthermore, the importance of digital assets and the way connectivity, data, AI etc. as well as basic and advanced digital skills sustain our economies and societies have been highlighted during COVID-19 pandemic. Digital systems allowed the work and the learning to continue, tracking the spread of the virus etc. and will also "play a key role in the economic recovery as the European Council and the Commission have undertaken to frame the support to the recovery along the twin transition to a climate neutral and resilient digital transformation" (European Commission, 2020). In this framework, monitoring such a performance in digital innovation is of paramount importance. Indeed, the European Commission uses the Digital Economy and Society Index (DESI) to monitor Europe's overall digital performance and track the progress of EU countries in their digital competitiveness (European Commission, 2020). The index is evaluated through indicators across five main dimensions: (i) Connectivity; (ii) Human capital; (iii) Use of internet services; (iv) Integration of digital technology; (v) Digital public services. In the 2020 edition of DESI rankings, Italy ranked 25th out of the twenty-eight EU countries, showing significant gaps in terms of Human capital, recording very low levels of basic and advanced digital skills, which in turn are reflected in the