

## Promoting Competencies of the Future

### The Role of University-integrated Makerspaces

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**Abstract:** An increasing interaction between man and machine in all areas of society leads not only to new job profiles but also initiates a discussion about the needed digital competencies in the future. The European Commission's Joint Research Centre has developed in a multi-stakeholder approach an initial framework to describe and measure the needed competencies such as problem solving ability, capacity of teamwork and programming skills [CVPI17]. It is expected that the transfer of technical, occupation-oriented and personality-building competencies alongside subject-related knowledge will become increasingly important in higher education [SV16]. In order to avoid inequalities among students -those with and without so-called digital competencies - new learning approaches are needed. One possible approach towards the enhancement of digital competencies can be found within the maker movement.

**Keywords:** Higher education, digital competencies, maker movement, university-integrated makerspaces, collaborative and hands-on learning

### What role can making play in higher education?

Using digital desktop tools, makers create new products and prototypes. It is part of their philosophy to share ideas and drafts within the global online community. Makers use so-called makerspaces as working environment, which provide access to the latest technical infrastructure. In addition, the working environment of makerspaces enables an interdisciplinary and creative exchange of knowledge. Over the last twenty years, several public libraries, enterprises, schools and universities in the USA and Europe have set up makerspaces with the particular aim of promoting innovation [Fr16]. In numerous reports 'making' has been identified as an important trend both for universities and for the education system [Jo15] [Co17]. Makerspaces have been described as a key technology for the further development of universities [HD16]. For this reason, a number of projects such as "FAB101"<sup>5</sup> or "OD&M Alliance"<sup>6</sup> have been initiated to investigate the potential of digital fabrication in higher education. Nonetheless, there are very few empirical

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analyses on concrete learning outcomes and competence development via making [ES17]. Taking into account the European Commission's definition of digital competencies [Fe12] and existing studies in the field of making and learning, making can be seen a promising learning approach for the enhancement of digital competencies [PGJ17]. However, appropriate methods and tools to develop competencies and to monitor learning outcomes in making are still missing. The contribution of this poster adds value at this point demonstrating a conceptual approach for the competence development in university-integrated makerspaces. Concretely, the link between the Digital Competence Framework for Citizens [CVP17], making and formal academic learning by the example of 3D printing workshops<sup>7</sup> will be established.

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<sup>7</sup> The most popular offered courses in fab labs are 3 D printing in USA and Europe [Fr16]. It combines aspects such as creativity, experimentation, open design and manufacturing etc. Therefore, it can be seen as a suitable starting point to analyse maker activities in formal academic learning.