# An Innovative Virtual Reality Online Collaborative Environment for designing, analyzing and modeling buildings and monuments

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Undoubtedly, architecture is interrelated with artificial intelligence, virtual reality and other technologies that create the digital culture. Specifically, in Europe, with the growth of industry 4.0, this interrelation has a major impact in the working environments and for this reason, it requires the pooling of knowledge and good practices on processes, models and technologies to work. In this framework, the main questions that are addressed are: What capabilities can architects acquire from the rapidly advancing field of mixed realities? Which are the optimal skills for higher-education students? And more specifically in the field of Architectural Practice, how will Academia contribute to bridging the gap between the use of the technological tool and the real designing needs?

Following this objective this study aims to establish a theoretical framework and to define strategies that both boost collaborative learning (Smith, Macgregor 1992), and suggest alternative lifelong learning strategies for architects by using as a case study the integration of the state-of-the-art technology of the HPC (High Performance Computing System) into the learning process by the educators of the School of Architecture at the Technical University of Crete in Chania. HPC combines artificial intelligence and deep learning architectures of 1 DLPetaFLOPS και 260.8 FP16 TeraFLOPS. Specifically, it includes the creation of an online collaborative environment for the design, analysis and modeling of buildings and monuments in virtual reality and aims at addressing two important skills 1. Competences for the digital society and the 2. Working environment in the digital age.

A number of interesting suggestions emerge from this analysis.

Firstly, through the integration of HPC in the learning process, the virtual layer intends to add to the physical space, thus adding value to the face-to-face communication. Studies show that the immersive environment may benefit current design practices by improving professionals' understanding of the spatial arrangement of the virtual model (Paes et al, 2017).

Secondly, the process of the HPC acquisition will act not only as a connector between two or more classes but also as a creative container that will accumulate and exchange knowledge from individual

students across the globe, offering them the opportunity to participate in a virtual class environment and work on a virtual 3D model in real time and in real scale.

Furthermore, this virtual container will invite instructors from different locations to participate in the education process. Architectural studios can reach new levels of education quality, interest and participation, by inviting the original creator to join the class and explain "in person" his/her architectural composition. An interesting case study would include students in Chania attending a workshop of Bernard Tschumi in New York, where he would showcase in real time sketching and 3d modeling how he designed the Acropolis Museum of Athens. Students would be able to take a walk inside the spatial model uploaded online by his team and experience the museum space, in real scale and in real time.
Educators and students from other architectural schools can participate.

All the above are examples of how the suggested communicative environment is able to amplify the cognitive capacities, strengthening the “multiple intelligences” of our thought (Gardner, H., 1994) and help therefore each learner to re-create his own educational path in the virtual reality (Di Lieto, 1995).

**References**

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