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The Use of Virtual Environments in Architectural Design Studio Teaching: Collaborative Computer-Aided Strategies of Distance Learning

The article explores an ensemble of new online practices employed in architectural design studio teaching, paying special attention to analysis of D. Randy Garrison and Terry Anderson, in *E-learning in the 21st Century: A Framework for Research and Practice*, concerning the recent pedagogical, technological, and organizational developments in distance education. It presents several approaches of collaborative digital architecture design teaching within virtual environments, scrutinizing the impact of technology-based instruction environments on the learning processes in various architectural schools all around the world. It departs from Michael J. Crosbie's remark that "[m]any studios deal almost solely with the individual, while complexities of contemporary practice require collaborative teamwork" (Crosbie cited in Emam et al 2019: 164), and examines which methods can enhance participatory practice when virtual environments are used for teaching architectural design studio. Comparing collaborative learning strategies with individualistic strategies of distance learning, as far as the teaching of architectural design studio teaching is concerned, the article aims to shed light on how methods of teaching that are based on the creation of networks offering to students the opportunity to develop informal social relations are more efficient than those that are based on more individualistic methods. In parallel, it explores how such networks of collaborative learning could be incorporated in on-line teaching strategies in the case of architectural design studios.

The main objective of the article is to demonstrate that the engagement of students in collaborative learning environments has an important impact on learning processes, contributing to the realization of much more successful final outcomes than in the case of individualistic methods of teaching. Today, the need to shape tools and methods allowing schools of architecture to conduct Virtual Design Studios (VDS) that allow collaborative learning is more urgent than ever. As Spyros Vosinakis and Panayiotis Koutsabasis remark, a worth-noting advantage of the Virtual Worlds (VWs) is the fact that they offer to their users the opportunity to "meet and collaborate in shared workplaces" (2013: 60). An important advantage of the incorporation of the so-called Virtual Worlds (VWs) in online architectural design studio teaching is the fact that, thanks to the use integrated platforms, "the learning community has the chance to see not only the final outcome but also the resources and paradigms that led to it" (ibid.: 66). The article presents the shifts in online architectural design studio teaching due to the elaboration of strategies promoting collaborative learning, explaining how Virtual World servers can be hosted in open-source platforms such as OpenSimulator and Second Life. It also analyses the impact that the development of interactive tools can have on collaborative design activities in the Virtual worlds (VWs). It focuses mainly on the analysis of the following cases: firstly,

the Virtual worlds (VWs) used in the interaction design studio course of the MSc program in Design of Interactive and Industrial Products and Systems at the University of the Aegean in Greece, and, secondly, the so-called 'Immersive Virtual Environment Design Studio', which Marc Aurel Schnabel set up at the Chinese University of Hong Kong. For the analysis of the second case, special attention is paid to the examination of how the Virtual Reality Architectural Modeller (VRAM) software by Regenbrecht et al. (2000) was used.

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