“An educational simulation game differs from other forms of gaming in that education, rather than entertainment, serves as its primary goal. Simulation games using a face-to-face, physical format gained popularity as an effective pedagogical strategy to impart lessons in Lean-Integrated Project Delivery to stakeholders of the built environment, such as owners, architects, engineers, constructors, and trade partners. However, in recent years, the construction industry has faced acute challenges in the learning environment due to the COVID-19 outbreak. In addition to the need to continue offering training during a time of widespread social-distancing, there has been a call to expand scalability and geographic as many projects are currently designed and built using geographically diverse teams. To respond to these needs, this research investigated the potential of immersive virtual reality (VR) educational simulation games as a means to offer significant benefits for student learning by eliminating temporal and spatial constraints, offering potentially cost-effective training, and providing uniformity of content. Researchers developed and tested a VR educational simulation game to recreate the Target Value Design (TVD) Marshmallow Tower Simulation, which is used by the Lean-IPD practitioners as training tool before embarking on TVD. The VR simulation game was tested with undergraduate and graduate students, and their feedback was captured from a post-simulation survey. This paper reports on results regarding participant understanding of critical concepts, aspects of design and development, learning outcomes, and potential impact on job competencies. The research also proposed a comprehensive mechanism for educational simulation games for the construction industry. The mechanism was tested with a developed VR simulation game as a case study.”