Cyprus University of Technology
Faculty of Fine and Applied Arts

Doctoral Dissertation

STEAM LEARNING DESIGN IN THE ERA OF MAKER EDUCATION

Stella Timotheou

Limassol, April 2024

CYPRUS UNIVERSITY OF TECHNOLOGY

FACULTY OF FINE AND APPLIED ARTS

DEPARTMENT OF MULTIMEDIA AND GRAPHIC ARTS

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Supervisor

Dr Andri Ioannou, Associate Professor, Cyprus University of Technology

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Approval Form

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ABSTRACT

STEAM through Making, as an integrated learning approach, has gained an increasing interest in the last few years amongst researchers, educators, and practitioners. However, learning environments where a STEAM through Making approach is applied are complex environments that require well organized learning designs in order to enhance learning in terms of content knowledge, attitudes, and development of skills. The scarcity of learning designs for successful integration of STEAM and Making practices in authentic school-based learning environments has inspired the work of this dissertation. Throughout four design-based research (DBR) cycles of design and implementation, this dissertation sought to provide deeper understanding of how the STEAM through Making approach can be implemented in authentic school settings. The first DBR cycle presents an exploration of the STEAM through Making approach to identify the conditions under which learning can be promoted. The second DBR cycle assessed the type of learning and skills evident when students engage with projects in a STEAM through Making approach. Furthermore, DBR Cycle 2 delved into students' development of learning and innovation (L&I) skills, presenting an analytical framework and coding scheme for the capturing and documenting of this evidence. Cycle 3 investigated the development of collaboration and creativity skills as they occurred simultaneously during STEAM through Making activities. The fourth and final cycle of this DBR work validated and extended the learning design principles derived from the previous DBR cycles as well as the analytical framework and coding scheme for the assessment of L&I skills. This dissertation contributes to learning design research and practice for learning in STEAM through Making in authentic classroom contexts.

Keywords: STEAM, STEM, Maker Education, learning design, skills, STEAM through Making approach, elementary education, constructionism