Chapter 2
Proposing a Serious Game Design Model Towards Maritime Competency Development:
A Case Study

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ABSTRACT

In maritime domain, interactive and authentic learning environments are needed for competency development of seafarers. This study aims to propose and pilot test a serious game design model which is specific to maritime domain for enhancing the utilization of maritime serious games. In this study, Serious Game Design for Maritime (SGDM), a holistic model to support the design of maritime serious games is firstly proposed. Using the SGDM model, Maritime Leaders at Sea (ML@S), a 3D serious game to enhance the leadership and teamwork skills of young seafarers and maritime students, has been prototyped as a case study. ML@S is conceptualized

DOI: 10.4018/979-8-3693-7863-2.ch002

as a module of the created Maritime Gamentor platform. The compliance test of ML@S proves that SGDM holistic model enables the preliminary design of ML@S in compliance with the STCW requirements and industrial expectations. Further maritime studies can follow the proposed methodology to design additional serious game-based modules for mentoring on maritime skills.

INTRODUCTION

International Convention on Standards of Training, Certification and Watchkeeping (STCW) (referred as STCW in this study), which has been issued by International Maritime Organization (IMO), defines the training and competency standards of the seafarers. It has been argued that there is an important gap between required on-board competency levels of seafarers and their actual levels of competency (ICS, 2020).

Despite the regulatory and technological advancements in shipping, human error is still the main reason in 80% of shipping accidents (Akyuz and Celik, 2018). For maritime safety, security and environmental protection, the STCW-compliant MET is of vital importance. It is critical that MET provides young seafarers with technical skills as well as soft skills such as maintaining situational awareness, risk management, problem solving, leadership and teamwork (Basak, 2017).

Ship operations currently require high amounts of human work. Well-educated and competent crew is needed for safe and efficient operation of ships (Lewin, 2015). Considering the technological developments and the lack of practical education and training in the maritime industry, experience sharing and mentorship are even becoming more important for competency development.

The administration of several MET institutions focuses on increasing opportunities for practical training sessions at maritime campuses. Maritime simulators as great infrastructures, have the capability of providing practical training. However, the program limitations might not allow to use of required quota for maritime students in practical sessions. Additionally, the practical onboard training is a critical milestone for maritime students. Nevertheless, the lack of the consistent procedures on cadetship training onboard ships might restrain development of the targeted competencies. In addition, it is difficult to provide maritime students with detailed and personalized onboard trainings due to the high costs and risks associated with using an active ship for training purposes (Mazhari, 2018).

In order to provide enhanced practical training to maritime students and thus remedying the potential gap between the necessary and acquired practical competencies of the seafarers, the maritime industry needs to find cheaper, easier and more flexible ways of training. Game-based learning, as a technology-enabled instructional method, offers a great potential for the maritime domain (Nikitakos et al., 2017).