

Abstract

The present dissertation discussed the effects of two emerging phenomena in learning owing to technological advances, i.e., digitalization and gamification, on learning effectiveness from three aspects: the instructional design, the social aspect, and the cognitive aspect. This thesis consists of three studies: Study 1 examined the effectiveness of adopting gamification in instructional design. As gamification has become popular for improving learning motivation and engagement, Study 1 is a meta-analysis that tapped into the effectiveness of gamification in learning performance in educational settings. Specifically, it studied whether gamification would benefit learning performance and explored potential moderators in determining the effectiveness of gamification. No subgroup differences were found in education level, suggesting that the effectiveness of gamification remained the same across elementary education, secondary education and tertiary education or above. Subgroup analyses revealed a moderating effect of peer competition in gamification in learning, suggesting that competitive games were better than non-competitive games for promoting learning performance in educational settings. However, this effect was not robust and no evidence of subgroup differences was found after controlling for the research rigor in studies. While the distinction between conceptual and procedural knowledge appeared important for understanding the effects of peer collaboration and competition on learning gain, no existing studies on this topic have distinguished the two types of knowledge when investigating the impact of peer interaction in gamified learning. Therefore, Study 2 explored how peer interaction affected students' learning performance in statistics (in terms of knowledge types: conceptual vs. procedural knowledge) differently. Undergraduate participants in the individual gameplay condition had significantly better learning gain in procedural knowledge than in collaborative gameplay. Finally, Study 3 addressed the cognitive aspect of learning. Considering the significance of reading for learning and the ubiquity of digital reading in our

daily lives, Study 3 investigated the predictors of children's L2 digital word reading performance, with a focus on the effects of extraneous cognitive load and the type of reading devices. Extraneous cognitive load negatively explained digital reading performance. Digital reading performance was significantly poorer when done using a phone as compared to a computer. The results gained from three studies provided valuable insights into how modern learning is shaped by gamification and digitalization. Educational implications on how to promote better learning were discussed.

Keywords: gamification, digitalization, academic performance, digital reading, gamified learning