

Investigation of Effects of Gamified STEM Supported Flipped Learning Model on Students' Self-Directed Learning Skills with Technology and 21st Century Skills

Hatice Cansu Özpır Mantas, Mehtap Yıldırım

Marmara University/Institute of Educational Sciences, Turkey

ABSTRACT

The aim of this study is to examine the effect of teaching practices supported by the flipped learning model and gamified STEM activities on fifth grade students' self-directed learning skills with technology and the development of their 21st century skills. For this purpose, STEM activities covering the themes of "Propagation of Light" and "Human and Environment" were planned, gamified and implemented to fifth grade students in the Science course. The study group of the research consisted of fifty 5th grade students in the spring semester of the 2021-2022 academic year. In this study, mixed method was used in which qualitative and quantitative research methods were combined in a single study. While 21st century skills scale, self-directed learning with technology scale constituted the quantitative data collection tools of the study; STEM notebooks, STEM product evaluation rubric, semi-structured student interviews, self-assessment forms constituted the qualitative data collection tools of the study. After the 10-week implementation, the quantitative data collected were analyzed in the SPSS program. Qualitative data were analyzed with descriptive and content analysis. As a result of the data obtained from the quantitative and qualitative analyses, it was concluded that the teaching practices prepared by using gamified STEM supported flipped learning model had a positive effect on fifth grade students' self-directed learning skills with technology and the development of 21st century skills; students had positive opinions about the use of gamification and flipped learning model in STEM activities, and gamification had a positive effect on maintaining STEM performances of the students.

Keywords: flipped learning, gamified STEM, self-directed learning skills, 21st century skills