

ABSTRACT

Waste issues remain a serious concern in elementary school environments. Many students still do not understand how to properly separate waste, even though two types of trash bins organic and non-organic are already available. Based on survey and interview results, only 10 out of 24 fourth-grade students understood waste separation, and many students admitted that they did not enjoy conventional teaching methods such as lectures. This indicates the need for a more engaging learning approach to help students better understand environmental material, particularly waste separation.

This study developed a 2D educational game with a waste separation theme using an interactive quiz genre. The game was designed using Construct 3 and developed through the stages of the Game Development Life Cycle (GDLC). The game consists of quiz activities where students must identify the type of waste and sort various waste items into the appropriate bins using a drag-and-drop mechanism, accompanied by a scoring feedback system. The analysis results show a significant increase in student understanding after using the educational game, from 10 students (41.6%) to 18 students (75%). This 33.4% improvement demonstrates that a game-based learning approach is more effective than conventional teaching methods in the context of waste separation education. Therefore, educational games can serve as an innovative and enjoyable alternative for enhancing environmental awareness from an early age.

Keywords: *educational game, game development life cycle, interactive quiz, primary students, , waste sorting*