



The Role of Design-Based Research in the Development of Primary Level i-STEAM Curriculum in Kazakhstan

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Abstract

The purpose of this quasi-experimental design-based study was to assess the effectiveness of an 3rd grade integrated STEAM (i-STEAM) unit in comparison to a matching STEM unit. The integration of the arts into STEM has shown to have a positive impact on student engagement (e.g., McGregor, 2017), mean-making (Jakobsen and Wickman, 2015) and scientific knowledge (e.g., Malone, et al, 2018). While research on the use of i-STEAM in the primary classroom exists most of these studies have not included comparison groups. This study seeks to fill this gap. The units developed for this study integrated an engineering design challenge (EDC) into the context of the unit. The Kazakhstani EDC focused on the development of a wind turbine (i.e., alternative energy source). The arts component of the i-STEAM unit focused on the integration of dramatic inquiry. Dramatic inquiry (DI) is a dialogic inquiry and dramatic play-based pedagogy (Edmiston, 2014) that can potentially assist in developing 3rd graders emerging engineering identity within the context of the i-STEAM unit. In a case study, DI was shown to increase early primary grade students' knowledge of engineering and technology (Malone et al, 2018). This study is designed to determine if this arts component has a differential effect on student knowledge of engineering and technology over that of an inquiry oriented STEM unit. The units were constructed using an iterative design based development approach. During the development phase, the units were constructed by a team consisting of a STEM educator, primary school specialist, dramatic inquiry expert, engineer and multilingual specialist. The constructed units were piloted. Based on the research team's observations, classroom teachers input and assessment results the units were revised prior to implementation. The implementation phase occurred in 10 classrooms. Five classrooms implemented the i-STEAM unit while 5 classrooms implemented the STEM unit. The presentation will discuss the curriculum development, research design and the preliminary findings in terms of shifts in knowledge of engineering and science concepts.

Keywords: STEAM, primary school, science education, engineering education, dramatic inquiry.

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