

ELEMENTARY PRESERVICE TEACHERS' CONCEPTIONS AND ABILITY TO DEVELOP AND ASSESS INTEGRATED STEM LESSONS

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Abstract

Elementary teacher preparation programs prepare their pre-service teachers (PSTs) to teach STEM. In this study, two teacher educators in the disciplines of science and mathematics utilized a modified "Draw a Science Teacher" (DASTT-C) framework (Thomas et al., 2001) and the Understanding by Design (UbD) framework (Wiggins & McTighe, 2005) to understand PSTs' conceptions of integrated STEM and how they plan and assess their lessons. This research brief discusses some of the results of 16 PSTs' pre- and post-DASTT-C results as well as analysis of STEM lesson plans written during their third-year pre-service program.

Conceptual Framework

This study uses the work of Thomas et al. (2001) and their use of the DASTT-C framework for the PSTs' conceptions of integrated STEM teaching and learning to understand that certain ideologies and events shape a teacher's identity as an educator. The framework utilized in this study is UbD (Wiggins & McTighe, 2005) to conceptualize that lesson planning begins by focusing on assessment of the objectives.

Design and Results

Modified DASTT-C Pre- and post-drawings/reflections were collected for each PST and analyzed for understanding of integrated STEM teaching. With regards to PSTs' preconceptions of STEM, 10 out of 16 PSTs discussed what the acronym STEM stood for on a surface level. Those who did not discuss the acronym described classrooms in which students learn through problem solving and hands-on learning. In the PSTs' post drawings, 11 out of 16 PSTs positioned the teachers in the front of the classroom and students seated mostly in rows. Two of the PSTs felt it important to draw the teachers wearing lab coats and goggles and another two drew designated STEM/Science areas in the classroom.

Lesson plans for integrated STEM were analyzed for three items: did the PSTs select standards in two or more STEM content areas, did they then write objectives to teach towards two or more content areas and finally did they design assessments to measure the objectives in two or more content areas. 12 out of 14 PSTs selected math, science and engineering standards for their lessons. Eight PSTs were able to write objectives to teach towards all of the standards they selected. Of the 16 PSTs, 12 were able to assess two or more content areas in their lesson plan.

The findings from this study are very similar to the findings by Bartels et al. (2019) that PSTs can teach two or more content areas based on participation in a brief team-taught methods coursework. This adds to the literature base by looking specifically at planning for integrated STEM and PSTs' assessing of STEM content learning objectives. Further research should examine what supports do PSTs need to assess integrated STEM lessons.

References

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