

Engineering in an After-School Integrated STREAM Project: Evidence of Learning

Vanessa Morrison

Adrian College, USA

Andrea R. Milner

Adrian College, USA

Natasha Wetzel

Adrian College, USA

EXECUTIVE SUMMARY

It is widely accepted that students' informal learning outside of the classroom can influence their learning in the classroom. Thus, many elementary teachers are considering a wider range of approaches and experiences associated with the STEM disciplines as they incorporate expectations of the Next Generation Science Standards, as well as the learning goals envisioned in A Framework for K-12 Science Education. This chapter focuses on engineering practices enacted in an after-school program as exhibited by third grade students. It explores the interdisciplinary learning of students as they planned and constructed artifacts from teacher created, ill-structured engineering challenges within small collaborative teams.

INTRODUCTION

Sometime after school dismissal, a trio of third graders are contemplating their ideas as they huddle over sheets of sketches individually composed moments earlier.

S1: Let's pick the best ideas. [Pointing to walls on friend's illustration of a simple animal shelter]; What is this?

S2: Construction paper walls.

S1: [Brief Pause]. I don't think we should use construction paper.

[Directs question to teacher]. Do you think we should use construction paper for the walls?

T: What do you think? What do you know about paper? Talk to your friends about it.

S3: Well ... since it has to be outdoor, when it ummm ... rains, the paper will get soggy and fall apart.

S2: But it (construction paper) will make the shelter pretty 'cause of the colors.

S1: We can still make it pretty using other stuff like play doh ... that's what I have on my drawing.

S3: For the roof, we can use wax paper or dixie cups ... dixie cup is made to hold water. What you guys think?

All: Dixie cups.

S2: Okay, but let's give it lots of color ... I wonder if animals can see in color?

T: I heard a lot of good ideas ... let's test some of these ... I see a lot of different supplies on the table you can use for the walls and roof. Why don't you test some and see which ones you think are best suited ...

S1: Yeah [reaches for a dixie cup], we can put some water on them ...

All: [Spreads out supplies on the table as S1 returns with a cup of water].

S3: [Pours a spoonful of water onto construction paper], see it soaks through like I said.

S1: Pulls apart and flattens a dixie cup], hear ... here.

S3: [Pours a spoonful of water onto the flatten dixie cup and the small group watched it trickled down, running off the edge of the cup – and repeated the process on a piece of wax paper].

All: Let's use dixie cup for the roof.

S2: Yes ... and build it out of play doh so it looks pretty.

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