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

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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.