



Designing a Toy Box Organizer: A PictureSTEM Curriculum Module (Curriculum Exchange)

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Kristina M. Tank is an Assistant Professor of Science Education in the School of Education at Iowa State University. She currently teaches undergraduate courses in science education for elementary education majors. As a former elementary teacher, her research and teaching interests are centered around improving elementary students' science and engineering learning and increasing teachers' use of effective STEM instruction in the elementary grades. With the increased emphasis on improved teaching and learning of STEM disciplines in K-12 classrooms, Tank examines how to better support and prepare pre-service and in-service teachers to meet the challenge of integrating STEM disciplines in a manner that supports teaching and learning across multiple disciplines. More recently, her research has focused on using literacy to support scientific inquiry, engineering design, and STEM integration.

Dr. Tamara J Moore, Purdue University, West Lafayette

Tamara J. Moore, Ph.D., is an Associate Professor in the School of Engineering Education and Director of STEM Integration in the INSPIRE Institute at Purdue University. Dr. Moore's research is centered on the integration of STEM concepts in K-12 and postsecondary classrooms in order to help students make connections among the STEM disciplines and achieve deep understanding. Her work focuses on defining STEM integration and investigating its power for student learning.

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Unit Grade Level: 2

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The PictureSTEM Project is developing an instructional module at each grade level, K-5, which employs engineering and literary contexts to integrate science, technology, and mathematics content instruction in meaningful and significant ways. These transformative new models for STEM learning use picture books and an engineering design challenge to provide students with authentic, contextual activities that engage learners in specific STEM content as well as integrate concepts across traditional disciplinary boundaries. These curricular units go through an extensive design research cycle to ensure a quality product.

Designing a Toy Box Organizer: Description of the 2nd Grade Unit

This 5-day unit is geared towards the lower elementary grades (grade 2). It connects learning in the areas of physical science, geometry, measurement, and engineering design through 5 pairs of literacy and STEM integration activities, each with their own age- and activity-appropriate high-quality trade book.

Overview of Designing a Toy Box Organizer					
	Lesson 1 Non-standard units	Lesson 2 Standard vs. non- standard units	Lesson 3 Physical properties	Lesson 4 Testing materials	Lesson 5 Designing a toy box organizer
Literacy Activities	Book: <i>How Big is a Foot?</i> Strategy: Story structure	Book: <i>Measuring Penny</i> Strategy: Compare and contrast	Book: <i>Living Color</i> Strategy: Identifying details	Book: <i>Leo Cockroach</i> Strategy: Sequencing to lead to summarizing	Book: <i>Too Many Toys</i> Strategy: Summarizing narrative text
STEM Integration Activities	<ul style="list-style-type: none"> Treasure Hunt modeling activity 	<ul style="list-style-type: none"> Design your own "standard" 	<ul style="list-style-type: none"> Sort materials by physical properties Describe objects in terms of these properties 	<ul style="list-style-type: none"> Testing materials Planning Initial design 	<ul style="list-style-type: none"> Create toy organizers Test Redesign

Lesson 1 – This lesson introduces the students to the problem of not have a standard unit of measure through having them try to make a treasure map marked out in paces. They learn that different people’s paces are different and so finding the treasure is difficult.

Lesson 2 – Students create a common or “standard” measuring tool as a class that they will use to measure the same fixed distance in order to see how using the same tool produces similar results.

Lesson 3 – Students are introduced to the science concept of physical properties through the book *Living Color* as they learn about how objects can be sorted in a number of different ways.

Lesson 4 – Students prepare for the design challenge by thinking like engineers while they test the materials that they will be using in their toy box organizer designs.

Lesson 5 – Students design, build and test an organization system for a toy box. After designing their new toy box, students will have the opportunity to give their directions and measurements to another group who will pretend to be the toy company and will attempt to build their toy box design.

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