



DefinedSTEM
BRINGING RELEVANCE TO LEARNING



Defined Learning

Executive Summary

Company & Product

Defined Learning is a company that specializes in providing k-12 schools with engaging multimedia content. Our flagship service, Defined STEM (www.definedstem.com), provides teachers a resource to bring the science, technology, engineering and math initiative to life. We accomplish this by providing a STEM project based learning curriculum around a central career theme. Our goal is to engage the students by showing real world jobs depicting how they use science and math in their career.

Executive Team

The principals of Defined Learning have over a combined 40 year background in media and curriculum development. Specifically with the utilization of multimedia in the classroom. The partners of Defined Learning are responsible for the development and deployment of unitedstreaming, later acquired by Discovery Communications, rebranded as DiscoveryEducationStreaming.com. This product was first to the market for online educational video libraries and was purchased for over 70% of the schools in US.

Problem

Many prominent leaders have called for reform of STEM education and recruitment of students to STEM fields of study as a matter of national importance. Publications and reports such as Science for All Americans (American Association for the Advancement of Science, 1990), Technically Speaking (National Academy of Engineering, 2002), The World is Flat (Friedman, 2005), Rising Above the Gathering Storm (Committee on Prospering in the Global Economy of the 21st Century, 2007), National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System (National Science Board, 2007), and Engineering in K-12 Education (National Academy of Engineering, 2009) have focused national attention on the need for STEM education and its relevance to the



nation's global competitiveness. Common themes throughout include the importance of educating scientifically, numerically, and technically-literate students who possess 21st century skills including problem solving and critical thinking.

The urgent need for improved education in STEM fields is underscored by the comparison of the performance of U.S. students in science and math in the TIMSS (Trends in International Mathematics and Science Study) and PISA (Program for International Student Assessment) assessments and the relatively small percentage of students in the U.S. entering and completing STEM degrees in post-secondary education. Since careers in science, technology, engineering, and mathematics fields contribute greatly to the nation's capacity for innovation and are among the fastest-growing and highest-paying careers in the economy of the 21st century, it is vital that we engage and prepare students in STEM education as well as excite them about career opportunities that are available in STEM fields.

Solution

STEM education involves more than education in the separate fields of science and math. It involves the development of a curriculum that integrates rigorous content from science, technology, engineering, and mathematics, within the context of designing solutions to real-world problems.

Integrative STEM education is a very effective way to engage students in higher order critical thinking and problem-solving skills by placing rigorous mathematics and science in the context of technology and engineering, the "T and E" in STEM. In addition, incorporating personnel, projects, and expertise from business and industry into integrative STEM projects can serve to enhance curriculum relevancy as well as provide role models to excite more students about STEM careers.

Markets/Customer Base

Defined STEM was launched in August 2009 and is currently being used in over 5,000 schools throughout the US including a statewide partnership with the State of Pennsylvania.

Our users are primarily middle and high school teachers who are in need of content that provide a springboard for students to understand why they are learning specific topics. For example, a student may not understand why a good foundation of arithmetic would be important if they want to pursue "alternative energy fields" as a career.



Navigation: Screen Shots



DefinedSTEM
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Welcome Patrick | Task Center | My Assignments | Training Center | Support
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Welcome to Defined STEM!
Enter a keyword or select a subject to start viewing our learning connections.

Enter Keyword or Topic: All Resources

Featured Student Products

- Data Table
- Multimedia Presentation
- Advertisement

[View All Student Products](#)

Featured Performance Tasks

- Healthcare Analyst**
Increase Healthcare Quality
- Forensic Scientist**
Understanding Evidence Gathering Techniques
- Automotive Engineer**
Conduct & Analyze Research, Make Appropriate

[View All Performance Tasks](#)

Featured Literacy Tasks

- Surgical Robots
- Forensic Photography
- Injection Molding

[View All Literacy Tasks](#)

My Tasks | Shared Tasks

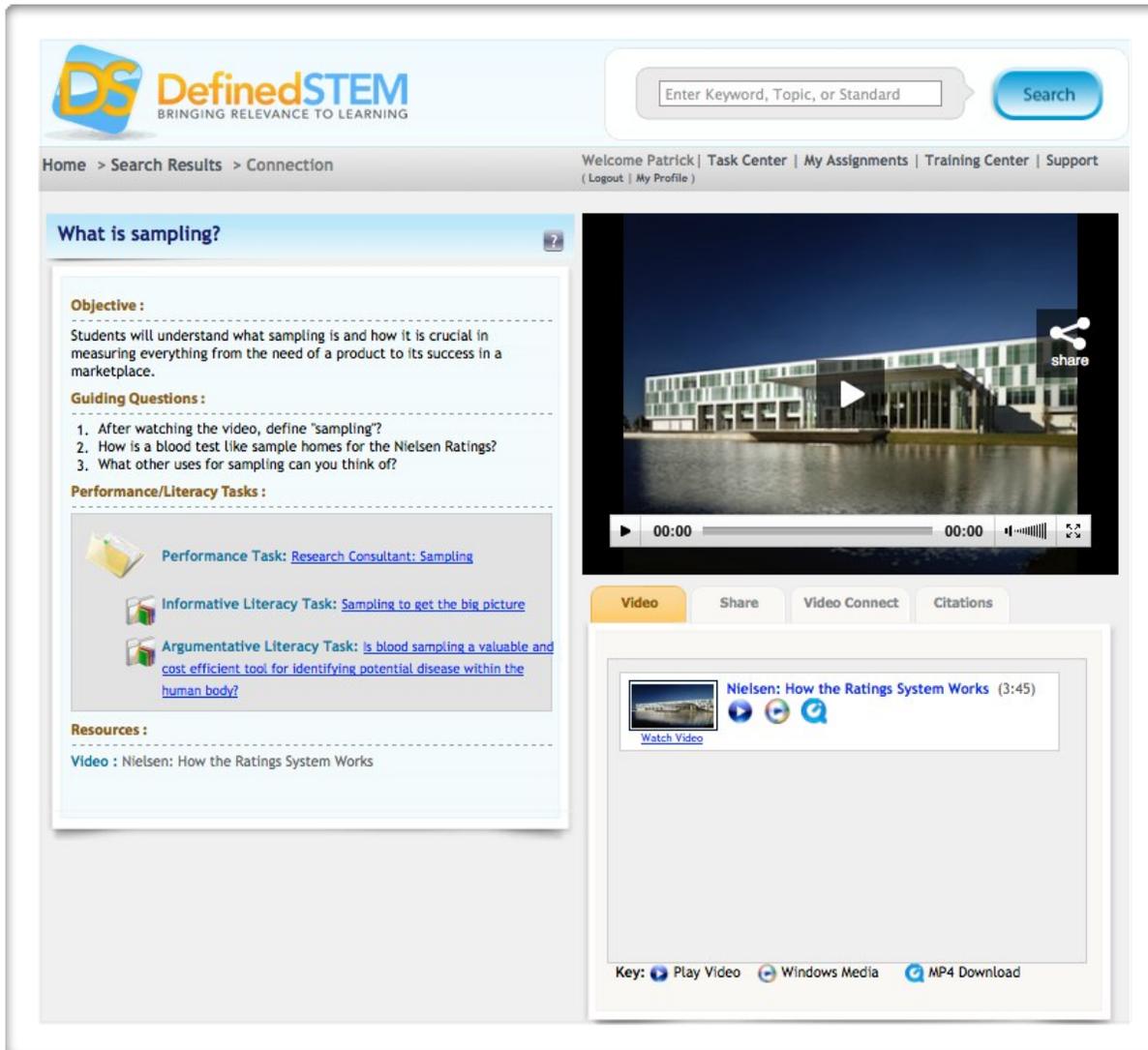
My Tasks
Your tasks are shown below. Select a task to view it.

Task	DateAdded	Task Type
Aquarium Designer - CopyPI	06/14/2012	Performance Task
Are animals safe in the movie business? - Copy	05/06/2012	Literacy Task
Chef - Copy	05/06/2012	Performance Task
PATRICK Test3	06/14/2012	Performance Task

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DEFINED STEM

Defined STEM is a web-based application designed to promote effective and relevant connections between STEM classroom content and STEM career pathways, thus providing learning opportunities for students. Defined STEM provides teachers a resource where they can access highly effective media content and related support materials. These resources and materials allow teachers to connect STEM career awareness to existing lessons and standards-based curriculum.



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Home > Search Results > Connection

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What is sampling?

Objective :
Students will understand what sampling is and how it is crucial in measuring everything from the need of a product to its success in a marketplace.

Guiding Questions :

1. After watching the video, define "sampling"?
2. How is a blood test like sample homes for the Nielsen Ratings?
3. What other uses for sampling can you think of?

Performance/Literacy Tasks :

- Performance Task: [Research Consultant: Sampling](#)
- Informative Literacy Task: [Sampling to get the big picture](#)
- Argumentative Literacy Task: [Is blood sampling a valuable and cost efficient tool for identifying potential disease within the human body?](#)

Resources :
Video : [Nielsen: How the Ratings System Works](#)

Video Player: Nielsen: How the Ratings System Works (3:45)

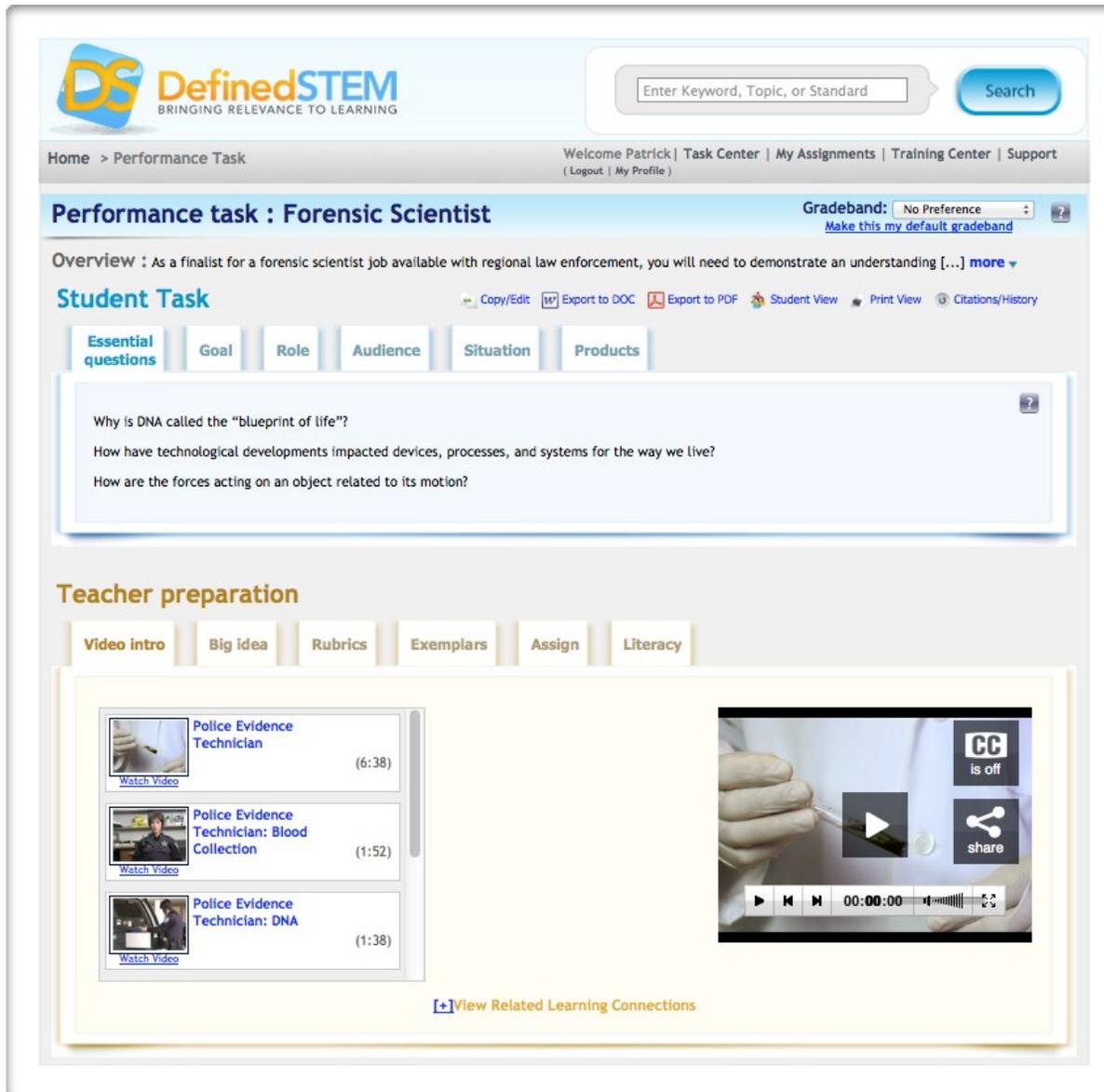
Key: [Play Video](#) [Windows Media](#) [MP4 Download](#)

LEARNING CONNECTIONS

A connection is multi-band entry point into curriculum that is cross curricular, multidisciplinary, and age appropriate for learning grades 4-12.

Through the video, students are introduced to an individual and/or individuals sharing their daily work activities and connect these activities to the critical content and skills necessary to succeed.

Each connection aligns the video to a learning objective based upon the content found within the video. Guiding Questions are present to be utilized as part of whole group instruction to lead class discussion related to the content and concepts within the video. These questions also provide the opportunity for the educator to connect the video to the lesson plan being presented and the desired learning outcomes. Additionally, the guiding questions may be used as an individual assessment to measure student participation and understanding.



The screenshot shows the DefinedSTEM website interface for a performance task titled "Forensic Scientist". At the top, there is a search bar with the text "Enter Keyword, Topic, or Standard" and a "Search" button. Below the search bar, the user is logged in as "Patrick" and has navigation links for "Task Center", "My Assignments", "Training Center", and "Support".

The main heading is "Performance task : Forensic Scientist". To the right, there is a "Gradeband" dropdown menu set to "No Preference" with a link to "Make this my default gradeband".

The "Overview" section states: "As a finalist for a forensic scientist job available with regional law enforcement, you will need to demonstrate an understanding [...] more".

The "Student Task" section includes a "Copy/Edit" button, "Export to DOC", "Export to PDF", "Student View", "Print View", and "Citations/History" options. Below these are tabs for "Essential questions", "Goal", "Role", "Audience", "Situation", and "Products". The "Essential questions" tab is active, showing three questions:

- Why is DNA called the "blueprint of life"?
- How have technological developments impacted devices, processes, and systems for the way we live?
- How are the forces acting on an object related to its motion?

The "Teacher preparation" section has tabs for "Video intro", "Big idea", "Rubrics", "Exemplars", "Assign", and "Literacy". The "Video intro" tab is active, displaying a list of three video thumbnails:

- "Police Evidence Technician" (6:38)
- "Police Evidence Technician: Blood Collection" (1:52)
- "Police Evidence Technician: DNA" (1:38)

 A video player is embedded on the right, showing a close-up of a person's hands using a pipette. The video player includes a play button, a "CC is off" button, a "share" button, and a progress bar showing 00:00:00.

At the bottom of the teacher preparation section, there is a link: "[+] View Related Learning Connections".

PERFORMANCE TASK

The performance task can serve as an authentic assessment that can be utilized by taking into consideration the many different ways that students learn. Each performance task provides many opportunities for students to demonstrate understanding. Since the "one size fits all" classroom minimizes student success, both the performance task and associated content have been designed to provide opportunities for all learners based upon the teacher's knowledge of his/her students. Supporting the performance task are videos and learning connections meant to support mixed ability levels, interests, and foundational knowledge.



Home > [Search Results](#) > Literacy Task

Welcome Patrick | [Task Center](#) | [My Assignments](#) | [Training Center](#) | [Support](#)
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Literacy Task: Backpack Design

Student Task

[Copy/Edit](#)
[Export to DOC](#)
[Export to PDF](#)
[Student View](#)
[Citations/History](#)

Background

Language Prompt

Research Resources

Tier Three Vocabulary

We live in a world of multi-tasking and moving from one place to the next. The backpack is a convenient way to carry things for many different tasks, while leaving the hands free to do other tasks. In many situations, people have a tendency to stuff their backpack with a number of items. Often, these items are heavy and cause physical stress on the wearer. Backpacks come in all shapes and sizes and are used by school students, hikers, and businessmen. Many backpacks are designed specifically for an appropriate task. Backpack sales are often determined by the ability of the backpack to perform the task it was designed to perform. Aesthetics are another area that helps determine the success of backpacks.

Students will need to consider how innovative designs can impact sales and utilization of various backpacks. What are some variables to be considered when designing new backpacks? How do the backpack materials and weight influence the design process? Why could solar powered backpacks become very popular? How are student backpacks different from backpacks designed for hikers other than size? How is volume determined for backpacks? What innovations would you like to see in future backpack designs?

Students will research the various articles and informational texts to learn about various designs for backpacks. Additionally, considerations should be given to how different people use backpacks and how the primary purpose of the backpack affects the backpack design.

Teacher preparation

Video intro

Rubrics

Product Learning Outcomes

Assign

Related Tasks



Backpack Product Design
Watch Video (4:50)



Designing Dolls
Watch Video (3:28)

Backpack Product Design

Columbia Sportswear Designer Chris Araujo combines innovation with design to create backpacks for one of the largest outdoor apparel companies in the world. Whether he's measuring the straps for comfort or designing the shape of the front pouch, math is essential to his designs.

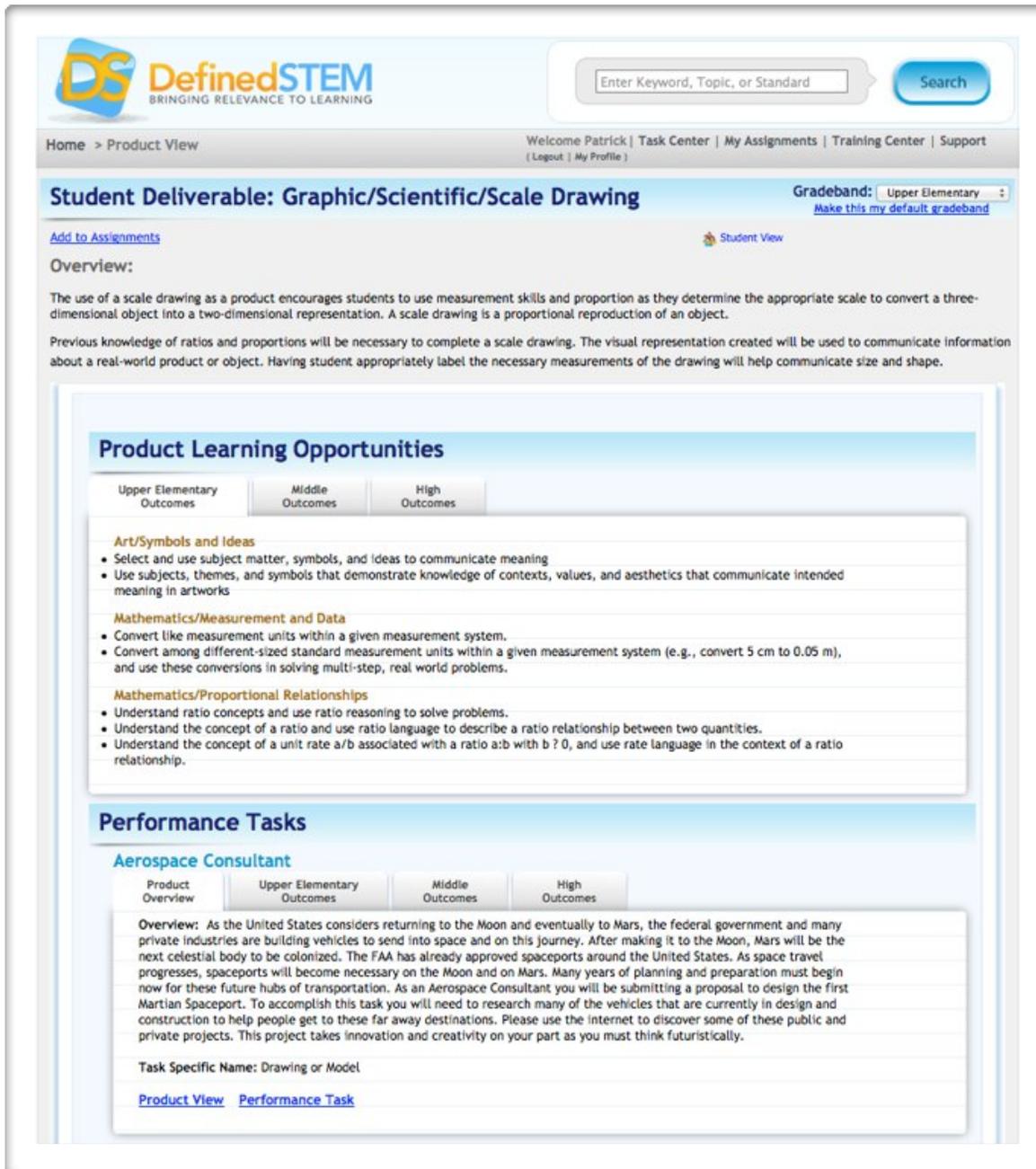
Video Downloads:



[View Related Learning Connections](#)

LANGUAGE TASK

The language tasks are designed to allow students to produce narrative writing pieces that are connected with content areas and relevant issues. The tasks provide online informational and argumentative resources for students to review prior to engaging in the writing process. All of the language tasks are designed using a similar template. Two types of language tasks are present. The tasks are either informational or argumentative. Each task contains a scoring guide aligned with the Common Core College and Career Anchor Standards for Reading and Writing.



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Enter Keyword, Topic, or Standard Search

Home > Product View Welcome Patrick | [Task Center](#) | [My Assignments](#) | [Training Center](#) | [Support](#)
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Student Deliverable: Graphic/Scientific/Scale Drawing

Gradeband: **Upper Elementary** Make this my default gradeband

[Add to Assignments](#) Student View

Overview:

The use of a scale drawing as a product encourages students to use measurement skills and proportion as they determine the appropriate scale to convert a three-dimensional object into a two-dimensional representation. A scale drawing is a proportional reproduction of an object.

Previous knowledge of ratios and proportions will be necessary to complete a scale drawing. The visual representation created will be used to communicate information about a real-world product or object. Having student appropriately label the necessary measurements of the drawing will help communicate size and shape.

Product Learning Opportunities

Upper Elementary Outcomes	Middle Outcomes	High Outcomes
<p>Art/Symbols and Ideas</p> <ul style="list-style-type: none"> Select and use subject matter, symbols, and ideas to communicate meaning Use subjects, themes, and symbols that demonstrate knowledge of contexts, values, and aesthetics that communicate intended meaning in artworks 		
<p>Mathematics/Measurement and Data</p> <ul style="list-style-type: none"> Convert like measurement units within a given measurement system. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. 		
<p>Mathematics/Proportional Relationships</p> <ul style="list-style-type: none"> Understand ratio concepts and use ratio reasoning to solve problems. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. 		

Performance Tasks

Aerospace Consultant

Product Overview	Upper Elementary Outcomes	Middle Outcomes	High Outcomes
<p>Overview: As the United States considers returning to the Moon and eventually to Mars, the federal government and many private industries are building vehicles to send into space and on this journey. After making it to the Moon, Mars will be the next celestial body to be colonized. The FAA has already approved spaceports around the United States. As space travel progresses, spaceports will become necessary on the Moon and on Mars. Many years of planning and preparation must begin now for these future hubs of transportation. As an Aerospace Consultant you will be submitting a proposal to design the first Martian Spaceport. To accomplish this task you will need to research many of the vehicles that are currently in design and construction to help people get to these far away destinations. Please use the Internet to discover some of these public and private projects. This project takes innovation and creativity on your part as you must think futuristically.</p> <p>Task Specific Name: Drawing or Model</p> <p>Product View Performance Task</p>			

PRODUCTS

The products provide various opportunities for students to demonstrate understanding. Based upon each individual learner and/or individual class, the educator can make appropriate instructional decisions for product development.

Each task contains between four and six products. The products are meant to provide students with experiences aligned with 21st Century Learning and Innovation Skills. Additionally, each task contains at least one product that requires the utilization of a technology based experience. This provides the student with experiential learning opportunities based upon software and web resources and the application of these tools to demonstrate their knowledge and understanding.

The products provided within each task are closely aligned with the multiple intelligences and the set of products within the task will help educators meet a number of those multiple intelligences.



Research

Understanding by Design

Defined STEM was built to bring relevancy to the classroom through project based learning. The frameworks that were used to build out the Defined STEM framework include, “Understanding by Design” (UbD), “21st Century Skills Framework”, “Literacy Design Collaborative”. the “Understanding by Design Framework”. The commonality of the frameworks are that “Project Based Learning” is the fundamental core of each.

Until recently there has been very little in the way of efficacy studies and proven research in support of PBL; that however has changed. Now studies have shown that the use of PBL in the classroom achieves:

- Students outscored their peers in the control group who received the more typical textbook- and lecture-driven approach.
- Students also scored higher on measures of problem-solving skills and their application to real-world economic challenges
- Teachers scored higher in satisfaction with teaching materials and methods than those in the control group.

Below are three of the studies that have demonstrated these findings:

- Finkelstein, N., Hanson, T., Huang, C.-W., Hirschman, B., and Huang, M. (2010). Effects of Problem Based Economics on high school economics instruction. (NCEE 2010-4002). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Mergendoller, J., Maxwell, N., & Bellisimo, Y. (2006). The Effectiveness of Problem-Based Instruction: A Comparative Study of Instructional Methods and Student Characteristics. *Interdisciplinary Journal of Problem Based Learning*, 1(2), pp. 49-69. Retrieved from <http://docs.lib.purdue.edu/ijpbl/vol1/iss2/5/>
- Yew, Elaine, Schmidt, Henk (2009). Evidence for constructive, self-regulatory, and collaborative processes in problem-based learning. *Advances in Health Sciences Education*, pp 251-273. <http://dx.doi.org/10.1007/s10459-008-9105-7>