

### Abstract:

The Playground Project was a project that was created as a new STEM, Science, Technology, Engineering and Mathematics, activity that meets Pennsylvania standards but that connects all curriculum, content, learning activities and assessments. This project was designed for third grade students who will be given a task that they must complete: to build a replica of a playground to help their school when creating a new playground for their schoolyard.

### The Playground Project

This project, The Playground Project, was created during an upper level class of the Integrative STEM Education minor. The Integrative STEM Education minor is new to Millersville University. STEM; Science, Technology, Engineering and Mathematics is a new and upcoming concept within the classrooms.

Teachers are now incorporating those four, along with a few others, subjects into many different subjects during regular classroom instruction. During the Millersville class; EDTE 490, Integrative Learning using Experiential Strategies is the second to last during the six-class process of the minor. In the class, students are asked to create many different assignments that can integrate the different STEM concepts into different lessons. Also during the course, the students reviewed different STEM curriculum that has created by different companies that are popular amongst teachers. One of the assignments that the class was asked to complete was the 'Integrative STEM Curriculum Project'. During this project, the class was asked to demonstrate the ability to design and create a new integrative STEM activity based on standards.

Throughout the assignment, there were several components that were required when creating the curriculum. The requirements were: introduction or overview, standards, goals or objectives, design brief, implementation instructions, assessments, tools materials & supplies, classroom guidelines, references, and sample product/solution. For the assignment, the project was intended for third grade students who are to imagine that the situation they are given is something that they are currently experiencing. The third grade students would be designing a new playground for their school since the old playground is unsafe and dangerous to play on. The students will be designing and building a replica of their new, dream, playground for their school. The project is intended to take over a six to seven day period for one period of their day, which is 45 minutes. The curriculum is intended for students to work in groups of three. Although the students have much freedom to create a playground they would love to have for their school, they have specific requirements they must follow. The students' playground must have three different simple machines that are

**Picture A**



**The Playground Project**

**Design Brief**

**Context**  
In class we've been learning about money: exchanging, purchasing and managing dollars and cents. We have also been learning about simple machines and their functions. Your playground at school is unsafe and dangerous to play on at recess. Based on the topics we have been learning, you will act as engineers and builders to help solve the playground problem.

**Challenge**  
You engineers will work in groups of three to design and build a new playground for you and your classmates to play on. Since building an entire playground is a great deal of work, you will be building a replica of what the new playground would look like. Design four playgrounds before selecting which playground your group will build and design. Your team will only have \$5,000 to spend on materials that you will need to build the playground.

**Criteria & Constraints**

- Each group only has \$5,000 to spend on materials
- Playground must have two different types of simple machines that are present on the playground.
- Complete the design log throughout the process
- Replica of designed playground must be at least 12 inches tall

incorporated within. Also, the students are given a \$5,000 budget and they are to use that money for materials that they need to build the playground.

Since one of the requirements in the curriculum is to have standards that correlate with the project, having standards that are aligned with the Pennsylvania State Standards, the Next Generation Science Standards and the Standards for Technological Literacy.

An important part of the assignment is the Design Brief. The Design Brief is given to students so that they are aware of the assignment guidelines. Within the Design Brief, the students are given the context, the challenge and the criteria & constraints. The idea of the sheet is to engage the students in the project that they are given along with all of the information that they need. Although the Design Brief is there to help the students on informing them what they are required to do, having a list of implementation instruction to give the teacher a step-by-step instruction on what each day will entail.

When individuals think of assessments, they often times think of tests. However, in this assignment, the students are given several worksheets that are considered assessments to determine whether or not the students have learned throughout this assignment. The first assessment that the students would be given is a Simple Machine Worksheet. The worksheet is designed to help the students keep track of the three simple machines that they used throughout their project. Since having three simple machines is a requirement for the assignment, the students need to hit upon that. The worksheet allows them to draw a picture of how the machine is being used on the playground and to write what the machine is being used for in the design. After the students have done that, they are given two follow-up questions that will help the teacher understand the students thinking during the process of incorporating simple machines into their replica of the playground.

As discussed previously, the students would be given a Playground Purchasing Log on materials that they will need to make their replica of the playground that they would like to have built in their schoolyard. On the purchasing log, there are three different columns. The first column states which materials the students are able to use throughout this project. The column includes materials such as: straws, paper clips, markers, cardboard pieces, water bottle, pipe cleaners, and many other materials. The second column is examples of what the materials could represent. For example, straws could represent pillars and markers could represent paint. The third column represents the price of the materials that is being purchased by the students.

Throughout the process of this assignment, the students will be completing a Design Log and Notebook. The Design Log and Notebook is designed to help keep the students thoughts organized throughout the process. This notebook is where the students will keep their drawings of the four different possible solutions of what they would like their replica of the playground like would like on their schoolyard. On top of the drawings of the possible solutions, the students will need to draw the final solution that the group has chosen to build and design. After the students have drawn their selected design, they are asked to answer a few questions that will allow the students to think deeply about why their final solution was chosen. After that section, the students are given another set of questions that will require deep thinking to help them process their thoughts during the assignment. Having the students complete these set of questions will help them relate their previous work to the work that they are continuing on. After that section, the final section, which is to be completed after the students have built their replica of their playground, design. These questions will allow the students to reflect on different parts of the assignment, such as the materials that they have purchased, the simple machines that were included and other parts.

After creating this entire assignment, the final part of the assignment is to build an example of what a replica could look like. Having done the worksheets and building a replica that goes along with the packet that was completed prior to handing it in, allows a teacher to understand challenges that the students may face during the process. This project that is given to students incorporates the STEM areas throughout the project by the following: science, which is incorporating the simple machines into the playground, engineering, which involves the construction of the playground replica and mathematics, which is when the students are constructing the purchasing log which consists of money. By creating a project for students that involves them to create a playground for their school, allows them to be able to relate to the project. The students are exposed to their school playground on a daily basis, which they are able to relate to. The students know what they would like to have in a playground but by adding the different restraints requires the students to think about the different aspects that belong on a playground and how they can relate to science.

 <b>Design Log &amp; Notebook</b>  <b>The Playground Project</b>  Name: _____ Group Members Names: _____  <b>Complete Before Starting To Build</b> <b>1. What is the problem your school has?</b> _____ _____  <b>2. How are you going to fix the problem the school has?</b> _____ _____ _____	<p><b>3. What are four solutions you could create to help your school? Please draw 4 different possible options</b></p> <p>Possible Solution 1:</p> <p>Possible Solution 2:</p> <p>Possible Solution 3:</p> <p>Possible Solution 4:</p>
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