

Tessellation Project

By Dr. Carol T. Benson

Comments:

In the past, the activity below would have been done by students on paper. The class would have gone to the library to do the research involved. All materials would have been submitted as hard copy.

General description of content:

This activity is a culminating activity for a chapter on tessellations. The requirements for the activity use student understanding of a variety of types of tessellations including translations, reflections, and rotations as well as regular and irregular. It includes opportunities for students to be creative and artistic in their submissions. There is also a research aspect so that students might appreciate the history and real world applications of a mathematical concept.

Objectives:

Content – Students apply their knowledge of tessellations to create their own illustrations.
Technology – Students will use internet for research, Geometer's Sketchpad for creation of tessellations or patty paper and scanning techniques if they choose to draw their tessellations by hand. Students also used OneNote and Word to save some of the pictures and write their research paper and explanations. All projects were submitted electronically, through the Q-drive or Blackboard digital drop box.

Role of the teacher:

As a teacher, I first provided basic techniques and examples illustrating the concepts of the lesson. Then my role was to assist students in their use of technology and to mentor them in their development of tessellations. By using technology to introduce the content and then to provide the instructions (found at the end of this lesson plan), I modeled the use of technology to the class. In this sense, I was also serving as a model in the use of technology to the ISU students observing in my class.

Student reaction:

Students responded positively to this activity. Many of the students were very creative in their tessellations. Some wrote creative essays based upon their research. One student commented that this lesson was one of his favorite activities and that he hopes we do more lessons like this.

Laptop implications:

This lesson required all students to have access to the internet and to Geometer's Sketchpad. The laptops provided the opportunity for students to communicate with one another to share a project, to create a digital project, and to submit their work digitally.

Learning standards:

National Council of Teachers of Mathematics –

- Reasoning -- provide opportunities for students to create geometric objects that use several concepts in combination. Explain the creation based upon the concepts used.

- Connections -- provide opportunities for students to demonstrate an understanding of mathematical relationships across disciplines and connections within mathematics
- Communication -- provide opportunities for students to use both oral and written discourse between teacher and students and among students to develop and extend their mathematical understanding.
- Technology -- use appropriate technology to support the learning of mathematics.
- Geometry -- understand the relationships between objects in geometry

National Board for Professional Teaching Standards –

- Commitment to Equity and Access. Accomplished mathematics teachers value and acknowledge the individuality and worth of each student; they believe that all students can learn and should have access to the full mathematics curriculum; and they demonstrate these beliefs in their practice by systematically providing all students equitable and complete access to mathematics.
- Learning Environment. Accomplished mathematics teachers create stimulating, caring, and inclusive environments. They develop communities of involved learners in which students accept responsibility for learning, take intellectual risks, develop confidence and self-esteem, work independently and collaboratively, and value mathematics.
- Technology and Instructional Resources. Accomplished mathematics teachers are knowledgeable about and, where available, use current technologies and other resources to promote student learning in mathematics. They select, adapt, and create engaging instructional materials and draw on human resources from the school and the community to enhance and extend students' understanding and use of mathematics.

Lesson plan for activity is found below.

Tessellation Project

Your tessellation project will have three parts:

1. A short (1-2 pages) paper on some historical aspects of tessellations. You may focus on Escher, art in a different culture, or some other historical information about the use of tessellations in society. Be sure to include something you find interesting about the history of tessellations. You should search on the web or in books for this information.
2. One or more tessellations that you have created in Geometer's Sketchpad. Within the single or collection, you should include each of the three main transformations (translation, reflection, rotation) and at least one non-regular shape. Creativity and aesthetics will be considered in grading.
3. A short paper (it may be composed of bullets) explaining the design(s) you came up with and how it/they meet(s) the requirements in 2. This could be something as simple as, "I chose ___ shape, reflected it in ____ and translated it _____."

All completed submissions that meet the requirements above will be awarded a "B." For an A, there must be creativity, artistic style, or some additional way in which you demonstrate the

effort, talent, or solid research that you've put into this project. If you are not artistic or creative, you might consider making your research paper more creative or demonstrating a high level of research skill. This project is worth 40 test points.

All parts of this project must be turned in together to the digital dropbox in Blackboard. Be sure that your name is on your document in the document title and on the pages of the document itself. You may work with one partner if you wish.