Rosslyn Chapel Education Program
Teacher's Guide

Master's Apprentice: Measuring Rosslyn Chapel

Grade level: Levels 1 through 4 (Secondary School)
Subject Area: Mathematics, Design, Technology, Social Studies

Content Standard:

Scottish Curriculum for Excellence: Technologies, as defined by Education Scotland (http://www.educationscotland.gov.uk/learningteachingandassessment/curriculumareas/technologies/eandos/index.asp)

Technological developments in society:

- TCH 3-01a: From my studies of technologies in the world around me, I can begin to understand the relationship between key scientific principles and technological developments.

Craft, design, engineering and graphics contexts for developing technological skills and knowledge:

- TCH 3-15b: I gain inspiration from natural forms, the built environment or imagination to develop a creative idea which could be realised using computer aided manufacture.
- TCH 4-15c: I can confidently use appropriate software to represent my ideas and items in the world around me, showing creativity, imagination or innovation.
- TCH 4-15d: I can understand and use computer aided design/computer aided manufacture, exploring its applications.

Performance Objectives:

- Accurately measure and draw real-life features to scale
- Develop a deeper understanding of the chapel and its construction
- Utilize Computer-aided Drawing programs to present drawings professionally, exploring tools within the program to alter/enhance drawings

Specific Objectives:

At the end of this lesson, students will be able to:

- Produce professional drawings to scale
- Implement tools in a Computer-aided Drawing program (like Google SketchUp or AutoCAD) to create unique drawings
- Imagine and create a unique idea of what an ideal chapel, or other medieval building, would look like
- Convey ideas through an organized drawing/plan

Materials and Resources:

-Field trip to Rosslyn Chapel
-Access to CyArk's digital archive and Rosslyn Chapel's website (http://www.rosslynchapel.org.uk/)
-Access to a 3D graphics software program (like Google SketchUp or AutoCAD)

Lesson Summary:

In this lesson, students will learn the basics of drawing and taking measurements. They will understand which details are important to document and record, and how to translate

measurements into a 3D graphics software program. Through their work, the students will also understand the context, history, and significance of small features and symbols represented at a site like Rosslyn Chapel.

Activity 1: Background

Outcome:
Students will learn the history of Rosslyn Chapel and study a detailed measured drawing to understand what features of a structure are important to include in a documentation report.

Method:
Students will read the student packet in groups and study two architectural drawings (one of Tikal in Guatemala and one of an aqueduct at the San Antonio Missions) carefully as they answer questions included in their packet.

Resources:
-Student Packet
-Architectural drawings (included as PDF and JPG) to zoom in as a class if needed

Lesson:
Guide the students through the history of Rosslyn Chapel relying on the student packet *Background* text. After reviewing the history and stonemasonry, show the class the video on CyArk's website entitled "Video Animation of the History and Construction of Rosslyn Chapel." Encourage the students to think as they watch the video about the amount of time it takes to build a structure like Rosslyn Chapel.

After the video showing, refer to the two architectural drawings included in the lesson packet: the pyramid complex at Tikal in Guatemala and an aqueduct at the San Antonio Missions National Historical Park in Texas, USA. These drawings are very detailed (one with a photograph superimposed to contribute texture and color information) and they are great examples of what to consider when you begin to make a drawing. Ask the class to study the drawings in groups and answer the questions included in their student packet. Guide the students through the drawing, explaining what different symbols mean and pointing out what makes the drawing easy or hard to read. It may be helpful to show the two drawings on a projected screen in order to zoom in on areas and measurements that are difficult to read in their student packets.

Activity 2: Exploring the Chapel

Outcome:
Students will be able to explore Rosslyn Chapel, and learn how to thoroughly document and label drawings and site notes. This activity works best if an on-site visit can be arranged.

Method:
The teacher will facilitate a class tour of Rosslyn Chapel. As the students experience the site, they will be expected to answer 2 questions in their packet, and complete a **Documentation Worksheet & Notes**.

Resources:
-Site visit to Rosslyn Chapel
-Student packet (Documentation Worksheet & Notes included in packet)

-Gloves
-Rulers
-Pencils
-CyArk's website for teacher review prior to site visit (http://archive.cyark.org/)

Lesson:

Before this lesson, the teacher should become familiar with what is available on CyArk's website for Rosslyn Chapel. Students will be prompted to compare their own drawings with the digital record, and this will depend upon which items are already uploaded onto the Rosslyn Chapel website as 3D Point Clouds, viewable in a 3D Viewer. At the time of lesson plan release, the following features are available online:

- Baptismal Font
- Caithness Tomb
- Victorian Altar
- Lady Chapel Altar
- South Door
- Crypt Altar

Please check the website to update this list.

Plan a field trip to Rosslyn Chapel. It may be helpful to participate in a class tour of the site. Prior to your visit, consider looking at the downloadable self-guided tours of the chapel, which are available on the Rosslyn Chapel website: http://www.rosslynchapel.org.uk/

As the students explore the chapel, ask them to write down any features that interest them on their **Documentation Worksheet**. Students will answer the following questions in their student packet:

Which features of the chapel do you like? Where are they located?

After the tour of the chapel has ended, refer to the above list of features available on CyArk's website. Ask students to pick one that interests them to continue with this activity.

Distribute gloves, rulers, and pencils, and ask the students to begin to fully document their selected feature on their **Documentation Worksheet & Notes**. Remind them to refer to the Tikal and San Antonio Missions drawings as an example. After the students finish their sketches, give them a few minutes to complete their **Documentation Notes**. Explain to the class that it is better to record as much information as possible when they make their sketch, as this allows for the most information to be included in their drawings later on.

Monitor the class as they complete this activity, and check or collect worksheets before departing the site.

Activity 3: Compare with the Digital Record

Outcome:

Students will compare their hand sketches with the digital record, navigating CyArk's archive along the way. Students will also learn basic 3D graphics software (like Google SketchUp or AutoCAD) commands as they recreate their drawing on a computer.

Method:

Students will explore CyArk's website online either in small groups or in pairs. They will compare their measurements from Activity 2 with the laser scan data using the 3D Viewer hosted on CyArk's website for 3D Point Clouds. Students will then recreate their drawing from their documented measurements using a 3D graphics software program, like Google SketchUp or AutoCAD.

Resources:
-Access to CyArk's website
-Access to a 3D graphics software program
-Completed Documentation Worksheets

Lesson:

Task 1: Compare and Contrast

When the students return to the classroom after their visit to Rosslyn Chapel, ask them to take out their Documentation Worksheets. Divide the students into pairs, and direct them to CyArk's multimedia page for Rosslyn Chapel. There are many different kinds of images here that relate to Rosslyn Chapel.

1. **Photographs** – these photographs were taken during field capture or a later site visit. They capture unique aspects of the chapel. Do you recognize precisely where some of these photographs were taken?

2. **Panoramas** – panoramas are unbroken views of the region surrounding the observer, or the person taking the picture. This means that photographs from all directions are stitched together to create one continuous view.

3. **Perspectives** – perspectives are images derived from laser scan data. They represent three-dimensional images on a two-dimensional plane.

4. **3D Reconstruction** – these models are the product of highly accurate scan data and innovative technology. The 3D viewer allows us to view and navigate the site or aspect of the site in 3D, so we can understand first-hand the appearance of real objects.

5. **Animations** – animations allow the viewer to fly through and visualize an entire site or a portion of a site digitally. They are created from the laser scan data, and allow for unique vantage points optimized observation.

Take a few minutes to explore CyArk's archive. As the students navigate the website, remind them to search for the feature that they drew in their Documentation Worksheet. They should look through all available multimedia to locate their feature, and compare their measurements with the measurements in the laser scan data. This can be done through the 3D Viewer, a useful tool that allows the viewer to take their own measurements using the measuring tape tool.

As the students compare the two images, they should ask themselves:
Do certain angles look distorted?
What parts of your drawing look accurate? What looks inaccurate?

Task 2: Drawing Recreation

Next, guide the students through an independent project in a 3D graphics software program like AutoCAD or Google SketchUp. Students will use the measurements they took during their field trip to create a precise drawing on the computer. If the class is new these kinds of programs, this is a good practice exercise. If the class is more advanced, this can be a warm-up exercise for Activity 4. If this is a new program for your class, refer to Google SketchUp's tutorials (http://www.sketchup.com/learn/videos) and/or CyArk Lesson Plan 16 (http://archive.cyark.org/education-lesson-plans) which provides an overview of AutoCad.

Activity 4: Documentation Report

Outcome:

Students will conduct a comprehensive study about the feature they drew in Activity 3, placing the feature in its historical, social, and architectural context.

Method:

Students will conduct independent research on their selected element and compile a report, including their drawings. Students must follow the documentation report format included in their student packet: Thesis, History, Significance, and Evidence.

Resources:

-Access to the Internet for research

Lesson:

Now that you have finished a CAD drawing about a specific feature at Rosslyn Chapel, it's time to research this element to place it in its complete context. In this report, provide the history of the element, its architectural components and significance, and its contribution to the Rosslyn Chapel site. Follow this simplified guideline as you prepare your report:

> Thesis: In this documentation report, I will explain the significance of baptismal fonts from the past through the present. I will also explain what kind of font is seen at Rosslyn Chapel, and what makes this font unique.
>
> History: Baptismal fonts are fixtures that are used solely for baptism. Most fonts are intended for small children, but several can also accommodate older children, teenagers, and adults. Fonts are typically placed near the entrance to a church, or in some churches, in a separate room called the baptistery. Fonts differ in size, material, and style dependent upon the architectural style in which it was made.
>
> Significance at Rosslyn Chapel: Rosslyn Chapel has a unique Victorian baptismal font, characteristic of the mid to late nineteenth century. The font is located in the baptistery, separated from the main body of the church but still located near the entrance.
>
> Evidence: Include your drawings in this section, and provide any and all explanations necessary. Describe how your drawing proves the significance of the feature at Rosslyn Chapel.

Write approximately 2 pages, and make sure to include your field notes, with measurements, and your CAD drawing. This will allow you to create a complete report detailing the process from field documentation through to the produced drawings.

Through this process, students will learn the importance of contextualizing features and providing all documentation in the format of a final report.

Activity 5: You are the Architect!

Outcome:
Students will become well-versed in the capacity of 3D graphics software programs, like AutoCAD, as they design their own medieval building, relying on influences from Rosslyn Chapel.

Method:
Teachers will encourage students to explore independently or in small groups any 3D graphics software program, functioning like an independent study. Depending on the class level, the teacher will provide extra background or tutorials as needed.

Resources:
-Access to a 3D graphics software program

Lesson:
After the students have completed a final report on a specific feature at Rosslyn Chapel, it's time for the students to design something of their own. Ask the students to imagine what their ideal chapel or other medieval building would look like, if they could design one. Direct students' attention to their student packet to record any and all ideas they have about their desired architectural features.

Students will first draw out their initial ideas, then input their design into a 3D graphics software program, like Google SketchUp or AutoCAD. The teacher should consider approving all sketches before the students begin drawing on the computer. This exercise allows students to experiment with measurements and the various tools the 3D graphics software offers. Provide ample time for the students to complete these drawings, and then share them with the class!

This activity would be a good extension to a lesson teaching students how to use 3D graphics software programs, giving the students an engaging topic to think about and design while learning and experimenting with new tools.

Summary and Conclusion:

After completing the above 5 activities, students will have experience drawing architectural elements, both manually and on a computer. In a workshop setting, review all student drawings and discuss any difficulties the students encountered while producing them. This lesson can serve as an introductory lesson before the students delve into a bigger design project, so this workshop evaluation would be a positive way to ensure that everyone is on the same page moving forwards.