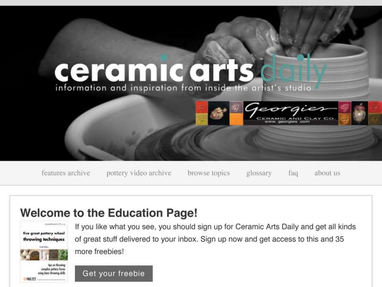

Ceramic Art Lesson Plan: Making Sounds with Clay

Fig.1 Airduct instruments have been made for thousands of years. This Aztec double whistle from Mexico is an example of a complex instrument with two chambers and two apertures.

Flutes, whistles and ocarinas are known as airduct flutes and they come in many shapes and sizes. Their common characteristic is an airduct assembly, which makes it easier for a novice to play, since it removes the requirement that a player carefully position their mouth and lips in the precise way necessary to get a proper tone.

Ancient examples of these instruments have been found in China, India and throughout the Americas, and the pre-Columbian inhabitants of America created some of the most complex and acoustically advanced instruments known to this day (figure 1).

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Making Sounds with Clay

Fig.2 Components of an airduct assembly.

How They Work

An airduct assembly (figures 2 and 3) is complicated to build, but easy to play. The edge is a sharpened blade of clay that sits across the aperture from the windway, precisely aligned so that it splits the stream of air coming from the windway.

Fig.3 Ocarina cross-section.

There are many variations of airduct assemblies. The aperture can be square, rectangular, round or oval. The edge can be short and thick, or thin and very sharp. The windway can also have many variations in shape.

Fig.4 An example of a flute with a recorder-style airduct assembly mouthpiece. Salt-fired earthenware, 20 inches in length by Brian Ransom.

Tubular airduct flutes, sometimes simply called pipes, are tube-shaped flutes with an airduct assembly at one end (figure 4). Examples include the recorder and penny whistle, and they can have finger holes or none at all. The finger holes enable the flute to produce additional pitches.

Fig.5 Zelda ocarina by Richard and Sandi Schmidt. Inspired by a popular video game, slipcast stoneware with hand-cut airduct assembly.

A unique benefit of airduct assemblies is that they permit the creation of multiple flutes, which are two or more flutes joined and played as one instrument that produces simultaneous pitches and harmonies.

Globular flutes with airduct assemblies are commonly called ocarinas (figure 5), although sometimes such instruments without finger holes are called whistles (figure 6). An ocarina has a vessel body that can be almost any shape, and an airduct assembly that causes the vessel to sound. If the instrument has finger holes, they can be placed just about anywhere on its body, since it's their size, not position, that determines the pitch they produce.

Fig.6 This gargoyle whistle by Kelly Averill Savino shows the creative range achieved with the ocarina form.

Whistles and ocarinas are quite possibly the most widely-known and popular ceramic instrument of all time, with traditions in virtually all parts of the world. They have been made since prehistoric times, from a variety of materials. Ancient clay whistles have been found throughout Europe, and in India, Egypt and China as well. Although the "ocarina" was coined in nineteenth century Italy, the instrument itself has a much longer history.

Early inhabitants of Mesoamerica and South America were prolific whistle and ocarina makers for a period of several thousand years. The variety and creativity of their globular flutes is remarkable and unparalleled. Ocarinas in pre-Columbian America were usually highly decorated and often depicted human figures and animals.

Fig.7 Bevel the tips of wooden sticks to make them effective cutting tools.

Making It Work

A mouthpiece that works can be easily fashioned on the end of a flute or as part of an ocarina. You'll need to bevel the tips of a couple of Popsicle sticks to make them effective cutting tools (figure 7). Use a bench grinder or sharpen them with sandpaper on a flat surface.

Fig.8 The mouthpiece shape has squared sides with a slight taper from back to front. It's thick enough to insert the stick to create the windway.

Once you've made the body, create the mouthpiece approximately 1 inch wide by ¾ inch thick and 1½ inches long. It should have squared sides and a slight taper from back to front (figure 8).

Fig.9 Carefully insert the stick with slow even pressure to create the windway. Be careful that the stick passes through the mouthpiece parallel to the top and bottom surfaces and squarely with the sides.

Carefully insert the Popsicle stick into the mouthpiece to create the windway (figure 9) The stick must pass through the mouthpiece parallel to the top and bottom surfaces and squarely with the sides. Use slow even pressure.

Fig.10 With the first stick still in place, use another beveled stick to cut the aperture.

With the windway stick still in place, use another beveled stick to cut the aperture (figure 10). On an ocarina, this is done on the underside, and it must be located just inside the interior of the wall of the body. Make a squared opening and remove the small piece of clay. Cut all the way down to the stick underneath. Make clean, square cuts on all four sides. Next, with the beveled edge of the stick facing down, make a square cut at a 45° angle, moving toward the mouthpiece. Press the stick in until it reaches the other stick. Your objective is to create a sharp beveled edge on the side of the aperture farthest from the mouthpiece. This sharp edge splits the air from the windway and creates the sound.

Fig.11 Put the mouthpiece to your lips and give it a test blow. If it whistles, you can complete your instrument by placing finger holes for flutes and ocarinas or leaving no finger holes for a whistle.

Carefully give a test blow (figure 11). If there is no whistle, reinsert the stick in the airway and check the sharpness of the bevel. Withdraw the windway stick, being careful to keep the stick flat. Hold the piece up and look into the windway while under an overhead light. You should see the beveled edge right in the middle of the windway. If you don't, reinsert the windway stick and lay the ocarina on the table with the flat side down. Press down on the body and mouthpiece to ensure both are in full contact with the table. Remove the stick and recheck the alignment.

This article appeared in Pottery Making Illustrated and was excerpted from Barry Hall's comprehensive book on ceramic musical instruments From Mud to Music published in 2006 by The American Ceramic Society.

Making It Whistle

Making airduct assemblies for clay instruments is a combination of science and art. Although it's not too difficult to make a working model, many artists have spent years perfecting the subtle variations, and learning from trial and error what designs sound the best to their ears. Some factors that affect the tone quality in flutes, whistles and ocarinas are the aperture size and shape, the windway size and shape, the angle of incidence, and acuteness of the edge.

Aperture size: The larger the opening between the windway and the edge, the higher the overall pitch, and larger apertures also require larger tone holes on the flute body to achieve the same pitch relationships.

Aperture shape: Short, wide openings produce a clear, focused tone. Long, narrow apertures produce a breathier tone and require more blowing pressure.

Windway size and shape: The windway focuses the air stream so it is made very thin, often less than $^{1}/_{16}$ inch. The width should be as wide as the edge opposite. Windways with upper and lower walls that become narrower toward the exit increase the focus of the air stream and create a less breathier tone.

Angle of incidence: Orient the windway in such a way that it directs the air stream head on to the edge, centered so that the edge cuts the air stream roughly in half. The windway should be parallel to the tube walls, and not heading down from above.

Acuteness of the edge: Recorders generally use a sharp, narrow edge at about 20° or 25°. Many ocarinas and clay flutes use thicker edges at about 45°.