



What to Do Before The Orgelkit Arrives!

Introduction

To prepare for your **OrgelkidsCAN** experience, awaken your students' curiosity with the following activities about musical instruments:

1. Introduce your students to the different types of instruments (see below).
2. Find out which students (especially EAL!) take lessons on keyboard or string instruments. You may be surprised to find a harmonium or sitar student in your class!
3. Begin working on one or two pieces of Recorder/Orff arrangements that would be enhanced with a sustained drone added to Bass Xylophones and Metallophones (See A Renaissance Banquet listed in resources)
4. Show students the inside of a piano and help them find simple Bordun parts: C and G, G and D and add them to the Bass Metallophones and Xylophones during pentatonic singing games such as Tommy Tiddlemouse, Doggie Doggie and Tideo. (See Singing Games Children Love in resources. If you are teaching recorder, Hot Cross Buns can be accompanied with a G and D bordun. (They will be able to play the Bordun on the organ!)
5. Look through your Provincial Curriculum for Science Units related to Sound and Simple Machines. See what resources, (books, DVDs, Kits,) are available through your school division and make friends with the Science teacher in the school!

Science and Technology of Sound – Types of Instruments

Besides the Western classification of Woodwinds, Strings, Brass, and Percussion, musical instruments can be classified by the way in which they produce sound. Sound is created when vibrations or sound waves are generated. The suffix “phone” comes from the Greek word phonos which means “sound”. Instruments from all over the world can be classified by the following categories using this method:

Idiophones: Vibrations are caused by striking two things together, or by rubbing, scraping or shaking the instrument. Examples include cymbals, claves, wood blocks, maracas, and triangles. They can also include trash cans, plastic tubes, and hollowed out logs.

Membranophones: Sound is created when a stretched membrane or skin is struck with a stick or with the hand. The membrane can be animal skin or man-made such as rubber or plastic and is usually stretched over a hollow tube. Membranophones include timpani, snare drums, tablas, congas, bongos, and bohran as well as djembe, domba, and other instruments from the Eastern World.

Chordophones: Sound is produced by causing a string to vibrate by striking, plucking, or bowing. Examples of Chordophones include violin, cello, harp, sitar, zither, piano, hurdy-gurdy, and even an elastic band.

Aerophones: Sound comes from a vibrating column of air. The vibrations will sound different depending on the material of the column: metal, wood, or with a reed or buzzing lips. Examples of Aerophones include all brass and woodwinds of the orchestra, recorders, pan pipes, bagpipes, pop bottles, and accordion type keyboards.

Mathematics and the Principles of Music Theory

We owe our understanding of pitch and intervals to the Greek Mathematician Pythagoras (See The Science of Music, Bill Nye) and the theory of notes, rhythms, and duration to ancient Greek culture. These foundations of musical theory have worked side by side with science and technology to create the instruments we enjoy every day and those played in great concert halls.

A Brief History of Organ Engineering

3rd Century BCE: the Hydraulis organ used water pressure (pumped by one or two men) to deliver wind to one or two dozen pipes which were played by pushing long levers with hands or fists!

7th Century: bellows replaced water pressure to supply wind to the organ

10th Century: organs required two men to play the keys, (and as many as 70 men in large organs!) to pump bellows

12th Century: exploration of different timbres

14th Century: the addition of more pipes requiring improved tracker* action, stops, and multiple cases and keyboards

15th to 17th Century: significant mechanical improvements to the organ: smaller keys, pedal boards, orchestral sounds

18th Century: the organ became larger and louder, requiring pneumatically assisted tracker action to offset extreme weight caused by high wind pressures

19th Century: development of electric-pneumatic action for large pipe organs, hand or foot powered bellows for the Reed organ, Harmonium, and Melodian, and steam-powered wind for the Calliope.

20th Century: development of tubular-pneumatic action and the ability to play drums, chimes, glockenspiels, and many sound effects in addition to pipe sounds

* Trackers are long rods that pull down the valves under the pipes. Until electricity was discovered, all organs used trackers. See “Types of Action” in *A Young Person’s Guide to the Pipe Organ* for more detailed explanations.

Books and Audio-Visual Resources

Instrument Bingo, Cheryl Lavender (CD with playing cards ISBN# 9781423444671, Hal Leonard) A fun way to introduce students to the sounds and classifications of instruments! Grade 3-6

World Instrument Bingo, Cheryl Lavender (Multi-media CD 9781480382978 Amazon) An excellent way to introduce students to classification by phones, and to hear and see instruments from around the world! Grade 3-6

Musical instruments of the World, Dr. J. Mark Ammon. Book with excellent resources to be used as background information with puzzles, worksheets and extended class activities. Grade 5-8, Mark Twain Media, ISBN 10-digit: 1-58037-252-X; 13-digit: 978-1-58037-252-7

Music of Many Cultures, Carol Fisher Mathieson. Book with excellent resources to be used as background information with puzzles, worksheets and extended class activities. Grade 5-8 Mark Twain Media, ISBN: 1-58037-102-7

A Renaissance Banquet, Rempel/Kunzman, #49012180, Schott. Authentic music and dance that work well with the organ. Students LOVE the dances! A must have!!!

Singing Games Children Love, Denise Gagne, #9781894096065, Themes and Variations. A collection of user friendly songs, dances, and games from around the world.

The Science of Music, Bill Nye DVD A mix of humor and quickly moving explanations and illustrations of Sound production Grade 3-6, ISBN: 1-932644-97-0

The Magic School Bus, Haunted House, Season One, Episode 8, Explores concept of sound vibrations. Grade 3-4

PULSE a STOMP ODYSSEY, Walden Media DVD. A wonderful way to introduce students to World Music and Dance as well as a variety of ways to create exciting musical sounds with everyday objects. Grade 4-8

The Great Music Caper, 2006, Haut et Court/ Millimages/ France 3 Cinema/ Decadoc. A riveting animated story which takes your students into the families of instruments and how the best music is collaborative art. Grades 3-5.

Online Resources

Performances on Smaller Organs:

Reproduction Hydraulis organ <https://www.youtube.com/watch?v=bP2u8NBI5m8>

Morrison's Jig - Portative organ https://www.youtube.com/watch?v=_BUP4YHB4ncays

Fidel und Portativ <https://www.youtube.com/watch?v=u5Ux1keYXPk>

Performances on Larger Organs:

Cameron Carpenter and Sarah Willis explore the Berlin Philharmonie Organ

<https://www.youtube.com/watch?v=L1aGPeqWNFw&t=14>

Bach Prelude and Fugue in D minor, BWV 565, Cameron Carpenter

<https://youtu.be/d5O8cHI-vPY><https://youtu.be/d5O8cHI-vPY>

Young Theatre Organist: <https://youtu.be/RnPXoz5rpUU>

Bohemian Rhapsody Played on 100+ year old fairground organ

<https://youtu.be/JTnGI6Knw5Q>

Organ Building and History:

Fratelli Rufatti: Pipe Organ Factory Tour

<https://www.youtube.com/watch?v=egOBhLNMnTo>

Introduction to the Pipe Organ

<https://www.youtube.com/watch?v=NGNOopA4Qfc>

A Young Persons Guide to the Pipe Organ, Sandra Soderlund, AGO, 1994.

Originally a paperback, this is an illustrated reference book for understanding the history and workings of the Pipe Organ.

<https://www.agohq.org/young-persons-guide/>



Teacher's Guide and Suggested Lesson Plans



Introduction

OrgelkidsCAN provides children with a hands-on experience in which they assemble, and then play, a fully functioning table-top sized pipe-organ. This finely crafted organ, carefully designed to be appealing to and educational for children, arrives in two cases as a kit of parts that can be assembled and ready to play in under an hour.

As the children assemble the organ, they apply physics, mechanics and sound theory, all while discovering the beauty and music of the pipe organ in a fun and meaningful way. When they are done, the kit is disassembled to its component parts, ready for the next group of children. This document provides a complete educational package with suggested lesson plans and assembly instructions.

The **OrgelkidsCAN** project is especially suited to children from 8-12 years of age. Full details are provided on our website at www.orgelkidsca.ca. This is a really good opportunity to team up with the Science teacher in your school for an outstanding enrichment experience!

The Educational Component

The educational component of **OrgelkidsCAN**[★] is multi-faceted and fits very well as an enrichment activity that blends Arts into the STEM (Science, Technology, Engineering, and Math) curriculum. As a musical instrument, the organ is a profoundly moving medium of artistic expression. As an educational activity, the assembly of the organ presents children with opportunities to develop the logical reasoning, critical thinking, problem solving, collaborative skills, and creative vision needed in a rapidly changing work environment. These are the skills we use daily when we evaluate a problem, identify resources, construct a solution, and execute plans. The following sections provide sample lesson plans that the teacher can apply to this enrichment activity.



Lesson 1: What Kind of Instrument is in the Mystery Box?

Lesson 1 may take place over two classes if desired. Watching the assembly process video on the OrgelkidsCAN.ca website before working with the children is strongly recommended.

Goals:

- To create a context for the organ as it relates to other instruments and its place in history and culture.
- To review various families and classifications of instruments students have learned so far.
- To make connections with the use of music in celebrations, storytelling, and everyday life in a variety of cultures.
- To spark interest and curiosity of the unknown instrument students will be putting together.

Preparation:

Gather pictures and samples of instruments from a variety of cultures that can be classified and sorted by size, shape, material, and source of sound production. Be sure to include SATB recorders, Orff Instruments, and any band instruments you may

be able to borrow. (Determine which students already play a keyboard instrument as they may want to play a solo on the Organ!)

Choose a short listening activity related to Timbre and Sound production such as:

- *Peter and the Wolf* video (activity worksheets provided)
- *World Instrument Bingo*
- Readers Theatre stories that can incorporate classroom instruments (e.g. *Too Much Noise, Bremen Town Musicians*)

Introduction:

Using a KWL chart, have students review what they Know about how sound is produced. Include comparisons of different phones and families of instruments, size, dynamic capabilities etc.

Core:

- Have students sort the samples of instruments into phones/families and write on the the chart under **Know:**
 - chordophones/strings,
 - aerophones/winds,
 - idiophones/percussion, and
 - membranophones/drums
- Brainstorm which instruments would work for enhancing a story to portray a scary creature, to sound like magic, to play a lullaby, or to introduce a King.
- Begin chosen listening activity with special attention to timbre.

Conclusion:

- Ask What they would still like to know about other instruments
- Tell them they will be Learning how to assemble and play an instrument that requires two or more players and has over 100 parts!

Lesson 2: Building and Playing the OrgelkidsCAN[🍁] Organ



Goals:

- To discover how an organ is built and what the most important parts are called
- To understand how the instrument physically works
- To stimulate curiosity about pipe organs in your community and a possible excursion to see and hear one played

Preparation:

Construction of the organ consists of several tasks which can be done simultaneously by small groups of students prior to assembling the component parts into the finished instrument. (It may be helpful to recruit a few older piano students to help redirect the groups if they run into problems. This will give you freedom to move freely around the room.)

You will need three medium sized tables for sorting the pipes and keys and one shorter, smaller table for the frame. (A computer cart on wheels works well, with dimensions of 60cm x 80cm and 72cm high. This makes it possible for students to place the pipes during assembly and to reach the keys and bellows easily.)

The total time to build the organ is about 45 minutes. Allow an additional 30 minutes to give children the opportunity to play the organ, especially children who are in school ensembles or are taking private music lessons.

The organ may be played alone, or in combination with other classroom instruments. Orff instruments and recorder work particularly well as ensemble instruments. (See

A Renaissance Banquet in resources section). Allow an additional 15 minutes to disassemble the organ. It is recommended that the instructor replaces the component parts into the travel cases.

Introduction:

Review dos and don'ts of handling parts, blowing pipes, assembly, and what to do while waiting for others to finish. (Have provided Word Searches, pencils, and clipboards available.)

Open the Mystery Box with the students and place all parts on one large table where they can look for similarities and differences. Ask them if they can tell which parts will make sound. Tell them that some parts will be sorted by size, others by number, and still others by matching letters. Show the students one of each of the following parts: Stopped Pipes, Open Pipes, Keys and Frame. Divide students into four groups to assemble each of the parts. Invite students from the Keys group and the Frame group to take the parts they will need to their own tables. The Stopped Pipes and Open Pipes groups will stay at the large table.

Hand out basic instruction sheets to each group and invite them to discuss with their group if they will be organizing by size, number, or letter. When students indicate they are ready, allow them to start. Walk around as needed to answer questions. (The Frame group will need the most help.)

Core:

Putting it all together! Students will use illustrated assembly cards along with the following instructions.

Divide the children into three teams: Frame, Pipes and Keys.

The **Keys** team is assigned the task of locating and sorting the keys into a numbered set.

- **Sort the Keys:** Arrange the keys by numbers and lay them on the table. Walk around to observe the other groups, then work on the Word Search until the Frame group invites you to bring the keys to the frame.

The **Pipes** team is assigned the task of locating and sorting the two types of pipes into numbered sets.

- **Sort the Stopped and Open Pipes:** Separate the Stopped Pipes from the Open Pipes then lay them out from largest to smallest. Turn them over so that the numbers are visible. Walk around to observe the other groups, then work on the Word Search until the Frame group invites you to come with two pipes

at a time, starting with the largest pipes. They will call by number: 1 and 2 then 3 and 4 etc.

The **Frame** team is assigned the task of assembling the basic frame structure and inserting the major components, namely the reservoir, wind chest and the bellows, along with the wind channels that connect them.

- **Assemble the Frame:** The frame consists of two end pieces with holes that the six cross pieces fit into. Each hole and each end of the cross pieces have numbers that need to be matched up for a good fit. When installed, the cross pieces will be pinned to the frame using a metal pin (we call it a noodle pin because of the shape). The pin fits into a hole on the frame through the end of the cross piece inside to lock it in place. Make sure that the cross pieces are well seated in the frame so the holes line up. Don't insert the noodle pins just yet — we have one thing to do first.
- **Insert the Reservoir.** Turn the frame face down on the table with the OrgelkidsCAN logo facing down. Carefully lower the wind reservoir into the bottom section of the frame. Make sure the window in the reservoir is facing down to the front of the organ.
- **Attach the L- shaped wind channel** to the bottom of the reservoir using thumb screws then carefully lift the frame and reservoir back up upright again. Now is a good time to plug the noodle pins into the 12 holes in the frame.
- **Insert the Wind Chest.** Carefully lower the wind chest into the top of the frame.
- **Attach the straight wind channel** vertically to the wind reservoir and wind chest at the back of the organ using thumb screws.
- **Attach the Bellows.** Carefully tilt the entire frame forward to slip the bellows plate under the back legs. Place the pins on the bottom of the bellows into the corresponding holes in the bellows plate to lock it in place. The L-shaped wind channel will bump up against the bellows where they are secured by closing the brass clips.

Stop here and walk to the **Pipes** table. Before going further with the assembly, gather all students around the Pipes table to compare the sounds of the Open and Closed pipes. Ask volunteers to gently blow into the five largest open pipes, one at a time. Invite discussion around what students hear. (Some may not be familiar with semi-tones!) Then, ask what they would expect the five lowest stopped pipes to sound like. Invite five more students to blow the pipes as before. What do they notice? (The stopped pipes will sound an octave lower than the open pipes!) Explain that the sound

wave cannot escape out the end of the pipe so it travels back down and exits out the mouth of the pipe. This creates a longer sound wave, so we hear a lower sound.

Invite the **Keys** group to attach the keys with the hooks under the wind chest.

Attach the nose piece at the back of the frame, with the V edge facing downward.
Insert metal pegs.

Carefully place the stop sliders in position on the top of the wind chest and set the pipe rack on top.

Invite the Pipes groups to bring two pipes at a time to insert in the pallet. (Students of the frame group can call for numbers 1 and 2, then 3 and 4 etc.) The mouth of the odd numbered pipes face the front, the even numbers face the back.

Alternatively, the students can complete the placement of the pipes in the pipe rack then carefully lift the entire assembly on top of the wind chest.

Check that all the pipes are sitting in their spots. Choose one rank of pipes to play by pulling out one of the sliders. Demonstrate the importance of keeping some air in the bellows at all times. Avoid pushing the bellows to the extreme top or bottom as the sound will fluctuate. (It takes a bit of experimentation, so be patient!)

Making music with the small Orgel!

Grade 3: Give all students a chance to play the organ by incorporating it into a singing game such as Tommy Tiddlemouse or Doggie, Doggie. Students can take turns playing and pumping a sustained bordun on C and G (stopped pipes) during the game.

Grade 4: Use the organ with recorders and Orff Instruments to play Hot Cross Buns (or other simple pentatonic piece) as an accompaniment (sustained or staccato pattern on G and D).

Grade 5 and up: Use the organ along with Orff Instruments and recorders in Buffoons, and Pachorgelia. (See scores and notes in resources.)

Conclusion:

Questions to stimulate discussion and participation could include the following:

- Which pipes do you think have a higher tone: the long or the short pipes?
- Do you think the open or the closed pipes will have a higher tone? (The closed pipes will be lower because the air has to travel up the pipe and back down out the mouth!)
- How does the air or wind get into the organ?

- How can you make a particular tone with a key?
- How can you get 2 different sounds by playing the same key?
- • Why do you have to continue pumping?

Wrap Up:

Refer to the KWL chart from the first lesson and discuss the classification of instruments. Ask questions such as:

- What family would the organ belong to?
- Does it belong to more than one family?
- Do you think the organ is also a machine?
- Why has it been called the ‘King of Instruments’?
- Why do you think it was played during silent movies?
- Would you like to see and hear a real organ?
- What questions would you like to ask an organist or an organ builder?

Lesson 3 (Optional):

The third lesson provides extended opportunities for children to experience a large pipe organ, either in person at a local concert hall or church, or by watching a video in the classroom.

Field trip to see and hear a real life-sized pipe organ played by a local organist:

Now that the children have learned how an organ is constructed, they know all the important principles of the organ instrument. During the tour and explanation, they can associate the knowledge gained from the small kit organ to the scale of the real instrument. This applies to both the organ building technology as well as the playing or performing on it. Contact us at orgelkidscan@rcco.ca for further information.

In-Class Video:

Watch one or two of the suggested videos listed in the resources section. Encourage the students to compare the organ they made to the ones they see. Stop and start the videos as desired to watch the organists as they use their feet, change stops, and change manuals. Look for videos and pictures of the largest and smallest pipe organs and for the youngest and oldest performers!