

Mini-Dig Module Components

Target Audience: Upper Elementary/ Early Middle School

1. Student Investigation
2. Teacher Guide
3. Teacher Background for Simulated Dig Activities
4. Handouts and photos (online at https://www.archaeological.org/pdfs/education/digs/Digs_Record_Sheets_Simple.pdf and https://www.archaeological.org/pdfs/education/digs/Digs_shoebox_photos.pdf)
5. Assessment

Your Own Mini-Dig

How do archaeologists find what objects ancient humans left behind?

Archaeologists study the human past through the objects, or *artifacts*, that people have left behind them. These objects often become buried as people move away, are taken over by enemies, or experience such natural disasters as landslides or floods. Archaeologists use clues from ancient literature, the landscape, data from scientific tools, and even satellite images to help them find where to dig. Once they decide on a possible place, archaeologists have to plan how they will dig, or excavate, in an organized way to recover the objects. This investigation uses a shoebox and other materials to create a small “archaeological site.” You will need to work as a team to carefully excavate the “dig site” and record the artifacts you find. This will help you to understand how archaeologists find and record what they are seeking.

Materials for a group of four

For this investigation, you will need:

- Shoebox Dig Site
- Excavating tools (spoons)
- Small sieve
- Containers for excavated soil
- Small plastic bags to hold artifacts
- Images of artifacts
- Top plan for each layer
- Marker to label artifact bags
- Record sheet for each layer
- Pen to record
- Magnifier
- Ruler

- Camera

Investigate

1. Take a look at the pictures of a place where there ancient artifacts might be buried. If this were your site, how would you go about finding out what is below the surface? Talk about your ideas with your group, and make a list of the important things that you will need to think about when beginning an excavation.

2. Share your list with another group. See where you agree and you don't. As a whole class, come up with a list of things that you, as an archaeologist, will need to think about as you plan your excavation.

3. Now, watch the video of an archaeologist at a dig site.

(<https://www.youtube.com/watch?v=PcT1vGyJzyg>) or

(<https://www.youtube.com/watch?v=ritMYfvzrQg>) What is he or she thinking about to get ready for the dig? Add to your list of important points, and use these to write your plan for excavating.

4. Now, back up for a minute. You'll see that the archaeologist in the video had a reason for choosing that dig site. Your teacher will supply you with a story about your Shoebox Dig Site. Take turns reading different sections aloud. What will you need to be looking for when you begin to dig in your box? How will you store what you find and record where you find it? What different roles will the people in your group play at the dig?

5. As you make your excavation plan, ask your teacher for help. You may also use any handouts that your teacher supplies. Before you excavate, make sure that your teacher checks your plan. Now, you're ready to go!

6. Now, carefully, begin your excavation by following your plan. Remember that it is important to record how your artifacts look and where you find them. The

conditions will help you to tell the story of how the artifacts got where they did, and what they mean to the story of the human past.

7. Share your information with that of another group. What similarities were there between your findings and theirs? What differences? Why do you think that your groups have some differences and some similarities? What did your findings help you to understand about the lives of the people who once lived in your “dig site”?

Shoebox Dig – Teachers’ Guide

Overview

Through this investigation, students become archaeologists on a small scale and uncover the stratified layers in a shoebox. This is a manageable, compact, and fun (although sometimes messy!) dig for older elementary school children that can be modified for middle school. Since this model uses an opaque shoebox, it is a “blind” dig, which is more like a real excavation. Students excavate in teams, uncover three or four layers, record their findings, and answer questions that reveal how carefully they served as excavation supervisors and how well their digging strategies worked. Since archaeologists use the metric system, this is a good opportunity to incorporate metrical calculations into the lesson.

The Shoebox Dig illustrates:

- basics of archaeology
- the logic of horizontal excavation
- the nature of stratigraphy, and
- the importance of keeping records and preserving the context of finds.

The artifacts used in the dig are simple and easily obtained, and they are not representative of genuine cultures. They permit students to focus on observation and analysis and help them avoid jumping to conclusions based on cultural cues. Alternatively, you may choose to add culturally specific simulated artifacts, replicas, or laminated images of real artifacts to relate the lesson to cultures that your students are studying in class.

Grade Levels

The dig is designed for 5th-6th grade students. To adapt the dig for use by middle school students, the shoe boxes can be modified so that they are not all identical. Each older team is then responsible for an area of the site, and the whole site will not be completely comprehensible until all the teams join forces to discuss and interpret their findings.

Goals

Interdisciplinary goals are to:

- help students practice transferable skills of observation, critical thinking, inquiry, and hypothesis-testing applicable to many disciplines, including science, mathematics, social science/history, art, and literature.
- illustrate the importance of context to the meaningful interpretation of data.
- promote teamwork, sharing ideas, academic honesty, and building on the past work of others.

- show the distinction between observations (data we collect using our senses) and inferences (how we explain the data).
- engage students in thinking about multiple interpretations.
- allow for design flexibility.

Archaeological goals are to:

- introduce principles of stratigraphy and make excavation strategies (digging horizontally and excavating one layer at a time to preserve context) clear and relevant.
- show that our knowledge of the past is incomplete and illustrate how some of its gaps came to exist.
- illustrate how careless work can affect interpretation, destroy context, and disguise cultural change.
- emphasize that excavation and archaeological research are not treasure hunting, but rather ethical endeavors to restore a past culture's heritage.
- teach students how to measure, map, draw, and understand a top plan and cross section (translate three into two dimensions).

Students experience in a kinesthetic way the fact that excavating an archaeological site destroys it, so that afterwards there is no possibility of checking information not recorded. Even if record-keeping needs to be simplified with young children, they should still be asked to do some form of recording as they dig. This could include drawing pictures or taking photographs. The dig should end with discussion of what students observed in each layer and why it is important to dig one layer at a time.

Materials and Preparation

You should first read *Teacher Background for Simulated Dig Activities*. This will supply you with the content background you need to help your students to get the most out of the investigation.

In preparing shoebox digs, you will need to acquire a sturdy shoe box for every four students. Each box will be filled with layers made of sand and soil, possibly mixed with colored sugar crystals, birdseed, or other ingredients to create different colors and textures and to help students recognize changes in strata (layers) as they excavate. Each layer should be thick enough (at least an inch deep - 2.5 centimeters) to be identified by students before they dig through it accidentally. Depending upon the number of students and teams (there can be as many as 4–5 members per team), filling the boxes and cleaning up afterward may take more than an hour. Excavating, recording, and discussing will take several hours. You may want to ask a parent volunteer to help with this activity.

The dig should be built around a story that you create, which may vary depending on the artifacts. These can be inexpensive and may include small objects saved up from past projects. Keeping the artifacts culturally neutral (not representative of genuine cultures) helps students focus on observation and analysis. Adding laminated images or replicas of real artifacts creates a more realistic site. It is best to create the digs at your school or the location where the boxes will be excavated, preferably outdoors. Once you have all the boxes, soil, and objects, the easiest way to proceed is for you to complete the lowest layer of soil and artifacts in all boxes in exactly the same way, and then move up to the next layer. The layers should be packed down quite tightly to resemble the (generally) compact soil of a real dig as closely as possible.

Making context important

- In at least one layer, several objects should be related, and you should place them near one another. Parts of a broken artifact can be positioned so that students who dig carefully will see the original connection. Small beads can be arranged to create a necklace pattern. A small circle of pebbles with a fragment of charcoal inside it can represent a fire pit.
- You might put a mystery artifact in one layer of each box.
- For older grades (middle school) you can increase complexity, emphasize teamwork, and ask students to participate in the planning and design of dig sites.
- One option is to leave some objects out of certain boxes so that it will only be possible to learn about all the finds if teams share information.
- Alternatively, different shoeboxes can represent different areas of a site altogether.
- Teams or classes can design the shoebox digs for one another and exchange them, or can design the dig(s) for the next year.

Materials (for four layers)

- Shoeboxes, numbered, with one side labeled LEFT or WEST at your discretion
- Sand, not too fine and dusty
- Potting soils, ideally of different textures and colors, and not too fine (choose soils of a uniform consistency that will help make it easy to spot artifacts), for an upper layer of soil-dwellers
- Colored sugar crystals or bird seed
- Oregano, sesame, coffee, or another safe additive with a distinctive odor
- A selected number of artifacts of different types for each layer (perhaps 5 items of 5 types in each layer; for example, 5 green beads, 5 plastic fish, and so on, for a total of 15 artifacts in each layer)
- Sugar cubes, clay, or plastic building blocks to create features (if desired)
- A piece of plastic or a plastic tablecloth to work on

The layers of our sample dig are composed of:

- Sand (bottom layer D)
- Soil mixed with birdseed (middle layer C)
- Another soil with a different texture and color (top layer A; left/west half)
- Soil mixed with colored sugar crystals (top layer B; right/east half)

Artifacts from our sample dig

- Fake or real (modern, not ancient!) coins
- Miniature plastic doll dinnerware
- Popcorn
- Small plastic bugs
- Beads of different types
- Fake “gems”
- Dried pasta
- Marbles

Excavation tools

- Spoons (excavation tools)
- Containers for excavated soil
- Small sieves
- Small plastic bags to hold the artifacts from each layer
- Waterproof black markers to label the bags
- Pencils
- Brushes
- Top plan
- Record sheets
- Clipboards
- Artifacts and/or laminated images of artifacts
- A top plan for each layer: a sheet of graph paper with a square or rectangle already drawn on it representing the excavation square
- A record sheet for each layer, designed by you and requiring (in a simple version) a list of artifacts found in each layer, or (in a more complex version) a description and sketch of each artifact. *In the handout section, you can find samples for this.*

Recording is essential

You should design your own top plans and record sheets based on the dig goals, the age and number of students, and the number and type of layers and artifacts. In the particular dig described here, it can be confusing to find two different types of soil, side-by-side, on top. Showing students what to look for can be helpful.

In the handout section, you can find samples for this.

Class Time

The project takes students at least several hours and requires several adults to remind them not to dig holes with their spoons and to record properly. It will take more time and require more adult supervision if you allow everyone to rotate through needed roles on the team and give each student a chance to dig. Cleanup takes between a half hour and an hour. Discussion of the dig and follow-up with questions and answers should take another hour.

Procedures

Introduce archaeology and the dig

Your class learns basic rules, definitions, and procedures of archaeology.

See *Basics of Archaeology for Simulated Dig Users*.

Divide students into teams

- Each team has 4 students (more only if necessary).
- You can assign roles or have the team members decide on roles (excavator, top plan draftsman, artifact recorder, artifact bagger, sieve specialist, overseer, and so on). You may allow team members to rotate through different roles so that everyone has a chance to dig. If everyone does not, it should be emphasized that all contributions to a dig are valuable and result in the final publication. The goal is not just to find artifacts, but also to interpret the site!

Video or photo of a real archaeological site

To begin, you can show students a short video or photo of an actual archaeological site. If you choose a video, it should also provide some background information on the people who once lived at the site, and why this is important to the archaeologist. You can stop the video at certain points to engage students with questions that will help them think about their “dig” (*Why did the archaeologists choose this site? How do you think they will prepare for their dig? How will they try to find out what is beneath the surface?...*). You should ask the same types of questions if you use a photograph. These questions will help students develop their plans for excavation. Remind them that this is important because archaeologists need to be systematic when digging.

You can have the teams of students start making a list of the important things that they will need to consider for their dig. Have the groups share with another group to see where they have similarities and differences. Then, as a whole class, come up with a list of things that the students, as archaeologists, will need to consider as they plan their excavation.

You can find a video example in the video section.

Video of an archaeologist

After showing the archaeological site and giving students a chance to plan, you can show them a video of an archaeologist at a dig site. The video should show the archaeologist demonstrating how he or she digs. This will allow students to compare their excavation plan/techniques to a real archaeologist’s. How did their plans differ and agree with the archaeologist’s? Give the groups time to add any new steps to their excavation plans.

If you want to challenge students more, you can wait to show this video until the very end of the investigation. The students can see if they followed a plan similar to a real archaeologist, or if they had major differences. Ask the students follow up questions (*How would change your plans for a future dig? What were some techniques that you learned from the archaeologist?...*).

You can find a video example in the video section.

Introduce the site

You should introduce some finds at the site and then have students excavate and infer the rest of the story. Explain how archaeologists know about the site (perhaps through old records and a surface survey). You might begin the dig by revealing several finds that have turned up in a farmer's field in this area. These artifacts should reveal something about the nature of the site, and students should discuss what they expect to find and generate hypotheses to test as they dig. You may make some of the finds seem contradictory, and these should lead to discussion of multiple uses of a site or changes in activities at the site through time.

- You should stress how important it is for archaeologists to separate observations of material remains from inferences (invented stories about the finds). The ultimate story of the site you have in mind should involve simple examples of cultural change (people who eat popcorn and live on a sandy coast are succeeded, once the sea has receded, by people who eat fast food and live on soil instead of sand; artifacts that include small plastic weapons and coins are followed by ones that include peace symbols and . . .). The story can be modified based on available artifacts, the students' ages, and the degree of complexity desired in the dig site.

See handout section for an example story of a site introduction.

Prepare to dig

You should remind students that archaeologists would not dig just to "find things," but rather to interpret someone's culture and way of life. On a real dig, nothing would be removed at all until it had been drawn, photographed, and recorded. Every dig destroys as it uncovers. The investigation is set up so that students first draw upon their own prior knowledge, and that of their team members, to create an excavation plan. They then share these plans with other groups, learning from each other. At this point, you may want to show them the video of an archaeologist explaining how an actual excavation is planned. Students can take this additional information and revise their own plans. Be sure to check each plan before students begin their excavations.

- You should tell your students how many types of artifacts (not the total number) they should expect to find and the number of layers (four, since the top layer is actually in two parts side by side).
- Students should note that boxes have numbers and one side is labeled LEFT/WEST. Each layer is designated by a letter.
- Each team should receive a top plan and a record sheet for each layer.
- Once you have approved of the students' excavation plans, team members (ideally) take turns digging, drawing, recording finds, and putting artifacts into correctly labeled bags. When everything has been excavated, the teams present their finds and conclusions to the class.
- Students answer your questions about the artifacts and come to conclusions about the people who lived in the different layers.

Pitfalls

Also see Dig Design Tips in *Basics of Archaeology for Simulated Dig Users*.

Sand and loose potting soil can be messy and, even when packed down tightly, are far easier to remove than the hard soil at a real site. Students need to be motivated to dig carefully, or the lessons and rewards of stratigraphic excavation will be lost. If the layers contain too many artifacts, these may become confusing and will be difficult to record, yet too few artifacts mean that not everyone can find something. The team members need to know that all the members of a dig team are contributing, whether they are digging or recording, finding artifacts or not, and that it is not the main goal of this (or any) dig just to “find things.” Everyone shares in uncovering and interpreting the puzzle that is the site.

Assessment

It can be difficult to assess an excavation project on results, since it is acceptable to make mistakes and learn from them. You should design a series of questions about the layers that students answer in teams, so that careful observers and diggers can be rewarded for their understanding of collaborative teamwork, their careful stratigraphic analysis, and their attention to detail. The questions should help students recognize the value of the information they can gain from artifacts evaluated in context. See the “Questions to ask students” section below.

See the Assessment Section for ideas on how to further assess students’ knowledge and skills.

Summing Up

All the teams come together to share their conclusions and show the accuracy and care they maintained during excavation. Students should start by discussing how information can be lost by carelessness. Digs hardly ever answer all the questions the archaeologists had in mind. They generally lead to further questions that the excavators hope will be answered by additional digging at this or other sites. At the end of excavation, your class should summarize the questions students have answered. *What new questions have come up? What kinds of evidence would students expect to find if they continued to dig in this area?*

At this point you can tell the story of the site if it has not yet been revealed. You should point out how unlikely it is that in a real-world situation the archaeologists would learn the story of the site the way you can tell it to the students!

Questions to ask students

You should design a series of questions to test how carefully students excavated and how well their digging strategies worked. The questions should help students recognize the knowledge they gain from evaluating artifacts in context. Individual teams will answer some questions while the whole class will answer others. If the contents of the shoe boxes are different (because they have been seeded with different artifacts), then discussing them all together will reveal more about the site than any one box can. You should then ask groups to present their different finds and draw conclusions.

Sample questions to use for assessment:

- What did the people who used shiny gems eat?
- Did the people who ate bugs use green stones, or metal pennies?
- Did the people who ate popcorn live in this area before or after the pasta-eaters?

- What one artifact did both the pasta-eaters and popcorn-eaters share? (Marble.) Can you come up with an explanation for how the two groups came to use the same object? (Possible inference: the later people found a marble left by the earlier people and used it, too.) How might the object have been used? (Here it will ideally become clear during discussion that sometimes there is just no way to find out the answer using the evidence at hand. What might further digging uncover to help answer the question?)
- What kind of jewelry was made in layer D? (Were gems or beads in the soil arranged in a patterned necklace or bracelet?)
- What kinds of pasta did the pasta-eaters eat?
- How many different kinds of bugs did the bug-eaters eat?
- How careful was your group in keeping the layers separate?
- What surprised or interested your team members the most?

These questions are not particularly deep; they merely require the excavators to observe closely. In a more complex dig, or in one using laminated images of artifacts that represent a real culture, the students can first develop hypotheses about what finds they will excavate based on the surface finds, and consider after excavation what they may discover if they dig further and uncover more of the same site.

Following up

As a subsequent activity, students can be asked to design (on paper) the possible stratigraphy under their school building. They can imagine or actually research, with assistance, life at the school site before the school was built, and depict the resulting material remains in layers shown in cross section under the present day surface. Their stratigraphic drawings can range in size from notebook paper-size to the height of the classroom or hallway wall.

A second follow-up activity could be the Schoolyard Dig [\[add link\]](#). This is a larger scale version of the shoebox dig, but takes place outside in the school's grounds.

In the real world, a dig ends with questions that are still unanswered and reconsideration of hypotheses that were not validated. Older students may continue their analytical thinking by studying the AIA's *Mystery Cemetery*, drawing conclusions about the site (Map 1 and photographs) and then checking their ideas through further excavation (Map 2).

Resources

See *Basics of Archaeology for Simulated Dig Users* and *Resources National Standards for Simulated Dig Users*.

Coan, J. 1999. *Digging into Archaeology: Hands-On, Minds-On Unit Study*. Pacific Grove: Critical Thinking Books & Software.

Cochran, J. 1999. *Archaeology: Digging Deeper to Learn About the Past*. Nashville: Incentives Publications, Inc.

McIntosh, J. 2000. *Archeology*. London: Dorling Kindersley Ltd.

Moloney, N. 1997. *The Young Oxford Book of Archaeology*. Oxford: Oxford University Press.

White, J.R. 2005. *Hands-On Archaeology: Real-Life Activities for Kids (Grades 4–10)*. Waco, TX: Prufrock Press.

Teacher Background for Simulated Dig Activities

Archaeological **excavation** (digging) is conducted in a scientific manner. The process of digging and thinking about a site teaches skills of critical thinking and analysis that carry over to many different topics and disciplines. This background material will help you explain archaeology and the goals of excavation to your students and allow them to conduct a simulated dig in a professional and systematic manner.

Archaeology is a discipline, a systematic approach to uncovering the past, and a way of thinking. Archaeologists dig up and study the physical (material) remains of people who lived long ago, including their public architecture, private houses, art, objects of daily life, trash, food, and more, to answer questions about who the people were, how they lived, what they ate, and what their lives were like. An archaeological **site** is any place where humans left remains. The **material culture** (the objects and structures) people leave behind give us clues to their beliefs and behavior.

Tangible remains of cultural behavior include the tools, houses, art, food, and other objects and structures of people who lived in the past. Remains made of inorganic (never living) materials, such as stone and clay, survive better than those of organic (once living) materials that can decay, such as wood, plant fibers, and animal hides. Both survive best in dry, sealed (air-tight) environments.

The objects, tools, pottery, and other items people used that have survived to be found by archaeologists are called **artifacts**. Artifacts are made or modified by humans and are portable. **Features** are structures made or modified by humans, such as buildings, pits, post holes, and caves. Features are not portable.

Context is the association of artifacts and features found within a particular area or layer, and the relative position and relationship of this area or layer to the ones above it and below it. The context of archaeological finds is what allows archaeologists to interpret them and understand their function and meaning.

Strata (layers) are soil, rubble from fallen buildings, and other debris that have built up in layers around the artifacts and features of past cultures. Successive strata may reflect entirely different time periods and cultures or different times within a single culture. Older layers are on the bottom, unless an earthquake, human activity, or other catastrophic event changes their position.

Human theft and re-use are significant reasons why objects, art, structures, and sites disappear.

- Buried sites are seriously damaged by illegal digging, or looting, a form of theft.
- Even very large, famous monuments (the pyramids of Egypt, the Colosseum in Rome) that have been in view, unburied, for thousands of years, have suffered during the periods when they were not considered culturally important and protected. Aside from some damage by time and weather, the exterior stones of the pyramids and half the outer ring wall of the Colosseum, along with all its structural and decorative stone and metal attachments, were removed and re-used by people. On a smaller scale, vandals and graffiti also damaged the sites. Now that the monuments are tourist attractions, they are protected again by society.

Students may wonder how a site can become covered over with layers of soil.

- Think about what happens today if the trash collectors go on strike. In the ancient world there was generally no trash collection, and since foodstuffs and many of the materials people used were bio-degradable, ordinary trash could build up, decay, and turn into soil on a site even while it was inhabited. After a while, people sometimes needed to raise their floors or their entire houses above the accumulated sediment. This might happen several times, and each rise in floor level left a new layer.

- Disasters cause strata to form. If houses burn down in a fire or are damaged by an earthquake, the owners may not clear all the rubble away, but rather smooth the site over and build on top. The new houses will be located in a new layer above the layer of earlier houses. If many houses burn down, a whole city may rebuild itself on top of the fallen houses. A city that started on flat ground may end up on a hill made of earlier layers, each layer from a different time the houses burned or were re-built for other reasons. Repeated floods may similarly damage a site and cause layers to build up.

One famous ancient city in Italy, Herculaneum, was located near the volcano Mount Vesuvius. Lava and mud from the eruption of the volcano buried the city. The ashes hardened and turned to stone. Many hundreds of years later a new city was built on top of the stone, right above the old city.

- If people abandon a city (perhaps because of drought or war), the houses eventually start to fall down from neglect. People scavenge building materials, animals move in, and grass and trees start to grow over the structures. After a long, long time, the city can disappear from sight, covered by dirt and greenery. There is part of a chapter in Kenneth Grahame's *Wind in the Willows* that deals with just this circumstance. In it, Badger explains to Mole how the many tunnels that form his underground residence were formed (Chapter IV: Mr. Badger).

Excavation

Excavation is one way archaeologists find out about a site, but it is not the only way, and not the first way. When archaeologists dig, they always do so for a reason, and they have some information about the area that leads them to think they will find a site. They are knowledgeable about the place being excavated, and they have specific questions. They do not just look around for somewhere to dig and then go treasure-hunting. Reading stories, listening to farmers' reports, examining maps, walking the landscape to get a big picture of possible habitation, using technology such as ground-penetrating radar to peer under the ground—these and other techniques all help archaeologists figure out where and when people lived in an area.

In classroom excavations, you should know the story of the site and stress in your back story that there have been surface finds leading to an interest in digging the cake/shoe box/schoolyard area. Ideally, the dig will begin with examination of such finds. You should design the dig with a story in mind and, after showing students the surface finds, discuss with them what kinds of inferences or hypotheses they can generate. Alternatively, you may choose to start with the story to engage younger students' interest.

Excavation units

Archaeological sites are generally divided up into squares to help archaeologists record finds precisely as they dig. The small-scale digs described here are created in a square or rectangular cake pan, in a rectangular shoe box, or (in the schoolyard digs) in larger squares or rectangles dug into the ground. These mirror the shape of archaeological excavation units.

Digging with trowels

When digging, archaeologists excavate horizontally and do not dig holes. They use flat masons' trowels, which are more like scoops, rather than gardening trowels. This is because archaeologists remove soil in flat, horizontal movements designed to expose, but not scoop out, artifacts. They do not remove any finds until they have noted their positions and found all the objects around them that could be related in some way. Otherwise, archaeologists could miss important associations between artifacts, or they might accidentally dig through two layers and merge the artifacts from different contexts.

Since trowels do not come in small enough sizes (and can be expensive), for most of our dig lessons students use spoons, even though these are not ideal. Spoons are more like gardening trowels than masons' trowels, and it can be hard to use them without digging holes, especially since the soil in a simulated dig is far looser than in a real site. Nevertheless, you should emphasize the principle of horizontal excavation. Since the shoebox sites are small, it is possible to pack the soil down firmly and to dig carefully, removing small spoonfuls of soil and using proper procedures.

Numbering layers, contexts, and finds

Archaeologists record everything, and they do so far more carefully than will be possible for students, especially younger ones. Every find is recorded horizontally and vertically, and not just each layer, but also each feature and each change within the layer is also numbered separately.

In a relatively simple simulated dig, just keeping track of layers will be sufficient to make the point that preserving context is important. However, it is essential to label and bag artifacts separately, even those from the same layer, whenever there is something clearly different about their environment. Changes in soil texture, soil color, and finds signal a significant difference that must be noted. A trash pit dug into a floor or a ring of stones used as a fire pit will be given its own number and the finds will be separately labeled. When excavators do not see any changes, or are not sure exactly what they are seeing, they generally make a transition to a new layer at a pre-determined, arbitrary depth, such as 10 cm. They do this to ensure that they are not accidentally mixing artifacts from different contexts.

In most cases, it will not be possible or productive for you to enforce this level of care in recording, but you should emphasize the basic principle and require some form of record-keeping.

Noticing changes within and between layers

As they dig, archaeologists pay attention to the color, texture, hardness, composition, and even smell of the soil they remove. In the cake excavation, students will be able to note color and perhaps smell as they dig, and the layers may have texture differences as well (or texture can be added in the form of nuts and raisins). In the shoebox digs, there should be differences in soil color, texture, hardness, and composition. Even the odor of a layer may be enhanced by adding herbs or ground coffee. A schoolyard dig, if composed of only one layer, can incorporate horizontal changes; for example, a “fire pit” (a circle of stones with charcoal inside) could have darker soil above or in it, perhaps darkened with ashes or dark potting soil.

When students notice a change in a layer or encounter artifacts, they should dig more slowly, removing small amounts of soil horizontally rather than digging more deeply in one area. They can brush finds to expose them. As they remove spoonfuls of soil and put them into a container, they should check for small artifacts that they might have missed. Ideally, they will sieve the soil as archaeologists do. Only when they have exposed all the artifacts at the same level, may students remove them and bag them, labeling the bag with the specific, unique layer number.

Archaeologists generally sieve the soil they excavate, either gently shaking the dry soil through a screen, or floating the soil in water before screening it (water-sieving) to catch small objects, seeds, and other finds missed during digging.

Top plans and record sheets

Even with very young children, you should make an effort to explain the concept of a top plan (used to record the location of all artifacts in a square in every horizontal layer) and a record sheet (used to list finds, describe and possibly draw artifacts, and write comments about the objects, their context, and the layer in which they were found). You should help students draw the rough location of artifacts on graph paper, and children should record to the best of their abilities the types of artifacts in each layer, possibly describing and sketching each artifact as well.

- A simple top plan for each layer can consist of a sheet of graph paper with a square or rectangle drawn on it representing the top view of the cake/shoe box/schoolyard excavation area.

Students who are too young to measure artifacts and plot them on a top plan, can practice with two pieces of graph paper on which the dig square is outlined. On one, the teacher sets out small pieces of candy. Students count down and across to locate the candy, and then they do the same on the other piece of graph paper to plot the point. If they plot all the candy correctly, they may be allowed eat it. The teacher can substitute raisins or small keepsake objects instead.

- Sample record sheets are included in the lessons. The record sheet may need to be varied slightly depending on the age of the students and the number of artifact types in each layer. You can create your own record sheets based on the ones included in this lesson.

Dig Design Tips

- Students will be able to identify the transition from one layer to the next more easily if the colors of the layers are different. Sand, dark soil, and white vermiculite can be included to create strata of varying colors and textures. You can also mix in other components (coffee, sugar, herbs, birdseed) to add more variety in texture and even smell. (Caveat: additives can sometimes sift down into lower layers and confuse the diggers.)
- On a real dig, the soil becomes compacted and objects are held in place. The soil on simulated digs is generally loose, which makes it easier for objects to be moved out of position. When creating a dig, you should compress the soil layers as much as possible to mimic the harder layers on a real site.

- You should know the story of the site and keep it in mind while designing the dig. The changes that occur in the artifacts from one layer to the next cannot be haphazard; they should make sense and allow students to make inferences and develop hypotheses as they dig.
- To help students analyze the dig site and test their assumptions, some surface finds should be visible to indicate the nature of the site. Alternatively, the site can be imagined as already partially uncovered. Some finds may even seem contradictory. Before students begin to dig, they should discuss what they expect to discover based on the finds. Then, as they excavate, they can revise their ideas and reinterpret.
- Preserving the context of finds is important, not just for comparing the finds from one layer to the next, but also for identifying artifacts associated meaningfully within a layer. Ideally, artifacts that are separated but belong together can be included in some of the simulated dig layers. Students will see how careful, horizontal digging and brushing expose the full context and clarify the connection between finds. For example, a pot's shape or design may only be recognizable once all the pieces have been found, or its function only understood once the spilled contents have been excavated.
- Recording and measuring are essential. Even very young children should attempt to record and draw the site and finds as well as they can.

Start and End with Questions

Start by asking what conclusions students draw from the surface finds. *What do they expect to find as they dig? What questions do they have?*

What do students think they might notice about the artifacts in different layers that would suggest a change within the same culture rather than a change to a different culture?

Students can be guided to think of an answer using artifacts relevant to their grade level.

- A change in Game Boy typology or skirt styles might show a change within one culture, or the frequency of appearance of certain song titles might increase or decrease.

What might suggest a completely different culture?

A change to different, all-new artifacts between one layer and the next might show a more sweeping change in people or culture. The language of written documents might change, for example. Evidence of violence followed by new types of artifacts might reveal cultural changes associated with war. The following lesson plans reinforce the importance of noticing changes.

- In the **Layer Cake Archaeology** project, students will see a site in transition: from a bottom layer containing a work area (or a burial ground, if appropriate), to a middle layer where

artifacts from the daily life of two contemporary cultures were preserved, to an upper level containing objects from the one culture that survived, topped off with a modern trash dump on the surface.

- In the **Transparent Shoebox** and **Shoebox Digs**, a change in the material culture of different groups with different interests is shown through changes in food and artifacts.
- In the **Schoolyard Dig**, you will have the greatest opportunity to develop a complex site and “back story” in just one layer. One-layer sites are more than sufficient for teaching the importance of digging carefully and preserving artifacts’ relationships to the objects around them. One realistic way to do this is to place related objects near one another (such as a bowl and a spoon, or the beads of a necklace). Another is to break something (a pot with an image that cannot be fully understood if pieces are missing, for example) and scatter the pieces in the same area. If a two-layer site is possible, cultural change can be indicated in a wide variety of ways, including a change in ceramic style from one pot type in one layer to a variation or a totally different type in the next.

Site Introduction Sample Story

Sample (very simple) story

Bottom layer D (sand): artifacts include popcorn, plastic gems, one marble. If possible, arrange gemstones in a circle to reveal the pattern they may have formed in a necklace or bracelet. Do not explain the marble; students will draw their own conclusions later.

Long ago there was a sandy desert in this part of the world. The sun was very hot, and the people who lived in the desert used to make popcorn by putting the kernels out on hot rocks. The popcorn-eaters did not use money; rather, they traded jewelry for the corn grown by farmers who lived far away near a river (where corn could grow because there was soil and water instead of sand!).

Middle layer C (soil mixed with birdseed): artifacts include coins.

After many years something very upsetting happened. The farmers stopped growing popcorn! They started producing birdseed, AND they wanted money for the seeds, too—not jewelry. The popcorn-eaters tried to adapt. But they had very little money and they really hated to eat birdseed. “What do they think we are, birds?” they said. They became so discouraged that they moved their whole village 100 miles to be near some other farmers who still grew popcorn and were willing to trade. The popcorn-eaters left behind the birdseed they hated, and money, too.

The whole area was abandoned for a while.

Top layer A (left/west) (soil): artifacts include plastic bugs and another marble exactly like the one in layer D.

Top layer B (right/west) (soil mixed with sugar crystals): artifacts include dried pasta.

Long after the unhappy popcorn-eaters left, the far-away river changed its course and brought water to the desert. The dry desert became green. Now there were soil and grass and trees. Two new groups of people moved into the area. They lived side-by-side, but they lived their lives in very different ways. For example, one group liked to eat bugs, and the other, pasta. One group liked sugary sweets, while the other did not.

Assessment for Mini-Dig

There are questions in the teacher support material that you can craft into an assessment immediately following the shoebox dig. If you would like a more in-depth assessment of your students' archaeological knowledge and skills, use the Layer Cake Archaeology Activity (https://www.archaeological.org/pdfs/education/digs/Digs_layer_cake.pdf). Some of the possible areas to assess can include:

- Developing research questions and rationales for those questions;
- Use of a systematic method to excavate a dig site;
- Recordkeeping as layers are uncovered and artifacts are discovered (field notes);
- Recognition of the fact that excavating destroys a site, therefore documentation is essential;
- Designation of roles and responsibilities in the excavation team;
- Ability to clearly explain their methodology, findings, and their interpretation of their findings.

Assessment components:

- Excavation plan (with research questions, methodology, tools, sampling, and team responsibilities)
- Field notes (data)
- Field report (interpretation of data and conclusions based upon those data)