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Taking Archaeology to the Classroom: A Model for a Fifth Grade In-class Fieldtrip

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TAKING ARCHAEOLOGY TO THE CLASSROOM:
A MODEL FOR A FIFTH GRADE IN-CLASS FIELDTRIP

by

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Public archaeology has grown over the last decade due to interest in the field and Cultural Resource Management requirements (Smith and Smardz 2000:25). One group that is often overlooked in outreach efforts is children.

For my thesis I designed an in-class archaeology fieldtrip for fifth grade students. The overarching goal of my program is to introduce children to the field of archaeology in an age-appropriate way that teaches basic archaeological concepts and generates interest and awareness of the field. To create the strongest program possible I conducted research on outreach programs, and surveyed public archaeologists and teachers to determine what elements they would like an archaeology program for fifth graders to include. Synthesizing research and teacher and public archaeologist responses has allowed me to create a program that utilizes successful methods of instruction and is mutually beneficial to all parties involved.

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CHAPTER ONE: INTRODUCTION

"Archaeology has a mysterious hold on people, conjuring up notions of intrigue, romance, excitement, and discovery" (Smith and Smardz 2000:27). Interest in the work of archaeologists, as well as Cultural Resource Management project requirements, has resulted in the growth of public archaeology over the last ten years (Smith and Smardz 2000:25). Public archaeology combats the idea that archaeology can "benefit humanity" without ever engaging with it and consists of outreach and education programs designed to generate interest in archaeology and educate members of the public about what the field of archaeology involves (Christensen 2010:21).

A large group often ignored in outreach programs is children. Like adults, children have an interest in archaeology, and "[c]hildren also have a remarkable way of influencing the attitudes of adults in their lives" (Smith and Smardz 2000:28). Educating children about archaeology not only helps create an informed public, but also indirectly educates parents and guardians. Outreach programs for children are important for several reasons. First, many people have misconceptions about the field of archaeology that are encouraged by romanticized media portrayals of archaeologists and excavations. Often in their quest for providing entertainment the media presents false portrayals of archaeology that are adopted by the public as true depictions. Teaching children about archaeology will help prevent myths about the field from influencing the way that people think about the material past, its discovery, and its protection. A second reason why outreach programs for children are important is because many people do not have an opportunity to learn about archaeology until they reach college, and by this time students

may have already identified what field of study they want to pursue. Making children aware of the field of archaeology will allow them to consider another possible profession when they get older. Finally, outreach programs for school children are important because many students have limited opportunities for exposure to archaeology outside of school; taking a program to students eliminates this obstacle.

For my thesis research, I have drawn upon information gained from other outreach programs and public archaeologist and fifth grade teacher survey responses to design a unit of instruction to teach children basic archaeological concepts. The audience for my educational program is fifth grade students in the Lincoln Public School district who likely have no prior knowledge of archaeology, and the lessons are designed to be used in the context of an in-class fieldtrip. The number of students taught will vary with the size of individual fifth grade classes, but is estimated to be between 20 and 25 students.

The overarching goal of my program is to introduce children to the field of archaeology in an age-appropriate way that teaches basic archaeological concepts and generates interest and awareness of the field. The best possible outreach program for teaching fifth grade students about archaeology will combine the material that archaeologists want the public to know, material that teachers want included in lessons, and activities that interest and engage students, resulting in a program that is not only educational but appealing to all parties involved in its construction and implementation. In order to determine what material is of interest to archaeologists, teachers, and students, I conducted surveys to gather information on elements that each group would like to see

included in an archaeological outreach program. Conducting research and utilizing feedback from students, teachers, and public archaeologists has allowed me to determine the most effective and engaging ways to teach basic archaeological principles to fifth graders in the form of an in-class fieldtrip.

In order to understand the decisions made concerning the structure of my in-class fieldtrip it is necessary to understand previous outreach efforts as well as different methods that have been used to teach children. The second chapter of my thesis discusses outreach programs run by various organizations and what can be learned from each approach, and the third chapter discusses the benefits fieldtrips provide for learning. The education standards and survey responses used to help shape the in-class fieldtrip are discussed in chapter four. In chapter five I focus on the importance of learning objectives and the different methods of teaching and assessment used in the fieldtrip. The sixth chapter is a summary of the seven possible lessons that comprise the in-class fieldtrip, and is followed by the thesis' conclusion. The appendixes contain the lesson plans for the in-class fieldtrip as well as the surveys given to public archaeologists and fifth grade teachers.

CHAPTER TWO: PUBLIC ARCHAEOLOGY IN VARIOUS FORMS

My thesis project is situated in the relatively new domain of public archaeology. This chapter explores what public archaeology is and the different approaches used to conduct archaeological outreach efforts. Before my program can be discussed, an understanding of how the public views archaeology and the different ways archaeologists can work with the public is necessary to understand the foundation and framework of archaeological outreach in which my in-class archaeology program was created.

Public Archaeology

Archaeology captures the imagination and many people envision archaeologists as khaki-clad adventurers digging random holes that yield buried treasure (Dyer 1983:6; South 2010:71). Evidence of the public's fascination with archaeology and the past is supported by the fact that "cultural tourism is the fastest growing aspect of tourism in the world today" (Prybylski and Stottman 2010:130).

Despite a growing interest in the past, for the majority of people, contact with archaeology and those employed in the field is infrequent and student exposure to the subject prior to college is hit or miss (Dyer 1983:5). This separation between an interest in the past and those who study it has created the belief that archaeologists are part of a "separate entity that bestows upon or shares knowledge [of the past] with the public" (Stottman 2010:6). The division between archaeologists and the general public has also created the impression that archaeology is something that only trained professionals can

do, and those interested in the field are often unaware of opportunities to be involved with research (Chidester 2010:89).

A lack of understanding about the field of archaeology also contributes to public misconceptions of the field. Archaeology is considered a way of authenticating evidence of the past, whether the past refers to the history of an area or a people (Lipe 2002:20). Unfortunately many people see archaeology as only providing proof of a past and discovering artifacts that can be used to augment history rather than reveal new information (Chidester 2010:89). Because archaeology is often connected with the past, it can be difficult for people to understand connections between archaeology and modern issues (Chidester 2010:89). Finally, a lack of communication between archaeologists and the public not only affects the limited view of what the field consists of, it can also affect the funding archaeologists receive for projects. Professional archaeology is often funded by the public, and the romantic notion of archaeology makes it less likely that people will fund necessary, but often mundane, projects (Smith and Smardz 2000:27).

One reason for the gap between the public and archaeologists is that, "[t]he benefits of archaeological research are often not directly accessible to the public because the work is highly technical, and research results are generally published in books and articles written primarily for other archaeologists" (Lipe 2002:20). Minimal dialog between archaeologists and the public has resulted in incorrect information being given about the field by those who are interested in the topic but have no education in the field. Efforts to include archaeology in the classroom are done with good intentions, but information given to teachers regarding the subject can be misleading. One book written

for social studies teachers states: "Archaeology is defined as the science or study of prehistoric antiquities such as the remains of buildings or monuments, bones, or other relics…While prehistory is not readily understandable to young children, they all know about dinosaurs and enjoy the study" (Wallace 2006:265). Archaeologists need to become involved in teaching children about the field not only to help fill the demand for archaeological education, but also because if archaeologists are not involved in the educational process children may receive incorrect information.

Despite the gap between the public and archaeologists, interest in the work of archaeologists, as well as Cultural Resource Management project requirements, has resulted in the growth of public archaeology over the last ten years (Smith and Smardz 2000:25). The main goal of public archaeology is to help generate interest in archaeology and educate members of the public about what the field of archaeology involves. Public archaeology does not aim to make the public experts; the public does not need to understand every aspect of archaeological work in order to develop ethical concerns about protecting sites (Smith and Smardz 2000:27). Involvement with archaeological sites can give communities a sense of ownership, pride, and relevance towards their cultural heritage, which can motivate them to protect sites and artifacts (Wilkie et al. 2010:233).

One way archaeologists can help create a more informed public is by talking about ongoing archaeological projects as well as projects which have been completed (Stottman 2010:4). Using the media to communicate findings and goals is one way that archaeologists can alert people to ongoing work and allow the public to become engaged

with projects (Wilkie et al. 2010:238). While communication with the public does not have to include an invitation to participate in excavations, open dialog in an accessible form can help avoid distrust between archaeologists and those affected by their work (Wilkie et al. 2010:238).

The way that public archaeology is considered by archaeologists impacts its ability to create an informed public. "There is a perceived dichotomy between public archaeology and archaeological research that [archaeologists] must work to overcome if [they] wish to play more than a supporting role in the reshaping of popular consciousness of the past" (Chidester 2010:89). This division between public archaeology, as a field of archaeology, and other archaeological interests is perhaps most clearly seen by a divided understanding of what public archaeology is.

Defining Public Archaeology

Discussions of public archaeology have provided anthropological literature with a variety of terms that are defined differently by various authors. Applied, public, activist, action, and community archaeology are common terms that are used interchangeably, but which have subtle differences in definition. Applied archaeology refers to the application of archaeology in the public sphere and the use of archaeology to solve modern problems (Stottman 2010:8). Despite taking place in the public sphere and helping with public problems, applied archaeology does not necessarily involve working with members of the public. Public archaeology, on the other hand, always involves interacting with the

public at some level, and can take different forms such as activist, action, and community archaeology (Stottman 2010:8).

Activist archaeology uses archaeology to affect change and advocate for a community in a way that is shaped by that community and often these communities are small in size (Chidester 2010:89; Stottman 2010:8). Perhaps the most politically aggressive form of public archaeology, activist archaeology is seen as "not just a tool to pursue the past but something that can be used to change the present and future" (Christensen 2010:21; Stottman 2010:8-9). Action archaeology, like activist archaeology, can also be used to empower groups (Chidester 2010:88). The term action archaeology is often used to refer to public archaeology that helps enhance a community's self-determination and provides a community with a sense of scientific validity, however it is rarely discussed in the aggressive manner that activist archaeology is (Chidester 2010:81). In other words, activist archaeology tends to use archaeological findings and interpretations to support modern causes, whereas action archaeology aims to empower communities but does not call for communities to use this empowerment for anything other than a stronger sense of identity. Examples of action and activist archaeology are given in the discussions of Archaeology in Annapolis and the Colorado Coalfield War Archaeology Project, respectively.

Community archaeology includes the community as equal participants in the archaeological process, and "attempts to reduce the risk of imposing [the archaeologist's] sense of importance on the site and alienating the community" (Miller and Henderson 2010:141; O'Gorman 2010:245). Community archaeology can involve many different

communities including local and descendant groups, and serves as a reminder that material culture has different meanings for different people (Marshall 2002:215-216; O'Gorman 2010:255). Because of the large number of communities that can be included, community archaeology embraces the fact that archaeology effects current populations (Stottman 2010:7).

While there are many different ways to approach community archaeology, Moore and colleagues identify a seven part methodology which, "concern all parts of an archaeological project from the initial point of devising research questions or areas of interest, to setting up a project, field practices, data collection, analysis, storage and dissemination, and public presentation" (Marshall 2002:211). Regardless of what methodology is utilized, community archaeology differentiates itself from other forms of public archaeology because the community keeps partial control over all parts of the project (O'Gorman 2010:243). Because of the large amount of community involvement, management and presentation skills are critical skills for those working in community archaeology (Marshall 2002:215).

There are many benefits to community archaeology including hands-on learning, exposure to archaeology, and the presentation of history as something that is tangible (O'Gorman 2010:258). Working on archaeological projects can also give communities a sense of ownership, pride, and relevance with their past, all of which can encourage the public to protect archaeological sites out of a sense of pride and responsibility that otherwise might not exist (Wilkie et al. 2010:233). Despite the many benefits of community archaeology, this area of public archaeology is usually only dealt with as a

part of Cultural Resource Management, and is rarely addressed in academia (Marshall 2002:213).

Regardless of the form that public archaeology takes, the core of all public archaeology efforts is outreach and education (Prybylski and Stottman 2010:132). "The primary purpose of these efforts has been to ensure continuing public cooperation in efforts to protect sites from looting, vandalism, and economic development" (Croft and Pretty 1983:15; Gadsby and Barnes 2010:61). While these are all admirable goals, they are most often done to meet the needs of archaeologists rather than the public (McDavid 2010:36). Because archaeologists tend to view public archaeology as a way to achieve their own goals rather than as a way to consider community ideas, public archaeology is often devalued and pursued only half-heartedly by the archaeological community as something that should be done but is not critical to an archaeological project (Jeppson 2010:78).

There are some shining examples, however, of places in which public archaeology has been strongly developed. Large scale efforts in Great Plains public archaeology are seen at the Prehistoric Indian Village in Mitchell, South Dakota, and the Hudson-Meng site in Nebraska. Other examples of large scale public archaeology programs include Archaeology in Public, part of the Archaeology in Annapolis project, and the Colorado Coalfield War Archaeology Project. In addition to large outreach programs, small scale outreach efforts are examined in the discussion of outreach at Portland Wharf and programs in the United Kingdom. While most of these outreach efforts are conducted on a much larger scale than my in-class fieldtrip, they all

demonstrate how archaeological information can be shared with the public in ways that are both engaging and informative.

The Prehistoric Indian Village

The Prehistoric Indian Village in Mitchell, South Dakota, is believed to have been occupied by the ancestors of the Mandan (Mitchell Prehistoric Indian Village 2012). Archaeologists have been able to understand the lifestyle of the occupants of the site through excavations of lodges as well as middens that contain bone, shell, seeds, corn, pottery, and tools. The Mitchell site was discovered in 1910 by a Dakota Wesleyan student who noticed evidence of past activity in the area. The first map of the area was created by W.H. Over in 1922 and in 1975 the site became a National Historic Landmark. Public archaeology was first incorporated at the site in 1983, when the Boehen Museum and gift shop were built. In 1999 the Thomsen Center Archeodome was built (Mitchell Prehistoric Indian Village 2012). The archeodome is a 10,000 square foot facility that encloses two full lodges of the prehistoric village. Inside the dome there is a full lab, dark room, computer classroom, and a video conferencing studio. Visitors are able to walk around a raised platform and look at the archaeological site from above. Guided tours in addition to posted information give a brief overview of what archaeology involves (Mitchell Prehistoric Indian Village 2012).

Augustana College in Sioux Falls is responsible for the museum as well as conducting and managing all archaeological work at the site. While archaeological excavations have been taking place at the site for several years, the first official field

school took place during the summer of 2010, and included students from the University of Exeter, England (Mitchell Prehistoric Indian Village 2012). In addition to providing field schools for students of archaeology, the center plans on creating opportunities for hand-on training and excavations for the general public. Another way that the archeodome is conducting public archaeology is by providing a free education curriculum that has been developed for the third through twelfth grade, and has three different curricula that correspond to different age levels (Mitchell Prehistoric Indian Village 2012).

Public archaeology at the Mitchell Prehistoric Indian Village is successful for several reasons. First, the site allows people to visit an archaeological site and occasionally provides the opportunity for visitors to watch archaeologists at work. While this may not seem like an accomplishment worthy of praise, one must remember that the majority of people are only exposed to archaeology through television and movies and never have the chance to see what actually occurs during field excavations. Second, the center provides educational materials for schools to teach children about archaeology. Allowing the public to see archaeologists at work and providing materials to help bring archaeology lessons to classrooms are important steps in helping the public gain an accurate understanding of what archaeological work involves and supports introducing people to archaeology while they are still in grade school.

The public archaeology effort at the Mitchell Prehistoric Indian Village is one example of the great strides that have been taken towards decreasing the gap between archaeologists and the general public. The Hudson-Meng site in Nebraska is another

example of a successful outreach effort that teaches visitors about the site's history, the field of archaeology, and encourages the public to draw their own conclusions in how the site was formed.

The Hudson-Meng Site

The Hudson-Meng site is a large bison bonebed that not only serves as an example of an approach to public archaeology, it also presents a study of the way in which site interpretation can change over time. The Hudson-Meng bonebed was first discovered in 1954 during an attempt to create a small stock pond (Fossil Freeway). The first excavations at the site occurred in 1970, and were conducted by Chadron State College (USDA: Forest Service).

At the start of the first excavations of the site there was no immediate evidence of occupational levels above the bonebed so the soil above the site was removed with a backhoe. Within an hour of excavation a projectile point, later identified as made of Knife River Flint, was found associated with the bones indicating human involvement in the deaths of the bison (Agenbroad 1978:8, 5). Analysis of the site's stratigraphy determined that the bonebed was a single unit spread over a large area. This led archaeologists to conclude that the bison were either killed during a single event or during several events in a short period of time (Agenbroad 1978:19). The initial interpretation of the site was that it was a Paleoindian kill site, and the number of bison bones led scientists to conclude that it was the largest kill site ever discovered with over 600 bison present (Fossil Freeway). Although archaeologists believed that the bison at

the site had been killed by humans, "with the carbonate encrustation present on the Hudson-Meng bone, no butchering marks such as cut marks were observed, to allow detailed butchering analysis" (Agenbroad 1978:36). There was also no observed pattern to bone breakage at the site (Agenbroad 1978:36). Rather than interpret the lack of butcher marks and patterned bone breakage as evidence that the site was not a kill site, archaeologists in the 1970s held that this lack of evidence did not disprove their theories as to how the site was created.

Further excavations of the Hudson-Meng site were conducted between 1991 and 1996, 1998, and 2000 by Colorado State University and the University of Wyoming. These excavations were focused on studying the taphonomy of the deposit (USDA: Forest Service). At first archaeologists believed that the site provided evidence of multiple kill events due to the presence of projectile points (Fossil Freeway). Taphonomic studies, however, soon led to the conclusion that rather than multiple small kill events the Hudson-Meng site represented a natural death event such as a fire (Fossil Freeway). Currently studies of site formation processes have been emphasized to allow for a clearer understanding of the cause of death of the bison (USDA: Forest Service).

The Hudson-Meng site is under the administration of the Nebraska National Forest, and is a place where archaeological outreach has been highlighted (Fossil Freeway; USDA: Forest Service). In 1997, a climate controlled enclosure was built over the center of the bonebed to allow the general public to visit the site and discover what archaeology has learned through excavations. Interpretive displays, tours, and science

activities are all present at Hudson-Meng to allow visitors to learn about archaeology through a variety of forms (Fossil Freeway).

Visitors are presented with both interpretations of the bonebed and are encouraged to develop their own theories as to how the site formed (USDA: Forest Service). By encouraging the general public to draw their own conclusions after being provided with the evidence that has been uncovered by excavations, archaeologists are able to demonstrate how data can be used to support as well as debunk different theories of the past.

Although it operates on a smaller scale than the Mitchell Prehistoric Indian Village, the Hudson-Meng site is a good example of another approach to public archaeology. Because the nature of the site is debated it demonstrates to the public how archaeological interpretations are formed as well as how they are supported or disputed. This allows people to gain a better understanding of the dynamic nature of archaeology and become active learners by forming their own theories regarding the site's formation. The Mitchell Prehistoric Indian Village and the Hudson-Meng site are examples of different approaches to large scale outreach programs on the Great Plains. Public archaeology in Maryland and Colorado provide additional examples of how archeological outreach can be conducted.

Archaeology in Public

The Archaeology in Public program was created as part of Archaeology in Annapolis and began shortly after the project commenced in 1981 (Logan 1998:70).

Archaeology in Public was started with the belief that although sites are not excavated purely to educate the public, and although outreach is not more valuable than proper archaeological methods, in order "to be effective and educational, public programs cannot be a secondary priority" (Potter 1994:194). The way in which Archaeology in Public is conducted reflects the use of critical theory by those excavating the site. Critical theory, which is referred to as "critical archaeology" in the program, approaches archaeological interpretations with the belief that circumstances can shape how knowledge is created and that "neutral knowledge" does not exist (Potter 1994:2).

With a foundation in critical archaeology, Archaeology in Public was designed to "help refranchise people with control over their own consumption of history," and "illuminate the origins of certain aspects of contemporary life usually taken for granted" (Potter 1994:167). In order to meet these goals the program was divided into three parts: a guidebook covering one section of the Annapolis Historic District, an audiovisual production, and tours of active excavation sites. Although each part of Archaeology in Public can stand alone the program is strongest when visitors experience all of the activities offered (Potter 1994:169). This belief that program components should be able to stand alone yet are stronger when combined is reflected in my in-class fieldtrip; each segment of my program can be used individually but the effect is greater if multiple segments are used.

Rather than presenting facts or stories, the guidebook offered by Archaeology in Public contains the message that the past has been interpreted differently in various eras and is "not immutable fact" (Potter 1994:171). The tours in the program are also

nontraditional in that they go against the idea that site visitors only want to be entertained (Shackel et al. 1998:4). Tour guides work to demystify archaeology for visitors by explaining archaeological methods of research and excavation. Explanations of archaeological logic and processes not only remove some of the mystery of the science, they also help put archaeologists and the public on equal footings which can lead to more open dialog (Potter 1994:168, 179; Shackel et al. 1998:3). Archaeology in Public tours invite visitors to challenge archaeological interpretations and suggest their own interpretations (Mullins 1998:11). Finally, the program recognizes the importance of evaluating outreach efforts to determine their success. Evaluations are conducted by asking people to complete one-page surveys after site tours end (Potter 1994:193). Like Archaeology in Public, my outreach program includes a means of evaluating the success of the program in teaching archaeological concepts.

At its conception Archaeology in Public was designed without knowing what people wanted to learn about the past, and instead focused on what archaeologists felt people needed to know about the past (Leone 2005:186). Over time archaeologists in the program realized that it is important to know how people think about the past in order to predict how they will react to archaeological interpretations of history (Potter 1994:167). For example, African American history was not initially a large focus of archaeological work in Annapolis and this may have led the African American community to feel their past was not relevant to the city's history (Logan 1998:72). In the late 1980s opportunities arose for archaeological work that would center on the history of African Americans in Annapolis. "Instead of supplying answers for the community about

African American sites in Annapolis, [the program] began the work by approaching members of the community and asking them to help develop research questions and ideas for public outreach programs" (Logan 1998:73).

Perhaps the best example of Archaeology in Annapolis and Archaeology in Public's approach to community and action archaeology is seen in work done at the Anne Arundel County Courthouse site in the summer of 1990 (Logan 1998:75). In 1990 the desire to expand the Arundel County Courthouse created the opportunity for archaeological work that centered on the history of African Americans in Annapolis. The area to be developed had been a predominantly African American neighborhood for over 100 years prior to its destruction in 1970 to build a parking lot for the courthouse (Logan 1998:75).

From the onset archaeologists worked with the Banneker-Douglas Museum, which serves as the interpretive center for African American heritage in Maryland, to design an approach for researching the courthouse site (Logan 1998:73). Work with African American colleagues helped project archaeologists shape research questions for the courthouse excavation. Collaboration made archaeologists aware that many African American were "sick of hearing about slavery" and would rather see the project focus on different aspects of African American history in Annapolis (Leone 1995:262). Together with the Benneker-Douglas Museum, Archaeology in Annapolis decided that research should focus on whether there was an archaeological presence of African Americans at the site, if information regarding free African Americans and their success stories could

be found, and if there was evidence of African cultural influences at the site (Logan 1998:73).

Although many archaeologists are not "accustomed to the idea of negotiating truth values with nonarchaeologists who are affected by [archaeologists'] work" the community and action archaeology used at the Annapolis courthouse site demonstrates that working with communities can be highly beneficial for research and outreach programs (Leone 1995:263). Working with African American communities not only resulted in research questions that may not otherwise have been considered, it also improved public outreach at the site. During the excavations, the courthouse site received more visits by African Americans than any other open site at the time, demonstrating that many communities are interested in archaeology and are likely to participate in outreach if they can see a connection between the archaeology being conducted and their cultural histories (Logan 1998:84-85). The work performed by Archaeology in Annapolis and Archaeology in Public can be considered both community and action archaeology and is an example of a successful effort to bring communities and archaeologists together to improve the public's understanding of archaeology as well as the research done by archaeologists. While the outreach efforts of Archaeology in Annapolis serve as an example of community and action archaeology, work performed by the Colorado Coalfield War Archaeology Project is an example of activist archaeology.

The Colorado Coalfield War Archaeology Project

Archaeology is inherently political and work conducted in Ludlow, Colorado by the Colorado Coalfield War Archaeology Project (CCWAP) "highlights the political nature of history and archaeology" (Walker 2003:76). In order to grasp the political history involved in CCWAP's work, the history of the Ludlow Massacre must be understood.

Ludlow, Colorado became famous as the result of a coalmining strike that occurred in 1913. Members of the United Mine Workers of America (UMWA) went on strike late in 1913 to protest "poor working conditions, substandard pay, and excessive company control" (Chicone 2011:58; Walker 2003:67). Strikers were evicted from company houses and established tent cities, one of which was located in Ludlow, Colorado (Walker 2003:68). In April of 1914 tension between strikers and mining companies erupted in a violent attack on the Ludlow tent city by "coal company employees and Baldwin-Felts Company private detectives under the command of the Colorado National Guard" (Chicone 2011:58). During the attack the city was shot at before being burned. Of the approximately 1,200 people living at the site, twenty-five were killed including two women and eleven children (Chicone 2011:58). The attack on the Ludlow tent city made the strike one of the most violent in American history and prompted the "10-Day War" at other strike colonies. In December of 1914 the strike ended with the defeat of UMWA (Walker 2003:67, 70).

The Colorado Coalfield War Archaeology Project was a multi-year project designed to study the history of the strikes and the people that participated in them (Walker 2003:66-67). Work at the site revealed that the "memory of Ludlow remains an important one to working-class people and organized labor and is still annually commemorated" (Walker 2003:73). Rather than working with a passive audience, archaeologists found themselves among people who challenged archaeologists' ability to change and reshape the past through their work without community involvement and/or permission (Walker 2003:75). Public concern over preserving the memory of the Ludlow Massacre began shortly after the attack, and was the driving force behind UMWA's purchase of 40 acres of land surrounding the site before 1916 (Walker 2003:72). UMWA's ownership of the site forced archaeologists to interact with communities that highly value the site's history and are concerned with its interpretation.

One way that archaeologists collaborated with the public was to allow groups, such as the UMWA Local Women's Auxiliary, to review work that would be put on the display. A review of an interpretive kiosk to be placed at the site resulted in suggestions that "centered on strengthening the connection between the Ludlow Massacre and contemporary labor struggles in the area, thus ensuring that Ludlow was not consigned to a dead past-something the very presence of archaeologists may tend to suggest" (Walker 2003:75). In addition to displays, the connection between the Ludlow site and modern labor struggles has been emphasized in 1998 and 1999, when 400 steelworkers "marched to Ludlow carrying a banner listing all the strikers killed there" (Walker 2003:73).

Power has always played a role in constructing social memory, and the silencing

of past labor struggles is not surprising. Evidence of labor struggles goes against the idea that America is a classless society, and unlike some archaeological research subjects, labor struggles are ongoing rather than being historically distant (Walker 2003:66,74). The Colorado Coalfield War Project was designed to be an "archaeology of the American working-class that [spoke] to a working-class audience about working-class history and experience" (McGuire and Reckner 2005:218). Although the Ludlow Massacre is well recorded, most documents focus on the political responses to the strike rather than the lives of the people living at the site at the time of the massacre. Archaeological research at the site focused on the everyday lives of the strikers and their families. The focus of the research humanized the strikers by discussing them in "terms of relations and activities that…modern audiences also experience," such as family life, which can help modern audiences "understand the harshness of the striker's experience" (McGuire and Reckner 2005:224, 232). Archaeologists also examined the ways in which class and ethnicity were seen in the archaeological record to gain a better understanding of the ways that "class and ethnicity cross-cut both workplace and home, male and female" (McGuire and Reckner 2005:225).

The Ludlow site is an example of activist archaeology because the site is highly valued by local communities and miners, and the memory the strike is still called upon by groups facing current labor struggles. Because of the importance that the site holds for modern communities, some members of the public were hesitant to allow archaeological work to be conducted due to concern that the material past would be interpreted in a way that would contradict or belittle public memory of the site. Archaeologists worked with

the public to explain their interest in the site and establish trust between the two groups. The activist archaeology performed by CCWAP shows that "the histories of Ludlow are not simply lying in the group waiting for archaeologists to dig them up," they are still in the minds of communities that use them to support their causes (Walker 2003:71).

Other Public Outreach Programs

Not every archaeological project can be categorized as community, action, or activist archaeology; some programs are designed with the sole purpose of educating the public about archaeological methods and concepts. At Portland Wharf the public is given the opportunity to learn about archaeology at "public information meetings…walking and trolley tours, school visits, public artifact washing nights…public excavations" and exhibits at local festivals (Prybylski and Stottman 2010:133). The outreach efforts at Portland Wharf in Kentucky are an example of programs that can reach people of all ages without spending as much money as larger programs, like the Mitchell Prehistoric Indian Village and Hudson-Meng site, require to operate.

Outreach efforts also occur outside of the United States. The Young Archaeologists Club in the United Kingdom is a club aimed to get children between nine and sixteen years of age interested in archaeology (Lavell 1983:56). Studies have been conducted to determine the ways in which the public, especially children, understand the past. A study was conducted between 2003 and 2004, by Anders Högberg, to determine what sites modern school children would want to preserve for future generations (Högberg 2007:38). Students were allowed to choose what sites they wanted to protect,

and their choices revealed that they wished to preserve sites which had an everyday importance for them (Högberg 2007:38). The locations chosen by students can be thought of as "framework[s] for memory" because the children did not distinguish between sites and important events associated with the sites (Högberg 2007:41). The places the children wished to protect were always locations that were personal and were often associated with an emotional or private event, such as the burial place of a pet or their favorite secret fort (Högberg 2007:39-40).

Högberg also ran an educational program in 2004, titled Archaeology for Everybody, designed to teach children about archaeology (2007:31). In Archaeology for Everybody, 45 students, all around eleven years of age, were taught about an Iron Age house located near their school. Lessons included studying maps, writing and presenting reports, taking guided walks around the site, and helping with excavations of the house (Högberg 2007:31). Despite the high level of involvement that students had with the project, Högberg discovered that time perspectives were either not clear or were unimportant to students, a fact which was demonstrated in the models of the Iron Age house that students constructed at the end of the unit of study. "In building models [the students] preferred to use the mythical Viking Age as a framework for their narratives, rather than an empirical foundation in the shape of documentation material from the investigation of the remains from the Early Iron Age, which they themselves had taken part in" (Högberg 2007:34). One example of the way in which students incorporated elements of the present into their models was by giving the occupants of the house a

modern family structure, that of an immediate family, rather than a more historically accurate extended family structure.

Högberg's project brings to light the fact that many people, especially children, view the past as the present only with different material "props." While Archaeology for Everybody may not have succeeded in teaching children everything about the Early Iron Age, the program certainly left students with a better understanding of the past and the field of archaeology than they had before they took part in the unit of study.

Conclusion

The variety of public archaeology outreach and education programs taking place is proof that the public is interested in archaeology. Outreach efforts that allow the public to watch archaeologists at work and become active learners take the field of archaeology out of the textbooks and into tangible situations that can be experienced by people of all educational backgrounds. Community outreach efforts like those in Annapolis and Ludlow, Colorado, which allow members of the public to help archaeologists form research questions and determine how information will be publicly displayed, remove the division between archaeologists and the rest of society by placing all parties on equal footing concerning how archaeological work is conducted. Although outreach programs which give people a voice in the archaeological process are the most effective way to bring archaeologists and members of the public together, programs that teach people about archaeology are also important in helping to create an informed public. While outreach programs that allow people to interact with archaeologists should be created for

all members of the public, the rest of my work will focus specifically on outreach programs designed for children.

CHAPTER THREE: LEARNING THROUGH FIELDTRIPS

This chapter examines the learning benefits that fieldtrips can offer students as well as the obstacles that schools face organizing off-campus trips. Also discussed is the importance of collaboration between public archaeologists and teachers to create a mutually beneficial program for students.

Outreach and Children

There are many questions and theories regarding the best way to teach children about archaeology (Högberg 2007:28). Questions include whether lessons should focus on methods, narratives, or should merely offer children a unique experience (Högberg 2007:43). If approached correctly, archaeology programs can offer students all of these things as well as a greater appreciation of the past.

Children are an important group for outreach programs to connect with because "the most educationally vulnerable part of the general public is at school" (Croft and Pretty 1983:15). Students attend school with the expectation that learning will occur, making them a perfect audience for educational programs. While many teachers are interested in introducing archaeology to their students, archaeologists are unable to frequently speak at schools because teachers are often unaware of organizations to contact in regards to having archaeologists visit classrooms (Johnson 2000:72; Wheat 2000:177). Because speakers are infrequent, some teachers attempt to teach students archaeology on their own. While such efforts are done with good intentions,

misconceptions are frequently taught as facts. For instance, the study of dinosaurs has been used as an example of archaeology (Wallace 2006:266).

Outreach programs are not designed to teach grade-school students complicated material or theories. "The purpose of archaeological study in early childhood classrooms is…to whet students' appetites for learning and to stimulate interest in learning more about the world around them" (Wallace 2006:267). Archaeology is well suited for children, especially fourth through eighth graders, because in elementary education science and social studies are taught topically. Topical curricula can incorporate archaeology by connecting it with subjects already being discussed, such as prehistory (Wheat 2000:119). Archaeology benefits schoolchildren by showing that the social sciences have many disciplines and areas of active research, and that learning about the past involves more than memorizing names and dates (Melber 2008:49). The interdisciplinary nature of archaeology can also help students see how different areas of study work together to answer questions (Wheat 2000:119).

Despite the fact that archaeology can help students gain a better understanding of the social sciences, "teachers are generally hard-pressed to add yet another subject area to their teaching load, especially one with which many are relatively unfamiliar" (Wheat 2000:117). Schools may also lack the materials needed to conduct engaging lessons about archaeology (Dyer 1983:8). One way schools help students learn about topics that teachers are unfamiliar with is by taking fieldtrips. Fieldtrips benefit students in many ways and can increase learning and motivation. If science is always taught in a second-hand manner, via lectures and discussions, it can become boring, abstract, and children

may struggle to connect it with their lives (Abruscato 2000:10). A lack of stimulation in the classroom can also lead to behavioral problems, which can result in decreased learning (Clark and Starr 1991:88). Fieldtrips are one way in which schools are able to provide students with novel and engaging learning experiences.

Fieldtrips

One definition of a fieldtrip is: "A trip arranged by the school and undertaken for educational purposes, in which students go to places where the materials of instruction may be observed and studied directly in their functional setting…(Good:239)" (Krepel and DuVall 1981:7). Rather than being seen as an extra activity or frivolous use of time, fieldtrips should be considered part of a class's curriculum needed to help students understand complex concepts (Melber 2008:119). Fieldtrips can take place at the beginning, middle, or end of a unit of study and are an extension of what students are learning in the classroom (Lankford 1992:4; McKay and Parson 1986:5). In addition to serving as an expansion of the curriculum, fieldtrips offer students the opportunity to be exposed to places that they might not otherwise experience and engender "cooperative working with other students, behavioral responsibility, leadership skills, social sensitivity and occupational interest" (Kisiel 2005:946; McKay and Parson 1986:7).

Fieldtrips can "connect with curriculum, provide a learning experience, provide a change of setting, provide enjoyment or reward, and satisfy school expectations" (Kisiel 2005:940). Of these motivations, the most common reason teachers give for taking students on a fieldtrip is to clarify material covered in the curriculum (Kisiel 2005:940).

Perhaps the biggest argument for taking students on fieldtrips is to "give students first-hand experiences that would not be possible in a classroom setting" (Hofstein and Rosenfeld 1996:96; Kisiel 2005:949; Lankford 1992:4; McKay and Parson 1986:7). According to Orion and Hofstein (1994), fieldtrips can create three types of novel experiences for students: cognitive novelty (concepts and skills), geographical novelty (location), and psychological novelty (based on previous experiences) (Hofstein and Rosenfeld 1996:98-99). Although the location and focus of fieldtrips may not be chosen directly by the students, the experiences and the ways in which students engage with material on trips is different from what normally takes place in a classroom and allows for a novel learning experience (Kisiel 2005:949).

Providing personal experiences makes fieldtrips attractive for schools; "many teachers are strongly motivated to take fieldtrips because they believe that firsthand experiences will in some way enhance student understanding of the curriculum" (Kisiel 2005:941). Learning through direct experience adds realism to studies which can help students understand abstract concepts (Krepel and DuVall 1981:9; Lankford 1992:5). Children can struggle with facts and skills taught in isolation from larger concepts, and the "most authentic way to explore the work of social science researchers is to take part in similar skills and processes" (Melber 2008:50; Wallace 2006:5).

Science is based on inquiry, and successful fieldtrips emphasize and allow students to take part in this process (Krishnaswami 2002:xiii). Inquiry-based learning allows students to be active and engaged in the learning process (Krishnaswami 2002:xiii; McKay and Parson 1986:7). One way students can engage in the process of

inquiry is by handling objects. Hands-on activities can spark student curiosity, lead students to ask more questions, and are generally the most effective way for children to learn science (Anastasiou 1971:41; Gega 1994:98, 51). Active participation in the form of handling objects can also help keep students interested in material and motivated to learn (Clark and Starr 1991:88; Krepel and DuVall 1981:9; Melber 2008:50; Sheppard 1993:37).

Another way to engage students with fieldtrips is by having them develop their own questions because students "seek answers more consistently when the questions are their own" (Krishnaswami 2002:4). Students learn best when they have ownership of the learning process and are not just parroting facts from teachers; there is "a special motivational aspect in finding out something for oneself" (Borich and Tombari 2004:200; Howe and Jones 1998:146). With active learning, "students are no longer passive learners of history but become archaeologists, searching, constructing, making assumptions, and drawing conclusions related to their findings" (Garfield and McDonough 1997:2).

While learning is the most important goal for students on fieldtrips, it is not the only goal (Kisiel 2005:948). Other teacher-identified goals are for students to: have a positive experience, increase motivation or interest, demonstrate good behavior, ask good/relevant questions, and to have a trip occur without any incidents (Kisiel 2005:944). Both teachers and students expect trips to provide fun as well as learning (Kisiel 2005:937). People usually learn more in tension-free environments, and a study conducted by Falk and colleagues (1998) revealed that museum "visitors with a self-

described entertainment agenda showed higher levels of learning compared with other agendas" (Kisiel 2005:937; Sheppard 1993:9).

One reason students learn well on fieldtrips is because they view the science taught on trips differently than science taught in the classroom, and often "school science" is viewed more negatively than other "science" (Hofstein and Rosenfeld 1996:101). Not only do students view "science" and "school science" differently, "support for the notion that science material is used differently by school teachers who tie the material directly to the school curriculum and by science club leaders who emphasize the 'fun' aspect of the same activities, was presented by Yaakobi (1981)" (Hofstein and Rosenfeld 1996:102). Table 1 illustrates some of the differences that students perceive between formal and informal learning environments, and supports the theory that students view content taught in different settings as different in multiple ways (modified from Hofstein and Rosenfeld 1996:89 in turn modified from Wellington 1991:365 and based on Rommey and Gassert 1994).

One way fieldtrips make learning fun is by using encounter as a basis for learning (Sheppard 1993:3). Everyday students are exposed to large amounts of information both in and out of school; however most of this information is not gained through physical encounters but is instead received through audio or visual means (Sheppard 1993:3). Because fieldtrips often focus on the "fun" aspects of learning and "generate their own interest and enthusiasm it makes the learning of inductive and deductive reasoning skills, problem solving, and data selection, gathering and testing a pleasure" (McKay and Parson 1986:7).

Table 1

Features of Formal and Informal Learning

Formal Learning	Informal Learning
Compulsory	Voluntary
Structured	Unstructured
Evaluated	Unevaluated
Close-ended	Open-ended
Teacher-led	Learner-led
Teacher-centered	Learner-centered
Classroom context	Out-of-school context
Curriculum-based	Non-curriculum-based
Solitary work	Social intercourse

Although teachers recognize the importance and benefits of fieldtrips, there are several obstacles that must be overcome before students can take any type of educational excursion. A study conducted by Ayars found that there are several reasons why teachers may opt not to take students on a fieldtrip, including: "too full schedules, lack of transportation, too many pupils in classes, course of study requirements, time consumed by routine duties, daily class schedule, problems of liability, too time consuming, and fear of disregarding some fundamental teaching" (Krepel and DuVall 1981:11). Other obstacles can include reserving space at the location of the trip and the school's proximity to potential trip venues (Melber 2008:125). Even if these obstacles are able to be overcome, fieldtrips still require large amounts of planning. The date and length of the trip must be decided, the site must be reserved, transportation routes must be chosen, and

food and other supplies are all elements that must be taken into consideration when taking children off of school property (McKay and Parson 1986:19).

Obstacles may arise during fieldtrips as well. One problem that teachers can have on a trip is not knowing their role; it can be unclear if lessons are to be delivered by the teacher or the hosting institution (Kisiel 2005:937). If teachers are in charge of directing the trip's lessons, they may not have confidence presenting information if they lack background knowledge on the topic (Hofstein and Rosenfeld 1996:95). Teachers may also have unclear goals for the fieldtrip. As discussed earlier, there are many ways teachers measure how successful a trip is, and if there are no clear learning objectives prior to taking an excursion it is difficult, if not impossible, to determine if the desired learning has occurred (Kisiel 2005:937). Another problem that can take place during fieldtrips is student anxiety created by being in an unfamiliar environment, which can hinder learning (Hofstein and Rosenfeld 1996:98).

In-class Fieldtrips

Because fieldtrips are "difficult to implement and are often expensive…they are often seen (by teachers and administrators) as disruptions to the normal school program" (Hofstein and Rosenfeld 1996:94-95). Many educators overlook the fact that if the goal is to have "active learning and connection to authentic experiences," fieldtrips can take place anywhere (Melber 2008:129). An in-class fieldtrip (see below) can give students almost all of the benefits of a traditional fieldtrip while allowing teachers to avoid many of the obstacles that come with planning off-campus excursions. An in-class fieldtrip

provides students with new experiences while at the same time allowing students and teachers to work in an environment they are familiar with which can reduce student anxiety (Lankford 1992:45).

An in-class fieldtrip can create novelty in the same way that a traditional class trip can. Although having a fieldtrip occur in a classroom does not create as much novelty as an off-campus trip, even a small amount of novelty can enhance cognition and create the same high levels of energy students experience on traditional fieldtrips (Melber 2008:126). In addition to creating novelty, another benefit of in-class fieldtrips is that they make it easier for parents to participate in the experience because chaperone transportation, entrance fees, and other considerations no longer need to be taken into account (Melber 2008:126). Eliminating transportation obstacles also benefits schools by increasing the number of students that can be taught (Sheppard 1993:61).

Although most of the obstacles created by traditional trips can be avoided during an in-class fieldtrip planning still needs to take place to insure that the activities of one class do not conflict with the regular schedule of other classes (Melber 2008:126). For example, if the in-class fieldtrip has activities that take place outside, these activities should be timed so as not to interfere with the recess and outdoor times of other students. Prior to participating in an in-class fieldtrip it is also important that teachers introduce students to the topic to be covered during the fieldtrip, just as they would before traditional excursions (Garfield and McDonough 1997:3).

Conclusion

In order for any in-class fieldtrip to be taught more than once it is important that the activity meets the needs of the teachers. In-class archaeology fieldtrips must take into account the curriculum and skill development requirements of the schools they take place in (Wheat 2000:118). While archaeologists may be experts in their own field, they usually lack specific knowledge about the audiences to whom they are presenting, especially when the audience consists almost entirely of children (Johnson 2000:72). Teachers, however, know both the school's curricula and their students which allows them to plan appropriate and relevant lessons for their classes. Because of the insight that teachers can provide on class curricula, requirements, and student abilities, it is important to involve teachers in planning in-class archaeology fieldtrips (Johnson 2000:79). By working with teachers, archaeologists can gain an understating of the teaching environment and develop projects that will fit the classroom structure (Wheat 2000:117). In order to "create the best synergism, archaeology educators should meet teachers with a mutually beneficial agenda" (Wheat 2000:118).

Because of the importance of working with teachers to create a mutually beneficial in-class archaeology fieldtrip, I surveyed fifth grade teachers in the Lincoln Public School district to learn what material they would like to see incorporated into an archaeology outreach program. I also surveyed public archaeologists to determine what material they would like to see students taught. Finally, I surveyed children who had formerly participated in archaeological programs to determine what activities they enjoyed because if students do not enjoy the in-class activities it is less likely that

learning will occur and it is possible that they will leave the experience with a negative view of archaeology.

CHAPTER FOUR: EDUCATION STANDARDS AND SURVEY RESPONSES

In order for a new program or fieldtrip to be accepted by teachers it is important that the program complements material taught in the classroom. Discussing and finalizing the details of an in-class fieldtrip with teachers is the best way to ensure that the school does not see the program as a loss of teaching time. Ideally public archaeologists and fifth grade teachers would have been surveyed prior to the creation of my outreach program, however circumstances did not allow for this to occur. Rather than conducting the surveys prior to creating my outreach program, I developed the program based on fifth grade education standards for the state of Nebraska and my experiences working with children in archaeological programs at Crow Canyon Archaeological Center and the University of Pennsylvania Museum of Archaeology and Anthropology. Once the survey results were collected I used the public archaeologist and teacher responses to determine what areas of my program needed to be adjusted or expanded (descriptions of the fieldtrip segments are found in Chapter Six). Although my program is based on Nebraska state education standards, I anticipate that other states have similar education standards, which allows my program to be taken to schools throughout the United States. Before analyzing the survey responses collected for my thesis, I discuss how the proposed fieldtrip segments complement the fifth grade curriculum and help reinforce fifth grade education standards in multiple disciplines.

Education Standards

The in-class archaeology fieldtrip I designed contains activities that reinforce several of the current (major revisions are now in the planning stages) fifth grade education standards for the state of Nebraska, and additional standards could easily be supported depending on how final details of the program are constructed; something which can only be done with input from the teacher whose class will be participating in the activities. Table 2 depicts the number of standards that each segment of the in-class fieldtrip supports.

Table 2

Segment	**Number of Standards**
"What is Archaeology?" Introduces the field archaeology	1 Social Studies/History, 3 Science 4 Total
"Find the Site" Introduces archaeological surveying	2 Math, 2 Science 4 Total
"The Art of Digging" Introduces archaeological fieldwork	5 Social Studies/History, 1 Math, 3 Science 9 Total
"Artifact Analysis" Introduces archaeological analysis	5 Social Studies/History, 1 Math, 2 Science 8 Total
"Present and Protect" Introduces the presentation and protection of archaeological information	1 Science 1 Total
Total	26

Even without some specific details of the program, for example if the lessons will focus on prehistoric or historic archaeology, the in-class fieldtrip meets multiple education standards.

My program meets two of the proposed "STAR (Standards That Are Reported) Social Studies/History Standards" (Starr 2003b). The first STAR standard for fifth graders states: "By the end of fifth grade, students will demonstrate skills for historical analysis," which students can exhibit by gaining the ability to "[i]dentify and interpret primary and secondary sources to make generalizations about events and life" (Starr 2003b:6). Multiple segments of the in-class fieldtrip concern analysis of primary sources. "The Art of Digging" and "Artifact Analysis" concentrate on the identification and interpretation of primary sources of information to help learn about previous cultures and could address historical time periods if desired. The in-class fieldtrip also meets proposed STAR standard 5.4.1, which holds that, "[b]y the end of fifth grade, students will improve their skills in historical research and geographical analysis," which can be demonstrated by identifying and interpreting primary sources (Starr 2003b:6).

In addition to proposed standards, the in-class fieldtrip supports standards that are currently in place for fifth grade social studies/history. Standard 8.2.1 states: "Students will describe human culture in the Paleolithic and Neolithic Eras," and one indication that this standard is met is that students will "[d]escribe how archaeological discoveries change our knowledge of early peoples" (Starr 2003a:11). Should the teacher chose to have the program focus on a prehistoric time period, this standard is easily supported by "What is Archaeology?", "The Art of Digging", and "Artifact Analysis." Teaching

students about the field of archaeology will help them understand one way scientists learn about the past and archaeological activities, especially if they are centered on the Paleolothic or Neolithic time period, will offer students a new way of learning material already taught in the classroom.

Two additional standards that are reinforced by the fieldtrip are standards 8.4.2 and 8.4.6, which state: "Students will demonstrate skills for historical analysis," and "Students will improve their skills in historical research and geographical analysis," respectively (Starr 2003a:16-17). Both of these standards can be demonstrated by students who "identify, analyze, and interpret primary sources" (Starr 2003a:16-17). Should the teacher chose to have the program focus on a historical time period the in-class fieldtrip can meet these two standards in "The Art of Digging" and "Artifact Analysis."

In addition to meeting social studies/history standards, the in-class fieldtrip that I designed meets multiple mathematics standards for Nebraska fifth grade students. Math standard 5.2 holds that "[s]tudents will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines" (Nebraska State Board 2009 [NSB]:19). This standard is further broken down into five different areas including coordinate geometry, in which students are expected to plot locations in the first quadrant, and measurement, in which students are expected to be able to measure weight using metric units (NSB 2009:19). The coordinate geometry standard is met in "The Art of Digging" because students are expected to plot their finds in a graph of their

excavation unit. Students will be able to practice the measurement standard in "Artifact Analysis" when they record observations and measurements for the artifacts they analyze.

"Find the Site" supports two separate fifth grade math standards. Standard 5.3 states: "Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines" (NSB 2009:19). One way that this standard can be expressed is "modeling in context" in which students "create, use, and compare models representing mathematical situations" such as "a variety of quantitative relationships using tables and graphs" (NSB 2009:20). In "Find the Site" students make graphs of the number of different colored noodles/candy that they count and compare the number of noodles/candy recorded in two different surveys. The recording of the data in graph form as well as the comparison between the number of noodles/candy seen in each survey clearly supports math standard 5.3.

The second segment of the fieldtrip, "Find the Site," also supports fifth grade math standard 5.4: "students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines" (NSB 2009:20). A subsection of this standard concerns display and analysis, and students are expected to be able to "organize, display, compare, and interpret data," as well as "draw conclusions based on a set of data" (NSB 2009:20). Displaying their survey findings in a graph and comparing the results of two different surveys, helps students meet this standard.

In addition to social studies/history and math standards, my in-class fieldtrip supports fifth grade science objectives. The Nebraska STAR science standards state that for fifth grade students, "[s]cience as Inquiry requires students to combine processes and scientific knowledge with scientific reasoning and critical thinking to develop their understanding of science" (Woodland 2003:6). My in-class archaeology fieldtrip uses guided-inquiry as a method of instruction which allows students to use scientific processes and reasoning they gain in class and apply this knowledge to archaeological problems. STAR science standard 5.2.1 states: "By the end of fifth grade, student will develop the abilities needed to do scientific inquiry" (Woodland 2003:6). Examples of activities that would demonstrate this objective has been met include: student construction of questions that science can answer, conducting a scientific investigation, using scientific tools, and presenting the information learned during a scientific investigation (Woodland 2003:6). All of these examples indicating science standards have been met are incorporated into multiple segments of my archaeology program. "What is Archaeology?" requires students to develop a question they would like to answer using archaeology, "Artifact Analysis" allows students to practice using scientific tools, and "Present and Protect" requires students to develop ways of presenting information they learned during the program.

The Lincoln Public School district's fifth grade science objectives also address the importance of teaching students how to conduct scientific investigations. Fifth grade science objective 5.4.1 requires students to be able to understand how to use tools used in scientific investigations (ruler, balance, etc.), and objective 5.4.2 requires students to

"identify and apply the components of a scientific investigation (question, controlled and manipulate variables, hypothesis, procedure, results, and conclusion)" (Lincoln Public Schools 2011). Each segment of the in-class archaeology fieldtrip allows students to practice one, if not all, of the steps in a scientific investigation in the context of an archaeological study. Allowing students to practice scientific investigations in a context that they are likely unfamiliar with will not only reinforce the process but will allow students to see how scientific processes are used in multiple fields to answer questions.

Clearly the in-class fieldtrip I have designed supports many of the fifth grade education standards for students in Nebraska. Almost every segment of the in-class fieldtrip supports multiple fifth grade learning standards, and additional standards can be supported during the program depending on how the teacher and archaeologist decide to focus the time period discussed during the fieldtrip. All segments, regardless of how many standards they support, require students to use scientific thinking and work with others to make observations and draw conclusions.

Survey Response Analysis

One of the keys to creating a successful in-class archaeology fieldtrip is synthesizing the views of public archaeologists, teachers, and students concerning what the program should include. To learn what these groups feel are important elements to have in an in-class fieldtrip I asked public archaeologists, fifth grade teachers, and students to complete surveys designed to determine what elements each group considered important in an archaeology outreach program. After the surveys were completed I

analyzed the responses and used the feedback to strengthen the lessons I had developed (found in Chapter Six) for my in-class fieldtrip.

Public Archaeologist Survey Responses. The first group I surveyed was public archaeologists. I chose to survey public archaeologists, rather than archaeologists as a whole, because they are used to conducting outreach programs and have valuable insight into what does and does not work for outreach as well as what archaeological concepts should be stressed to those interested in the field. The survey I created for public archaeologists (Appendix A) was posted online using Qualtrics.com and a request for participation was sent via e-mail to the SAA Public Education Committee, the SAA PEC State Network, and the SAA Public Archaeology Interest Group, and was received by between 54 and 174 public archaeologists (Shirley Schermer, personal communication, 2012). Three weeks after the first request for survey participation was sent, a survey reminder was e-mailed to the previously mentioned groups, and after seven weeks 11 responses were submitted. Survey responses were analyzed by grouping similar answers in order to determine which elements were considered important by most public archaeologists.

Most of the archaeologists surveyed conduct outreach programs that target K-12 students; however they also design programs for adults. The majority of their outreach participants are in the fourth through eighth grade. I was surprised by the large number of outreach programs designed for children, however the fact that the survey specifically mentioned that information was being gathered to help construct a fifth grade in-class archaeology fieldtrip may have influenced archaeologists that work with children to

respond in higher numbers than those that work with adults. The fact that most survey respondents work with children lends strength to their answers because they are familiar working with a younger public and are therefore knowledgeable about what methods and materials are best suited for this age group.

When asked what methods their outreach programs use to teach the public about archaeology, seven archaeologists responded that they use lectures and presentations to address the public; the next most common method was hands-on activities mentioned by three respondents. The rest of the survey questions dealt specifically with outreach efforts targeted towards a fifth grade audience. While information regarding outreach as a whole would have been interesting, the young age of the students targeted in my in-class fieldtrip made gaining information on working with children more relevant than information on working with the public as a whole.

When public archaeologists were asked what archaeological concepts they thought were important to teach to fifth grade students 16 different concepts were mentioned. Stratigraphy and absolute/relative dating were mentioned by six archaeologists, and context was mentioned by four people. One answer I feel addressed a concept that is critical to impart to students discussed the importance of teaching students about archaeological ethics. One respondent stated: "it is most important to teach ethics and purpose before methodology (or the focus is really only then 'a treasure hunt')." That archaeology is a science with methods and ethics is a fact that I had originally incorporated into my outreach lesson plans; still, this response caused me to revisit my lesson plans and make sure that the science, methods, and ethics of archaeology were

more strongly emphasized in each segment. The most common responses, stratigraphy, dating, and context, had already been incorporated into my lesson plans, however I made sure that each of these concepts was addressed more clearly when appropriate.

The fourth question on the public archaeologist survey addressed what parts of the archaeological process were important to teach fifth graders. Eight archaeologists responded that research, surveys, excavations, analysis, and publishing were all important topics to share with students. The most common response, given by nine archaeologists, was that students should be taught the importance of protecting and curating archaeological sites and artifacts. Other responses included rock art, ethics, and experimental archaeology. The answers given by public archaeologists support the choices for the segments of my in-class fieldtrip because every response, with the exception of experimental archaeology, describes a process that I have included in my program.

Two questions in the public archaeologist survey concerned methods for teaching children about archaeology. When asked what the best way to teach fifth graders about archaeology was, ten of the eleven responses stated that experiential and hands-on learning was the best method for teaching children. This strongly supports my choice of a three part lesson which includes a hands-on activity as well as a short lecture and worksheet. In addition to determining the best way to teach young students I wanted to learn what archaeologists felt was the worst way to teach children. Seven of the eleven archaeologists stated that long lectures were the most ineffective way of teaching fifth graders archaeology. While most respondents had answered earlier that the most

common method they use in outreach programs is lectures and presentations, this does not necessarily conflict with their response to the worst way to teach fifth graders, because the first question asked what method was used the most regardless of participant age. While archaeologists feel that long lectures are a poor way of teaching archaeology to children, the short lectures included in the beginning of each segment of my in-class fieldtrip are critical to conveying information to students and are not long enough to be considered a lecture form of outreach.

Public archaeologists were also surveyed to determine what five things they would want a fifth grader to take away from an outreach program. Sixteen different answers were given, proving that archaeologists agree on several important take-away messages. The three most common responses were that fifth graders should leave an outreach program knowing that archaeological sites are finite and need protection (ten responses), that archaeology is a science with specific methods and procedures (nine responses), and have an idea of what archaeologists do and do not study (six responses). Other responses included that archaeology and learning about the past is relevant to today, ethics, and that archaeology is fun. The responses given by archaeologists on what take-away messages are important caused me to review my lessons and make sure that whenever possible it is mentioned that sites are non-renewable resources that are worthy of protection and that archaeology is a science with certain methods and procedures.

The final question asked of public archaeologists was whether they would consider adding an in-class fieldtrip to their outreach efforts. Ten archaeologists responded that they would be interested in adding such a program, and three stated that

they already have a similar program in place. One respondent gave reasons for both including and not including an in-class fieldtrip. Reasons for not wanting to include such a program included the cost, potential lack of experience working with children or collaborating, a potential lack of organization, and the possibility that facilities (restrooms, first aid, shelter, etc.) would not be available for everyone participating.

Incorporating the responses given by public archaeologists concerning outreach efforts designed for a fifth grade audience was easier than expected. Most of the responses given supported decisions I had already made concerning what information to convey to students and how instruction should occur. Archaeologist's responses clarified what topics I should stress in my program and supported my decision to use hands-on activities as one way of teaching students archaeology.

Fifth Grade Teacher Survey Responses. The second group of people surveyed to determine the best way of teaching students about archaeology was fifth grade teachers currently employed in Lincoln Public Schools (LPS). Teachers are familiar not only with the fifth grade curriculum but know what an outreach program would need to provide to be considered as something to incorporate into the curriculum. The survey created for fifth grade teachers (Appendix B) was posted online using Qualtrics.com, a request for participation was sent via e-mail to all currently employed LPS fifth grade teachers, and was received by approximately 117 teachers (Leslie Lukin, personal communication 2012). Three weeks after the first request for survey participation was sent a survey reminder was sent, and after seven weeks 13 responses had been submitted. Survey

responses were analyzed by grouping similar answers to determine which elements were considered important by most teachers.

Survey results indicated that LPS fifth graders take an average of four fieldtrips a year (five fieldtrips if the response which stated that a class took ten fieldtrips is included in the calculations). When asked what influences the number of fieldtrips taken by a class, seven different responses were given. Nine teachers stated that fieldtrips are district mandated, and five teachers stated that a fieldtrip's relevance to the curriculum was a factor in whether or not the class went on the excursion. Other responses included time, funding, available opportunities, transportation, and student behavior. These responses indicated that it would be critical to get the school district to approve of the in-class archaeology fieldtrip before teachers would give it serious consideration. While district approval would be needed for any program brought into a school, the fact that the district rather than teachers, decides what fieldtrips classes take, indicates that the district would need to be approached before teachers about introducing an archaeology outreach program to students.

Because teachers are familiar with the fifth grade curriculum, survey participants were asked what history subjects already taught to students they felt an in-class archaeology fieldtrip could complement. Eight teachers responded that archaeology could complement their lessons on early/Native Americans, and four responded that it could complement their lessons on American history from colonization until the Civil War. Other responses included survival by adaptation and cultural exchange, both of

which could easily be incorporated into discussions of Native American archaeology and American history.

Determining what topics already covered by the fifth grade curriculum archaeology could support is important because teachers are likely to resist any program that does not fit the current curriculum. Outreach programs need to take into consideration the existing frameworks for the groups that they want to address and work these structures into their programs. The in-class fieldtrip I have designed is flexible enough that it can be changed to cover Native American history, American history, or both, depending on what each teacher is looking for. Both early American history and American colonization have a rich archaeological history which would be easy to present to fifth graders in a way that connects with what they are already learning in the classroom. This connection would strengthen students' understanding of history rather than introduce entirely new concepts.

One question in the survey that yielded surprising results addresses if teachers had previously taken a course in archaeology. Seven teachers stated that they had never taken an archaeology course while six answered that they had; some however stressed that they took the course "many years ago" in college. The fact that six teachers responded affirmatively was surprising because most background research indicated that teachers are often completely unfamiliar with archaeology. While taking a single archaeology class does not make one an expert, it is encouraging that some teachers are at least slightly familiar with the field of archaeology and may be aware of what the field can

offer students and how it can support material already covered by the school's curriculum.

Teachers were also asked what subjects (math, history, writing, etc.) they would like to see incorporated into an in-class archaeology fieldtrip. Social studies and the study of rocks and minerals were the two most common answers with four responses each. Math, writing, and science all were mentioned by three teachers, and reading was mentioned once. The large number of teachers that mentioned that they would like to see the study of rocks and minerals incorporated into an archaeology program is due to the inclusion of the subject in the fifth grade science curriculum; however my current outreach program does not include information on rocks and minerals. Depending on the specific topics within the study of rocks and minerals, collaboration with teachers could be used to create another segment for the fieldtrip that would focus on how humans have used lithic technology and the properties of rocks and minerals that allow for stone tools to be created and used for a variety of purposes. Three teachers stated that they would like to have as many different subjects incorporated into an outreach program as possible. As demonstrated earlier in this chapter, the program I have designed requires students to use multiple subjects including science, social studies, math, and writing, and helps meet several state education standards.

Another question included in the survey was what the biggest obstacle would be in bringing an in-class archaeology fieldtrip to students. Seven different responses were given: time, teacher knowledge/participation, student behavior, connection with the curriculum, cost, one teacher who was unsure and one teacher who believed there would

be no obstacles. Of these responses eleven mentioned that the time needed to conduct the program would be the largest obstacle; all other responses were only mentioned once.

The impact that the amount of time an outreach program requires on whether or not it could be presented to students highlights the difficulty in adding a new program into the already packed curriculum that fifth grade teachers cover in a school year. One teacher stated that the program, "would be interesting if there is enough time in the quarter to cover the tested material," and another stated that it "is hard to give up class instruction/text time that is needed [for students] to pass their tests." Because of the importance of testing as well as a full curriculum, it is critical that outreach programs work with teachers if there is any chance of introducing programs to students during school hours. If teachers and public archaeologists work together, it is likely that they can create a mutually beneficial program that teachers will see as supporting their curriculum rather than taking away class time.

Finally, teachers were asked if they would be interested in having an outside program bring an in-class archaeology fieldtrip to their class. Five teachers said that they would be interested and that such a program would broaden students' knowledge base and experiences. Six teachers said that they might be interested in the program, but several factors would need to be taken into consideration including the quality of the program, the time required, and how it supports the curriculum. Only two teachers said that they would not be interested in such a program; one because they do not teach fifth grade social studies and the other because they do not believe there is enough time in the curriculum to incorporate another program.

The survey responses given by teachers clearly show the importance of collaboration between archaeologists and teachers to create a mutually beneficial outreach program. Teachers are constrained by curricula and the need to cover tested materials. In order for any program to be brought into a school it would need to complement the current curriculum so that schools do not see it as a loss of time, but rather as a way of reinforcing material already taught to students. The responses given by teachers indicate that Native American history and American history up through the Civil War would be the best time period for an archaeology program to address because these are topics covered in the fifth grade. Additionally, the more subjects an archaeology program can incorporate the more likely teachers will see it as supporting the curriculum. The incorporation of social studies, science, and math into the in-class fieldtrip make it likely that the program will be viewed favorably by teachers. It is also important for public archaeologists to be flexible when working with teachers in order to create an outreach program that will be used in fifth grade classes. The more willing teachers and archaeologists are to work together, the more likely it is that a mutually beneficial program can be developed and incorporated into the classroom.

Student Survey Responses. The last group I surveyed was students who had formerly participated in archaeological outreach programs offered by the National Park's Midwest Archaeological Center (MWAC) in 2010. The names of 15 participants had been kept by MWAC, and of these five names were in the Lincoln Public Schools directory. The five students whose names were listed in the directory were mailed surveys and consent forms. One of the five surveys was returned due to an invalid

address, and none of the students who received the surveys responded. Students were sent surveys rather than asked to participate in interviews because written responses were considered more convenient for participants and were anticipated to yield a higher response level than would result from conducting interviews.

Feedback from former outreach participants is important to consider when creating an in-class fieldtrip because it can reveal what activities students did and did not enjoy and what information students retain overtime. While it is unfortunate that no former participants took part in the survey, the lack of response stresses the need to incorporate assessment into outreach programs rather than trying to conduct it two years later. The in-class fieldtrip I have developed includes diagnostic, summative, and retention assessments. The diagnostic assessment consists of a pre-test to determine students' knowledge of archaeology before the fieldtrip. The summative assessment takes place immediately after the program to determine what students have learned and what they think about the program immediately after its conclusion. Retention assessment will take place two weeks after the in-class fieldtrip and will measure how much information students retain over time. Both the summative and retention assessment will be compared to the diagnostic assessment to determine how much student knowledge of archaeology has improved.

By including assessment in the in-class fieldtrip, the effectiveness of the program will be measureable, and student feedback can be taken into consideration when adjusting the program to better suit future classes. Determining how much students learn from the program will not only be of interest to archaeologists but also teachers who are donating

class time to allow the program to take place. Student opinions of the activities are important because the program needs to be viewed favorably by learners if it is to have a positive impact on their views of archaeology. Because of the importance of student feedback, and the difficulty of collecting feedback after a program takes place, it is important to include assessment in outreach programs and use the collected information to improve future programs.

CHAPTER FIVE: OBJECTIVES, METHODS, AND ASSESSMENT

The previous chapters have discussed the importance of public archaeology, examples of outreach efforts, the value of teaching children about archaeology, the benefits and obstacles of using fieldtrips as a teaching method, and the survey results gathered from public archaeologists and fifth grade teachers. With these topics in mind, I designed an educational program to teach children basic archaeological concepts. Ideally public archaeologists and fifth grade teachers would have been surveyed prior to the creation of the outreach program, however circumstances did not allow for this to occur and the survey responses collected were used to determine what elements of my program need to be adjusted.

The audience for my program is fifth grade students in the Lincoln Public School district (LPS) who likely have no prior knowledge of archaeology, and the lessons are designed to be used in the context of an in-class fieldtrip. The number of students taught at a single time will vary with the size of individual fifth grade classes, but is estimated to be between 20 and 25 students.

My proposed program is divided into five segments, each of which addresses a different step in the archaeological process and will take between forty-five minutes and one hour and thirty minutes to teach. The five segments of the program include: "What is Archaeology?," "Find the Site," "The Art of Digging," "Artifact Analysis," and "Present and Protect." The overarching goal of my program is to introduce children to the field of archaeology in an age-appropriate way that teaches basic archaeological

concepts and generates interest and awareness of the field. Each of the segments has its own set of learning objectives, however before each segment is discussed in detail it is important to understand what the objectives are, why they are needed, and the teaching methods that are most effective for meeting these objectives.

Rational for Objectives

Learning objectives are the outcomes that are expected to occur after a unit of instruction (Howe and Jones 1998:71). While many lessons have goals teachers wish to accomplish, learning objectives are created by taking these goals and phrasing them as specific outcomes. Learning objectives are important because they give teachers goals to work towards and set standards for assessment and evaluation at the end of instruction (Clark and Starr 1991:134, 141).

Objectives can be written in several different ways and can be used to describe what students will be expected to learn or perform upon the completion of a lesson (Clark and Starr 1991:140). Learning objectives can be further categorized as belonging to either the cognitive domain, which includes remembering and reproducing knowledge, or the psychomotor domain, which involves muscular and motor skills. The final domain objectives can belong to is the affective domain, which concerns understandings, appreciations, and attitudes. Learning objectives that are part of the affective domain are considered to be covert objectives because they are hard to measure (Clark and Starr 1991:136). In order to easily measure the fulfillment of objectives, it is important to focus learning objectives on the cognitive and psychomotor domains.

Cognitive and psychomotor objectives can be phrased as either simple behavior objectives or criterion-referenced behavior objectives. Simple behavior objectives state only what the learner will do at the end of a unit of instruction, while criterion-referenced behavior objectives specify the level of performance needed to meet the objectives. Criterion-referenced behavior objectives are more specific than simple behavior objectives, and as such they are more useful for instruction because they provide definite standards for assessment (Clark and Starr 1991:142-144). Because my program involves multiple segments taught in a single day, I use both simple behavior and criterion-referenced objectives in my lessons.

Another way in which objectives can be categorized is by whether or not they are closed or open objectives. Closed learning objectives are based in knowledge that all learners are expected to achieve in the same way, while with open learning objectives quality can vary between learners (Dunn 2011:37). My archaeology program utilizes both closed and open learning objectives in order to measures students' knowledge of archaeology as well as their ability to use what they have learned to answer questions.

Regardless of the type of learning objective used in instruction, objectives should always be specific and clear (Clark and Starr 1991:184). If too many outcomes are listed in a learning objective, or if the objective is vaguely phrased, it is difficult to determine if the objective has been met at the end of the instruction. It is also important to create learning objectives that have observable outcomes to make determining if objectives have been met possible (Howe and Jones 1998:122). Learning objectives should always relate

to the learning that takes place in a unit of instruction rather than the activity used to facilitate that learning, in other words objectives should be context-free (Dunn 2011:36).

It is not enough for a teacher to know what the learning objectives for a unit of instruction are, teacher objectives "will be futile unless the students adopt them, or compatible objectives, as their own" (Clark and Starr 1991:145). Teachers need to inform students of learning objectives and why these objectives are important early in a lesson because objectives, and the criteria for their success, "are the fundamental tools that allow children to engage in their own learning" (Clark and Starr 1991:145; Dunn 2011:36). Students need to be made aware of a lesson's learning objectives not only because it will allow them to engage in their learning, but because it is the "student's objectives that cause him or her to act" (Clark and Starr 1991:145). If students are aware of the objectives for a lesson and what is needed to meet those objectives, they are more likely to keep the objectives in mind while they work to achieve them. Finally, studies have shown that one of the best motivators of learning is for students to know a lesson's objectives and receive feedback on their progress in meeting those objectives (Clark and Starr 1991:146). Because of the impact that student understanding of objectives can have on learning, my program shares with students the objectives for the entire unit of instruction as well as for each segment. To help students keep the learning objectives in the front of their minds objectives will be referenced throughout the lessons.

In-class Archaeology Fieldtrip Objectives

The program I have designed consists of seven possible segments, and because of this I have created eight sets of learning objectives; learning objectives concerning individual segments of instruction and learning objectives concerning all seven segments of instruction. Completion of the learning objectives for individual segments as well as the entire unit of instruction will be demonstrated during student participation in activities and discussion, and the completion of short exams given at the end of the program. Because of the different nature of these sets of objectives, as well as the way in which they will be assessed, the objectives of my program consist of all of the categories of objectives previously described.

<u>"What is Archaeology?" Objectives</u>

1. At the completion of the segment students will be able to describe what topics an archaeologists would and would not study.
2. At the completion of the segment students will be able to provide a written question that they would like to try and answer using archaeology.
3. At the completion of the segment students will be able to work as a group to study and provide a written description of a modern object in the way that an archaeologist would describe an artifact.

<u>"Find the Site" (Outdoor and Indoor Option) Objectives</u>

1. At the completion of the segment students will be able to describe what an archaeological survey involves.
2. At the completion of the segment students will be able to orally interpret bar graphs of their findings during the archaeological survey.
3. At the completion of the segment students will be able to orally explain the advantages and disadvantages of different survey methods.

"The Art of Digging" (Outdoor Option) Objectives

1. At the completion of the segment students will be able to use proper trowel techniques.
2. At the completion of the segment students will be able to take metric excavation measurements.
3. At the completion of the segment students will be able to interpret their findings during their excavation.

"The Art of Digging" (Indoor Option) Objectives

1. At the completion of the segment students will be able to record images using a metric grid.
2. At the completion of the segment students will be able to construct and defend interpretations of images.
3. At the completion of the segment students will be able to discuss reasons for differing interpretations of rock images.

"Artifact Analysis" Objectives

1. At the completion of the segment students will be able to properly clean artifacts.
2. At the completion of the segment students will be able to record measurements (weight, size, color, etc.) of a given artifact.
3. At the completion of the segment students will be able to write an interpretation of the artifact they are studying.

"Present and Protect" Objectives

1. At the completion of the segment students will be able to describe why it is important to share scientific information with others.
2. At the completion of the segment students will be able to create a short list of possible modes of presenting information.
3. At the completion of the segment students will be able to explain different ways of protecting archaeological resources.

Program Objectives

1. At the completion of the program students will be able to orally describe what archaeologists study.
2. At the completion of the program students will be able to list five different tools used by archaeologists.
3. At the completion of the program students will be able to orally explain the importance of context in archaeology.
4. At the completion of the program students will perform significantly better on a test of their knowledge of archaeology compared to their performance on a pretest (improvement will be measured using a repeated-measures ANOVA test, with a significance level of $\alpha<.05$).
5. At the completion of the program students will perform significantly better on a retention test of their knowledge of archaeology compared to their performance on a pretest (improvement will be measured using a repeated-measures ANOVA test, with a significance level of $\alpha<.05$).

Inspection of the learning objectives for the individual segments of instruction as well as the overall objectives for the program reveals that many of the objectives are simple behavior objectives that require students to be able to orally describe different concepts and aspects of archaeology. Because many of the objectives will be demonstrated by oral responses they will be assessed subjectively by the instructor, and if the instructor feels that most of the students are able to provide accurate oral descriptions and explanations then the objectives will be considered to have been met.

The only three objectives that will not be assessed subjectively are the second, fourth, and fifth objectives listed in the overall learning objectives for the in-class fieldtrip. The objective requiring students to list five tools used by archaeologists will be assessed using

a test given at the end of the fieldtrip, and the objective will be met if 60% of students are able to list five tools. While this percentage may seem low, it is expected that most students will easily meet this objective because it is an open-ended question in which many possible answers are correct. Another reason why the percentage of students who must list five tools for the objective to be met successfully is so low is because the main learning objectives that will be assessed in a non-subjective manner are the fourth and fifth objectives for the entire unit of instruction.

The last two learning objectives describe the desired increase in students' knowledge about archaeology. This increase in knowledge will be measured by comparing students' understanding of archaeology before the outreach program with their level of understanding after the completion of the fieldtrip. If a statistically significant number of students are able to perform better on a test given at the end of the program, as well as on a test given two weeks after the program, these objectives will have been met because students' understandings of archaeology will be greater than they were prior to taking the in-class fieldtrip.

Methods of Instruction

Once the learning objectives for a unit of instruction have been decided, the method of instruction for helping students meet these objectives must be determined. The number of ways material can be taught is limited only by the creativity of the instructor. While numerous methods of instruction exist, experience and research has proven some methods more reliable and effective means of teaching than others. Many

scholars believe that teachers should follow a four step learning cycle during instruction. The four steps of the learning cycle include: 1) exploration of a concept, usually done using hands-on activities, 2) focus and explanation of the concept, performed by the instructor, 3) application of the concept in a new situation, and 4) expansion of the concept by encouraging learners to ask new questions (Benbow and Mably 2002:200). Lessons that follow the learning cycle, "can result in greater achievement in science, better retention of concepts, improved attitudes towards science and science learning, improved reasoning ability, and superior process skills than would be the case with traditional instructional approaches" (Abell et al. 2010:201). Because of the effectiveness of basing instruction on the learning cycle, my in-class fieldtrip follows a modified version of the learning cycle and incorporates several methods of instruction.

It is critically important that methods of instruction employed by teachers align with the objectives established for lessons (Clark and Starr 1991:149). It would be foolish for a teacher to set a series of psychomotor domain objectives and then use methods of instruction that do not allow for the outcome of the lesson to be practiced. Because my program consists of both cognitive and behavioral objectives, my methods of instruction will include approaches that allow students to learn and practice both types of objectives.

Just as there are open and closed learning objectives, there are also open-ended and closed-ended learning activities/problems. Closed-ended learning activities/problems focus on a single response from learners, foster convergent thinking, and are best used to provide background knowledge on a new topic. Open-ended activities/problems, on the

other hand, "boost children's thinking process, independence, and creativity," because they do not look for a specific outcome and are designed to allow children to use their knowledge to solve problems in their own way (Gega 1994:51-52). In order to be effective, learning activities must consist of both open and closed-ended activities/problems, and for this reason my program includes both types of activities and problems (Gega 1994:51).

Because of the importance of using a variety of methods of instruction and both open and closed-ended activities/problems, the methods of instruction I employ in my outreach program are lectures, worksheets, hands-on activities, and reflective discussion. All four of these methods will be used in each segment of the in-class fieldtrip. Scholars have noted that students struggle to learn large amounts of new information quickly; by presenting material in a variety of ways I will allow new information to be repeated which will increase learners' memory of the information (Clark and Starr 1991:215). Another justification for using multiple methods of instruction is that, especially when working with children, lessons should consist of a series of short, rather than long, tasks to keep the students' attention focused (Dunn 2011:64). To help clarify the advantages and disadvantages of the methods of instruction that I have chosen, each of the four methods will be examined independently, with the exception of the lectures and worksheets which are grouped together based on the nature of those methods.

Lectures and Worksheets. One method of instruction that can be utilized in the classroom is direct instruction. Direct instruction consists of specific activities done in a specific order, and includes lectures, demonstrations, and worksheets. Because direct

instruction is teacher-centered and structured, it is a good method for introducing new information (Clark and Starr 1991:147; Howe and Jones 1998:115). Most fifth grade students do not have extensive, if any, background knowledge of archaeology. Teaching students about archaeology must include teaching them background information and facts about the field, not only so they can meet the cognitive objects set forth in the program, but also because they will need basic understandings of archaeological principles to fully engage in the hands-on activities.

The lectures at the beginning of a segment of instruction will last approximately 15 minutes and will address only knowledge related to the segment being taught to avoid overwhelming students with new information. The lectures will focus on declarative knowledge (information about things) and arbitrary knowledge (materials defined and learned from others) (Borich and Tombari 2004:133; Howe and Jones 1998:10). The opening lectures introduce new vocabulary words and concepts, as well as the objectives for each segment of instruction. The lectures will be presented at an age appropriate level and use visuals to help clearly present information. The worksheets completed by students after the lecture will reinforce material covered in the lecture and allow students to ask questions about concepts of which they are uncertain.

As mentioned above, there are several advantages to using lectures as a method of instruction. Lectures are useful for introducing new material and summarizing important concepts; both of which are necessary building blocks for students to engage with material at a level deeper than surface understanding (Clark and Starr 1991:215). Despite their advantages, lectures have three main disadvantages as methods of instruction. First,

lectures involve passive learning by students which makes it easy for students to become disengaged with the material being presented. Second, lectures do not encourage independent thinking because they are designed to present facts and encourage convergent thinking. Finally, lectures are less effective than active participation because they do not allow students to directly engage with material (Clark and Starr 1991:216).

Despite the disadvantages of lecturing, lectures are used as the first method of instruction in the in-class fieldtrip segments because they are the most effective means of conveying new information to learners. To help combat the disadvantages of lecturing worksheets will be distributed to students after the lecture to reinforce the material presented. Although worksheets are still a method of direct instruction, they allow students to think about the material they have learned and engage with that material at a simple level. Once students have heard the lecture and completed their worksheets, the next method of instruction used in the outreach program is hands-on activities.

Hands-on Activities. The opposite of direct instruction is inquiry-based instruction, in which learners "are given opportunities to ask questions, explore materials, gather data, come to conclusions, and discuss results" (Howe and Jones 1998:144). An inquiry method of instruction focuses learners' attention on "cognitive process, affective, and social domains" rather than cognitive content (Howe and Jones 1998:146). Inquiry is not as efficient as direct instruction, especially when it comes to learning new material; however it provides learners with a deeper understanding of materials than direct instruction. Guided-inquiry is a method of instruction that takes a middle road between direct instruction and inquiry, allowing the extremes of each method to be avoided (Howe

and Jones 1998:144-145). Guided-inquiry allows students to engage with materials by letting them make their own decisions about an activity, but also helps them work towards a desired objective. Because of the focus guided-inquiry places on cognitive process, social domains, and deeper understandings of material, this method of instruction in the form of hands-on activities is used in the in-class fieldtrip once students have been provided background knowledge via a lecture and worksheet.

Many educators believe that hands-on activities are generally the most effective way for students, especially children, to learn science (Gega 1994:51). Physical knowledge–the direct experiencing of material–is a large part of hands-on learning and is often the center of elementary school science classes; some scholars believe 40% to 50% of elementary science classes should be used for hands-on science experiences (Gega 1994:169; Howe and Jones 1998:10). One of the main advantages of hands-on activities is that students learn best when they have ownership in the learning process and hands-on activities can provide this sense of ownership rather than a feeling of just parroting facts (Borich and Tombari 2004:200).

Hands-on learning is an important method of instruction because it allows instructors to make the activities they use in class appealing to their students which can increase learner interest and involvement with material (Clark and Starr 1991:148). Active participation can also boost student motivation; there is "a special motivational aspect in finding out something for oneself" (Clark and Starr 1991:88; Howe and Jones 1998:146). If science is always present to students in lectures, rather than allowing students to engage with material, it can become boring, abstract, and removed from

student's lives, and boredom resulting from a lack of educational stimulation can lead to behavior problems and non-learning (Abruscato 2000:10; Clark and Starr 1991:88). Additionally, hands-on activities have been found to spark curiosity in material, and the ability to handle objects can lead students to ask questions during the learning process (Anastasiou 1971:41; Gega 1994:98). Problem solving included in hands-on learning is useful in classrooms because it can be performed by either individuals or groups (Clark and Starr 1991:279). Group work helps kids learn not only science, but gain social interactive knowledge, which involves working with others, compromise, and cooperation (Abruscato 2000:75; Howe and Jones 1998:11).

While there are clear advantages to hands-on learning there are two distinct disadvantages to this method of instruction. First, if students do not have the necessary background knowledge about a topic, hands-on activities can be overwhelming and confusing, thereby losing their effectiveness. Second, if too many activities or changes take place in a unit of instruction students may feel deprived of the "security gained from an accepted pattern or framework" of instruction (Clark and Starr 1991:89).

Because of the numerous advantages of hands-on learning as a method of instruction, as well as the fact that the in-class fieldtrip segments contain objectives that are demonstrated during hands-on activities, one hands-on activity is incorporated in each segment of instruction. Examples of the activities used in the segments include creating rock images, conducting a survey, a mock dig, and analyzing an artifact. These activities will be performed by groups of students, make information engaging, allow students to

take ownership of their work, and allow students to gain a deeper understanding of the material.

Two measures will be taken to strengthen hands-on learning as a method of instruction. First, hands-on activities will only be conducted after students have received a lecture and completed worksheets on the material covered in the activity. This will ensure that students have the background knowledge necessary to complete the activity and will decrease confusion during the activity. Second, only one hands-on activity will be used in each segment, and the methods of instruction used in each segment will follow the same pattern. The use of only one activity per segment will help students avoid feeling overwhelmed by the number of activities they are to perform, and keeping the same pattern of instruction in all segments of the program will give students a consistent framework of instruction. Once students have completed the hands-on activity, the segment of instruction will conclude with a reflective discussion of the material.

Reflective Discussion. The final method of instruction used in the in-class fieldtrip is reflective discussion. For discussions to be effective they need to involve the entire class and not center on the teacher; the teacher's role is to guide and monitor the discussion (Howe and Jones 1998:160). Discussions allow students to form logical knowledge concerning particular topics. Logical knowledge–concepts and conclusions from observations and experiences–is a large part of reflective discussions and is something students must construct on their own; it cannot be taught (Howe and Jones 1998:10). Reflective discussions allow classes to review material and consider questions that arose during the learning process. Reflective discussion also provides an opportunity

to revisit learning objectives, review the criteria needed to meet objectives, and work to extend learners' abilities to apply new knowledge to different contexts (Dunn 2011:98).

There are several advantages to using reflective discussion as a method of instruction. The ability to revisit and clarify ideas about newly learned material can help correct student misconceptions and reinforce new concepts (Farmery 2005:55). Discussions can also help improve critical thinking by encouraging students to base their ideas and conclusions on evidence discovered during the learning process (Gega 1994:97). Giving students a chance to discuss their learning with others provides them with an opportunity to reflect on the learning process and give personal meaning to new information (Clark and Starr 1991:239; Dunn 2011:92). Another reason reflective discussion is an important method of instruction, especially when covering science topics, is that "other skills of scientific enquiry lead to discoveries, whereas reflection and discussion between peers is what leads to the discoveries being accepted as true" (Farmery 2005:55).

To summarize, reflective discussions are a useful method of instruction because they can effectively shape attitudes and ideals, help students develop communication skills, allow for critical thinking to be practiced, and allow students to practice receiving immediate feedback on their ideas (Clark and Starr 1991:239). The main disadvantages to discussions are that teachers can be tempted to dominate the discussion and students who are unfamiliar with participating in discussions can either be hesitant to speak or try to talk over each other. The best way to avoid these two problems is to establish guidelines to determine how students will participate in the discussion and provide

enough time for students to think about discussion questions and form their responses before the instructor either prompts students or answers the questions for them.

Because reflective discussions allow students to think critically about material, revisit learning objectives, and can help students remember material, it is an important and useful method of instruction that is well suited to be the final method of instruction used in the in-class fieldtrip segments. Reflective discussion can also help students transition between segments by asking them to consider how what they have just learned can be used in the next step of the archaeological process. The disadvantages of reflective discussion can be managed by establishing a discussion protocol with students, and giving students enough time to reflect on material and formulate responses before the class is prompted.

Methods of Instruction Conclusion. The methods of instruction used in the in-class archaeology fieldtrip were selected because they roughly follow the student learning cycle. Each method of instruction builds off of the previous method and allows students to smoothly transition between activities. A variety of methods of instruction keeps the material interesting and engaging, and ensures that "all students have compatible learning experiences at least part of the time" (Clark and Starr 1991:148). Although there are strengths and weaknesses to each of the four methods of instruction, the positives of the methods not only outweigh the negative aspects, but there are ways in which the negative aspects of each method of instruction can be diminished if not completely removed.

Assessment

In order to determine if methods of instruction are successful at reaching learning objectives a system of assessment, evaluation, or a combination of the two is needed. Assessment refers to determining what has been achieved during a unit of instruction, whereas evaluation involves placing a value on what has been achieved (Gega 1994:183). In other words, assessment is a way of examining the effectiveness of the program while evaluation is a method of determining the abilities of the learner. The effectiveness of the in-class fieldtrip will be measured using systems of assessment, rather than evaluation, for two reasons. First, the purpose of the program is to improve students' knowledge of archaeology and I am interested in determining what students have learned rather than placing value on their knowledge. Second, the context of the program is that of an in-class fieldtrip. Fieldtrips utilize sources outside of the school to teach information, and it is not the responsibility of these outside institutions to place values on students' learning. Although the program takes place inside the classroom, the role and responsibilities of the outside organization stay the same; if any evaluation is to occur it will be done by the teacher and not by the instructor leading the fieldtrip.

Assessment can be used any time a student does something that demonstrates learning has occurred. One benefit of assessments is that they can help teachers make informed decisions regarding their methods of instruction that can improve teaching and learning (McTighe and Ferrara 1998:1; Taylor 2003:39, 4). Assessments should look at student learning and the unit of instruction, and evaluate the lesson rather than the students (Howe and Jones 1998:84-85, 127). Well executed assessments should reveal

what students do and do not know, and how the difference can be made up (Dunn 2011:33).

Types of Assessment. There are three different ways of analyzing an assessment. Criterion-referenced assessments compare a student's performance to a performance standard. Norm-referenced assessments compare a student's performance with that of the group, and learner-referenced assessments compare a student's performance to their previous performance (Abell et al. 2010:152). I will use both criterion-referenced and learner-referenced assessments in the in-class fieldtrip. Criterion-referenced assessments will be used to determine if objectives requiring students to learn factual information have been met. All of the objectives for the individual program segments, as well as the program as a whole, will be measured using open criterion-referenced assessments; although multiple answers for each objective are correct incorrect answers do exist. The final two objectives for the entire program will be assessed using learner-referenced assessment because they concern an increase in students' understanding of archaeology.

Determining students' knowledge about a subject before a unit of instruction is taught is called diagnostic assessment (Gega 1994:183). It is important for instructors to perform diagnostic assessments because the results show what students bring with them to a subject including what misconceptions students have that need to be corrected (Taylor 2003:1). Diagnostic assessments can also help instructors determine what content areas instruction should emphasize, and what areas students already understand. For the in-class archaeology fieldtrip diagnostic assessment is necessary to determine if the last two objectives for the entire program have been met.

In addition to different reference points of assessments, instructors can use two different forms of assessment. Formative assessment is an ongoing, day-to-day method of assessing student learning, and summative assessment is a summary of learner achievement in a given time frame normally done at the end of a unit of instruction (Dunn 2011:35). Because my program is designed to be taught in a single day, both formative and summative learning assessments will be used. The formative assessment used in the fieldtrip is open-ended, semi-formal, and consists of instructor observations made during activities and discussions. The summative assessment is closed-ended and formal; it is preplanned, given at the end of the fieldtrip, and the results will be recorded (Farmery 2005:114, 124).

Validity, Reliability, and Fairness. Assessments are most accurate when they make use of multiple sources of information and are valid, reliable, and fair (McTighe and Ferrara 1998:6). Assessment validity refers to how well an assessment measures what it is designed to measure (Borich and Tombari 2004:61). Validity can be further broken down into construct and instructional validity. Construct validity exists when an assessment, "produces learner behaviors that bear a direct link to the cognitive activity [instructors] want to assess" (Borich and Tombari 2004:63). Instructional validity exists when the assessment reflects the objectives of the lesson and "gives the same emphasis to specific goals and objectives as did [an instructor's] lessons" (Borich and Tombari 2004:68).

In order to ensure validity multiple forms of assessment will be used that allow students to demonstrate what they have learned in the form of activities, discussions, and

a test. Multiple forms of assessment are important for two reasons. First, rather than relying on a single assessment–which provides a snapshot of learning–multiple assessments allow for a better understanding of overall learning (McTighe and Ferrara 1998:7). Second, multiple forms of assessment can measure students' abilities to perform the tasks segments are designed to teach, as well as how students can apply this knowledge in a short exam. Assessments will be instructionally valid by placing the same emphasis on the different means of assessment and providing an equal number of exam questions related to each segment in the fieldtrip.

Assessment reliability refers to an instructor's ability to reproduce the results of an assessment at a different point in time (Borich and Tombari 2004:61). In other words, if an assessment is reliable the results for two groups of students given the same assessment should not be drastically different. The in-class fieldtrip will provide reliable assessment by presenting information in the same way and using the same methods of assessment regardless of the class being taught. It is also important that methods of assessment are fair. Fairness in an assessment involves making sure all students have an equal chance to demonstrate what they have learned, and this fairness is compromised when the assessment addresses material that was not covered in the unit of instruction or conflicts with the method of instruction used (McTighe and Ferrara 1998:8). To ensure assessment fairness, all of the questions used in the assessment will relate to material covered in the program.

The different forms of assessment used in the in-class archaeology fieldtrip are best examined individually. Each type of assessment will be described, its positive and

negative aspects will be discussed, and the reasons for using each method of assessment will be given.

Teacher Observation. The first method of assessment that will be used in every segment of the program is teacher observation. Teacher observation does not only involve monitoring students' work, but also asking students to explain what they are doing and why they are making specific choices. Two positive aspects of teacher observation are that it can be done quickly and provides immediate feedback. Asking students questions and listening to their answers is the "quickest way to find out if pupils grasp concepts and processes" (Gega 1994:184). Because the fieldtrip takes place in a single day, it is important to quickly assess how segments are progressing, how effective the methods of instruction are, and how well students understand the material. Immediate feedback allows instructors to rapidly correct problems in student understandings or methods of instructions, which in turn allows the time given for the fieldtrip to be used effectively.

Teacher observation can be done both formally and informally (Clark and Starr 1991:145). Informal observation takes place when teachers do not record what they observe, whereas formal observation involves keeping a record of observations. The in-class fieldtrip will require instructors to perform semi-formal observations. The majority of observation that will take place will be informal and done for the purpose of determining if students have met the objectives for the lesson and are performing the activities correctly. After the program is completed instructors will be asked to record

their observations concerning how well each segment went and what activities and concepts students struggled with.

While there are advantages to teacher observation, there are also distinct disadvantages. Teacher observation is not an exact way of assessing student learning and is open to subjective interpretation (Gega 1994:184). The inexact nature of observation could result in different instructors viewing the same group of students as having different levels of understanding, and does not allow for two groups of students to be compared objectively. Observation can also be unreliable because student behavior may be influenced when they are aware they are being observed, causing instructors to draw inaccurate conclusions about the amount of learning taking place (Clark and Starr 1991:435). Teacher observation also becomes problematic because it is difficult for instructors to observe every student for the amount of time necessary to determine their level of learning (Gega 1994:184). A final disadvantage to teacher observation is that observed behaviors and problems can be forgotten if they are not recorded (Clark and Starr 1991:435).

Despite its disadvantages, teacher observation is an important means of assessment for the in-class archaeology fieldtrip. Because of the limited amount of time available to work with students, an assessment that can be performed quickly and yields immediate feedback is critical if the time for the program is to be used effectively. Observing students as they perform activities, asking students to explain their actions, and discussing segments with students allows instructors to quickly correct student errors and misunderstandings. Additionally, many of the objectives require students to orally

explain various concepts. Although observation will not allow instructors to determine if every student can orally explain a concept, by asking students questions related to the objectives instructors can quickly determine if information needs to be repeated or if the methods of instruction are working effectively.

Selected Response Assessment (True or False Quiz). In addition to teacher observation, the effectiveness of the fieldtrip will be determined using objective selected-response assessments. Several objectives, both for individual segments and the program as a whole, concern students gaining factual knowledge about archaeology, making selected-response assessment an appropriate tool for measuring learning. Selected-response assessments can take several forms including multiple choice, true/false, and matching questions (McTighe and Ferrara 1998:11).

There are several positive aspects of selected-response questions. First, selected-response questions are objective, which not only makes them consistent but also allows multiple groups of learners to be compared. Selected-response assessment is also useful for testing facts and concepts, and can cover a broad range of information in a short amount of time (McTighe and Ferrara 1998:11-12). However, while there are clear advantages to this form of assessment, there are also disadvantages.

Selected-response assessments isolate information students have learned from the context in which the knowledge was gained. Isolating information from its original context can make it difficult for students to demonstrate learning because they are required to transfer information to a new context. Another drawback of selected response

questions is that they do not test critical thinking, creativity, or communication skills, because students select their answer from a list of choices (McTighe and Ferrara 1998:13-14).

Some scholars believe that selected-response assessment should not be used because it enforces student beliefs in "right" answers. Whether or not the reinforcement of a belief in right and wrong answers is positive or negative depends on the type of information students are being assessed on. If students are being assessed on factual knowledge then there are right and wrong answers, making selected-response an appropriate form of assessment. However, if students' problem solving techniques were being measured, selected-response would be a poor tool for assessment. A final drawback of selected-response assessments is that they may cause instructors to focus lessons on facts rather than understandings and applications of knowledge (McTighe and Ferrara 1998:13-14).

Although there are disadvantages to using selected-response assessments, the nature of the in-class fieldtrip, as well as the fact that teacher observation will take place, makes selected-response assessment an appropriate means of gauging students' factual knowledge. Because the program's instructors have limited time with students, it is important that assessments make the best possible use of time. Selected-response assessments can not only cover a great deal of information, they can be performed relatively quickly, and allow different groups to be compared.

Many of the negative aspects of selected-response assessments are counteracted because various forms of assessment are used in the program. Although selected-response assessments remove information from its original context, do not test critical thinking, creativity, or communication, these elements can all be considered during teacher observation, and because teacher observation will occur instructors will not be overly tempted to stress factual knowledge over applications of knowledge.

While there are many forms of selected-response assessment, the in-class fieldtrip will use an altered true/false test to measure student learning. In traditional true/false tests students are only able to select one of two options (true or false). The exams in my program will include a third choice, "Don't Know," that students can select if they are unsure of an answer.

True/false exams include many of the benefits of general selected-response assessments, they are objective, easy to score, "provide a wide sampling of materials in a short space," can be performed quickly, and "provide easy directions for children to follow" (Taylor 2003:22). The objectivity and short amount of time needed to take a true/false test works well with the in-class fieldtrip because it allows different groups to be compared and a wide variety of material to be assessed quickly. The fact that true/false tests are usually easy for children to understand is also important because the fieldtrip audience is fifth grade students.

True/false exams also have disadvantages that instructors need to consider. Exams that utilize true/false questions can be confusing to students, especially if

statements are included that are not entirely true or false. True/false exams can also "stress rote memory instead of comprehension" (Taylor 2003:22). If students are concerned only with rote memory, it is possible they will only learn new material at a surface level and information will not be retained for a long period of time. A final disadvantage to true/false exams is that they are open to students guessing answers (Taylor 2003:22). On a traditional true/false test there is a 50% chance that a student will be able to guess the correct answer, which means that if a student had no prior knowledge of a topic and guessed on every question, they would be predicted to answer 25% of the questions correctly (Borich and Tombari 2004:88-89).

Several steps will be taken in my program to handle the disadvantages of true/false exams. First, all of the statements used in the exam will be written clearly and each statement will be entirely true or false. Providing clear statements will help students perform well on the exam by decreasing misunderstandings and eliminating the problem of partially true or false statements. Although the true/false exam will focus on knowledge that has been memorized, the use of teacher observation will encourage students to learn material not only on a surface level but also gain a deeper level of understanding. Finally, although guessing is always possible in a true/false exam, by altering the traditional format to include a third option ("Don't Know"), I hope to eliminate some amount of guessing during the test. If students are allowed to indicate that they do not know if a statement is true or false it is possible that misleading results of exams can be avoided.

A true/false exam will be given to students in the diagnostic, summative, and retention assessments. Because two of the objectives of the fieldtrip concern improvement in students' understanding as measured by exams, how the true/false component of the exam is scored is important. Instructors will explain to students that they will be given one point for answering a question correctly, zero points for indicating that they do not know an answer, and will lose a point for answering a question incorrectly. This system of scoring will provide clear indicators of increased or decreased understanding of archaeological concepts because positive or negative scores will indicate if students have learned concepts correctly or misunderstand what has been taught.

Constructed-Response Assessment (Concept Maps and Short Answers). The third type of assessment used in the in-class archaeology fieldtrip is constructed-response assessment, which involves presenting students with questions they need to provide answers for. Construction questions are useful in assessing student learning because they test recall of information (Borich and Tombari 2004:90). Brief constructed-response questions can be written as either short answer questions or visual representations such as graphs or concept maps (McTighe and Ferrara 1998:14-15).

There are three main advantages to assessing student learning using brief constructed-response questions. First, constructed-response assessment allows for a range of responses to be given to a question rather than forcing students to select from a list of options. Second, constructed-response questions can test either declarative or procedural knowledge, while selected-response questions are best suited for only

declarative knowledge questions. Finally, if constructed-response questions require students to explain their answers the assessment can provide insight and understanding into student reasoning. Additional advantages include the fact that brief constructed-response questions can be completed in a short amount of time, can assess many different content standards, are usually straightforward in what they ask students to do, and require students to understand both facts and relationships (McTighe and Ferrara 1998:14-15; Taylor 2003:25). The three main disadvantages of brief-constructed response assessments are that they can be confusing if not written clearly, they do not test attitudes or values, and instructors are responsible for judging student answers which can make the assessment subjective if assessment guidelines are not used (McTighe and Ferrara 1998:15; Taylor 2003:25).

Although there are disadvantages associated with brief constructed-response assessments, the advantages outweigh the disadvantages. I am not concerned with the fact that this form of assessment does not measure attitudes or values because none of the objectives concern the affective domain. Potential confusion will be eliminated from the assessment by writing questions and directions clearly and at a level appropriate for a fifth grade audience. Subjectivity will be partially removed from the constructed-response assessment by providing instructors with guidelines for measuring student performance.

The two forms of constructed-response assessment used in the program are concept maps and short answer questions. Concept maps are "graphic organizers [used] to help children construct meaningful relationships among the facts and concepts they

learn," and assess conceptual knowledge (Gega 1994:186). Concepts maps will be used in the program to assess student understandings of the archaeological process. The second form of constructed-response assessment will be a short answer question. While short answer questions test knowledge and critical thinking and can be evaluated using objective measurements, they are problematic because they are usually given in summative assessments when it is too late to alter the lesson and correct student misconceptions (Gega 1994:185). Although most short answer questions are only used in summative assessments, I will include a short answer question in the diagnostic assessment which will allow for student misconceptions to be identified and corrected during the in-class fieldtrip.

Determining Effectiveness. The in-class archaeology fieldtrip will include three formal assessments: a diagnostic assessment of students' knowledge of archaeology given before the unit of instruction, a summative assessment given at the end of the unit of instruction, and a retention assessment given two weeks after the conclusion of the unit of instruction. In order to allow for comparisons between assessments students will be given the same exam each time, although the order of the questions will be rearranged (Appendix C). The results of the diagnostic assessment are important because they allow instructors to determine what the class's understanding of archaeology is and can shape how the program is taught as well as what the teacher can subsequently refer to in other lessons. The summative assessment given immediately after the program will be used to measure the immediate effectiveness of the lessons, and the retention assessment will be used to measure the program's ability to teach archaeological concepts in a manner which

results in retention of those concepts. The effectiveness of the fieldtrip will be based on whether or not the final two objectives of the overall program are met.

The second to last objective for the program as a whole states that: at the completion of the program students will perform significantly better on a test of their knowledge of archaeology compared to their performance on a pretest (improvement will be measured using a repeated-measures ANOVA test, with a significance value of $\alpha<.05$). Because the fieldtrip is designed to increase students' understanding of archaeology, rather than evaluating what students have learned, I am interested in determining how much their understanding of archaeology has improved. Statistics holds that if the probability of a change in performance due to happenstance alone is less than five percent, than a significant change has occurred. It is highly unlikely that students will improve their assessment scores after the program by chance, if students perform significantly better on the summative assessment than they did on the diagnostic assessment, then I will consider the fieldtrip to have been effective in teaching fifth graders about archaeology.

The last program objective states that: at the completion of the program students will perform significantly better on a retention test of their knowledge of archaeology compared to their performance on a pretest (improvement will be measured using a repeated-measures ANOVA test, with a significance value of $\alpha<.05$). If students are able to perform significantly better on a retention test compared to a pretest of archaeological knowledge I will consider the fieldtrip effective at teaching students about archaeology in a way that allows students to store basic archaeological concepts in long term memory.

While formal assessment will address many of the fieldtrip objectives and the objectives for individual segments, informal assessment will be the main way for determining if learning objectives are being met. Although teacher observation is a subjective means of assessment, instructors teaching the program will be expected to have knowledge of archaeology and be able to determine, via questioning and talking to students, if the class is meeting the learning objectives or if more time needs to be spent explaining specific concepts. If the instructor feels that the learning objectives are being met I will consider the in-class fieldtrip to be effective in teaching children about archaeology.

Assessment Conclusion. Assessment is an important part of instruction for several reasons. Assessment allows for instructors to determine if their learning objectives have been met, can measure student learning, and can indicate what methods of instruction need to be improved (Borich and Tombari 2004:31; Gega 1994:99). It is important that instructors think about what methods of assessment they will use, what material they will assess, and how they will explain the nature and reason for assessment to students. Teachers need to take the time to explain how assessment will work to students because assessments give messages to students "about what is worth learning, how it should be learned, what elements of quality are most important, and how well [they] are expected to perform" (McTighe and Ferrara 1998:32).

My in-class archaeology fieldtrip will include multiple forms of assessment. Diagnostic assessment is important to determine the level of understanding that students have about archaeology, and can be used to shape how the program is taught. Summative

and retention assessments measure how much students learned after the unit of instruction, and can also be used to help instructors make changes to lessons that can result in more effective learning. Each form of assessment used in the fieldtrip has strengths and weaknesses, however many of these weaknesses are made up for in the strengths of the other assessments used.

Conclusion

One of the strengths of my program is the use of multiple teaching methods and assessments to help students meet the objectives for each learning segment. Multiple teaching methods allow students to be exposed to material multiple times but in different contexts. The consistent pattern of learning methods used in each segment allows students to engage in learning without becoming overwhelmed by the deviation from their traditional school day. Multiple forms of assessment are used in order to gain the best understanding of the program's effectiveness. Teacher observation allows for quick feedback and can be used to make immediate adjustments to program segments. Assessments taking place after the program's conclusion are used to determine how well the lessons teach children about archaeology in a way that they will remember.

CHAPTER SIX: IN-CLASS ARCHAEOLOGY FIELDTRIP SEGMENTS

With an understanding of objectives, methods of instruction, and methods of assessment, it is now possible to examine the individual segments of the in-class archaeology fieldtrip. The in-class fieldtrip that I have developed consists of five unique segments, each of which focuses on a step in the archaeological cycle. The five segments are: "What Is Archaeology?," "Find the Site," "The Art of Digging," "Artifact Analysis," and "Present and Protect." While all five segments are designed to be taught as a group, the strength of my program is its flexibility. Depending on the teacher's needs, the program can include however many segments best fit with the school's current curriculum; the segments complement each other, but are able to be taught individually as well. The program is also flexible because each outdoor activity has an indoor alternative, which allows the program to be taught regardless of the weather. In the following pages each segment will be discussed briefly, the lesson plans for the activities can be found in the appendixes.

"What is Archaeology?"

The first segment of the program is designed to introduce students to the field of archaeology. Learning objectives for this segment include: students being able to describe what an archaeologist would and would not study, students' understanding what types of questions archaeology can help to answer, and that students will be able to study objects in a way similar to that of an archaeologist. "What is Archaeology?" will start with a short lecture introducing students to anthropology and its subfields after which it

will focus exclusively on archaeology. The lecture will help students understand what archaeologists do and do not study, and will encourage students to think about why archaeology is important.

After the short lecture, students will be given individual worksheets which will reinforce the concepts covered in the lecture and encourage students to think of a question they would like to try and answer using archaeology. Once students have completed the worksheet, they will take part in a short activity designed to get them to start thinking like an archaeologist. Students will be divided into groups and provided with a modern artifact (water bottle, cooking utensil, coffee grinder, etc.) and asked to describe and list everything they can about the artifact as if it were an object they are unfamiliar with.

"What is Archaeology?" will conclude with a group discussion of the artifacts the groups examined and a review of what archaeology is and why it is important. The lesson plan for "What is Archaeology?" can be found in Appendix D. The first segment can be used as a transition to the second segment, "Find the Site."

"Find the Site"

The second segment of the program is designed to teach children about archaeological surveying. Learning objectives include: students will be able to describe what an archaeological survey involves, students will be able to interpret graphs of their survey findings, and students will be able to describe the advantages and disadvantages of different survey methods. The second segment is designed to be conducted outside,

however an indoor alternative is also available if needed. The segment will begin with a discussion of the methods students use to find things, and a presentation which will include archaeological vocabulary and introduce students to different survey methods used by archaeologists.

After the presentation students will be given a worksheet to complete that will reinforce concepts covered in the presentation. Once students have completed their worksheets, the class will briefly review the exercise and questions will be addressed. Next the students will take part in a survey exercise which will take place either outside or in the classroom. The survey exercise will help students practice survey methods and record and analyze their findings. After the exercise is complete the class will gather and discuss what students learned during the exercise. The lesson plan for the outside and inside segments of "Find the Site" can be found in Appendix E and Appendix F, respectively. The conclusion of the second segment can serve as a transition to the third segment, "The Art of Digging."

"The Art of Digging"

The third segment of my program is designed to teach students about archaeological excavations. In this segment students will learn that there is a science and strategy to how archaeologists conduct excavations, and that digging at a site requires patience and careful note taking. Learning objectives include: students will be able to use proper trowel techniques/recording methods, students will be able to take metric measurements, and students will be able to interpret their findings. Like the second

segment, the third segment is designed to take place outdoors, although an indoor alternative is also available.

The segment begins with a presentation that introduces students to the tools used in archaeological excavations and the concept of stratigraphy. After the presentation students will complete a worksheet that will reinforce concepts covered in the presentation. In the outdoor option, once students have completed their worksheets they will take part in a mock excavation which will allow them to gain firsthand experience excavating, taking measurements, and recording notes in the same way that archaeologists do. Once the mock excavation is complete the class will gather to discuss their findings and try to interpret what their sites were used for.

The indoor alternative makes use of rock image interpretation. The presentation for this option will address the many different things that archaeologists can study and how archaeology does not always involve digging, it can also include uncovering meaning in art. Students will be divided into groups to create their own "rock images" and will then try to interpret another group's rock image panel. The activity will involve recording the "rock images" of their peers and interpreting their findings. After the activity has concluded, the class will discuss the groups' interpretations and the reasons for possible conflicting views. The class will then look at examples of rock images from around the world, and possibly view a short film clip on rock images. The outline of the lesson plans for the outdoor and indoor segments of "The Art of Digging" can be found in Appendix G and Appendix H, respectively. The conclusion of the third segment can be used as a transition to the fourth segment, "Artifact Analysis."

"Artifact Analysis"

The fourth segment of my program is designed to teach students about how archaeologists study the artifacts that are recovered during archaeological excavations. In this segment students will learn methods of analyzing artifacts and the importance of recording their observations. Learning objectives include: students will be able to properly clean artifacts, students will be able to record metric measurements related to an artifact, and students will provide written interpretations of artifacts. This segment is designed to take place indoors and as such there is only one option for this section of the fieldtrip.

The segment will begin with a presentation that covers what archaeologists study (artifacts and features) and why they are interested in these things (to learn about past human behavior). Students will be asked how we learn about the past, and what scientists look for when they study something (color, size, weight, etc.). The presentation will include an example artifact and students will be asked what they would record about the item. Finally the presentation would discuss the importance of recording observations.

After the presentation students will complete a worksheet that reinforces ideas covered in the presentation. The worksheet will include completing a pot puzzle to teach students about how archaeologists can reassemble artifacts and that when pieces of artifacts are missing it can make reassembling them more difficult. Once the worksheet is complete students will take part in an analysis activity that includes cleaning, studying,

and interpreting an artifact. Once students have completed the analysis activity the class will gather to discuss the artifacts that were analyzed, methods of cleaning different materials, and restate the importance of recording findings. The lesson plan for "Artifact Analysis" can be found in Appendix I. The conclusion of the fourth segment can be used as a transition into the fifth and final segment.

"Present and Protect"

The fifth segment of the in-class fieldtrip will teach students about the importance of sharing what they have learned with others and protecting the archaeological sites and artifacts that they used in their study. Learning objectives include: students will be able to orally explain why it is important to share information with others, students will be able to create a short list of possible modes of presenting information, and students will be able to orally explain possible ways of protecting archaeological sites and artifacts.

The fifth segment will begin with a presentation that discusses what happens after archaeologists have analyzed their finds. Students will be asked how and why scientists should share information with others. The presentation will also ask students to think about ways in which archaeological resources can be protected and why it is important to protect these resources. After the presentation students will be given a worksheet that will reinforce the concepts that have been discussed.

Once students have completed their worksheets they will take part in an activity that will challenge them to create a display that will teach others about the artifact that they analyzed. Students will be given free creative license in creating their display, so

posters, models of a museum exhibit, or short essays will all be acceptable forms of presentation. The activity will also require students to describe how they would protect their artifact and the site which it came from. The segment will end with a discussion in which students may share their work and the idea that the archaeological process is a cycle will be restated. The lesson plan for "Present and Protect" can be found in Appendix J.

Additional Option

While the in-class fieldtrip consists of only five segments, it is possible to extend the experience so that parents are able to learn about their child's encounter with archaeology. If the class has done most of the segments, then one possibility for extending the fieldtrip experience is to ask parents to come to the classroom after school to see their child's work. Students can explain to their parents what they learned and share their work packets and artifact displays. Not only would an after school student showcase allow children to share their work in a unique setting, it would also allow parents to learn more about archaeology. An after school showcase would also provide an opportunity to share with children and their parents any further opportunities to become involved in archaeology.

CHAPTER SEVEN: CONCLUSION

Archaeological outreach programs are important for a multitude of reasons. Outreach can support archaeological endeavors by correcting common misconceptions of the field and creating an informed public that understands why fieldwork is important. Additionally, interested communities can learn more about an area's history through outreach and in doing so gain a greater appreciation for how the past influences the present. "The political goals of generating public relations and stimulating interest in archaeology in sponsors and the public to gain support are…a part of the archaeological process" (South 2010:71). Outreach goes one step beyond publishing findings and giving presentations at conventions; it reaches out to those who are interested in archaeology but may not have the time or money to pursue the field as a career.

One group that is often overlooked in outreach efforts is children. Teaching children about archaeology can introduce them to a career they may never have previously considered, which may in turn increase the number of archaeologists in the future. Children are also able to influence their parents' perceptions of the field by discussing what they learn at home. The multidisciplinary nature of archaeology lends itself to teaching children because it incorporates many of the subjects children are already learning in school into archaeology lessons.

One way children are introduced to new material is through fieldtrips. Off-campus trips reinforce material covered in the classroom and provide novel learning environments that give students first-hand experiences that can promote interest and

learning. The in-class archaeology fieldtrip I have designed teaches fifth graders about the archaeological process via a series of five segments. Each segment consists of a short informative presentation, worksheet, hands-on activity, and reflective discussion. The novelty that my program brings to students allows classes to experience many of the benefits a traditional fieldtrip would provide while simultaneously allowing schools to avoid many of the obstacles that are usually encountered when conducting a fieldtrip. Although my program takes place inside the classroom, it is no less special than a traditional fieldtrip. Not only can new experiences and activities generate excitement, the classroom can become a novel place for learners simply by rearranging desks and setting out a variety of archaeological tools for students to see (Garfield and McDonough 1997:3). The public's fascination and imaginative ideas of archaeology can be used to capture students' attention and get them to actively learn about the field (Sheppard 1993:55).

Conducting research and utilizing feedback from teachers and public archaeologists has allowed me to determine the most effective and engaging ways to teach basic archaeological principals to fifth graders. Surveys completed by public archaeologists and fifth grade teachers directed the topics emphasized in my program. The use of teacher feedback and fifth grade curricula also ensured that my in-class archaeology fieldtrip supports many of the standards and objectives in place in the Lincoln Public School district. Collaboration is critical if outreach programs are to succeed; the program I have designed recognizes and embraces this fact. Synthesizing information gained from research as well as teacher and public archaeologist surveys has

allowed me to create a program that will teach fifth graders about archaeology in a way that is informative and supports the current fifth grade curriculum.

It has been said that "enjoyment is the by-product of good instruction, it is not a goal" (Sheppard 1993:10). The in-class fieldtrip I have designed has not put entertainment above education; the program is designed to teach fifth graders about archaeology using methods of instruction that are known to be successful. Student enjoyment of the program will be generated by learning about a new field of science in a way that creates a novel learning environment while simultaneously reinforcing material taught in school.

Appendix A

Public Archaeologist Survey

Public archaeologists were provided with a brief description of the proposed in-class archaeology fieldtrip prior to answering the following questions.

1) What age groups do your programs target? Which age group has the most number of participants?

2) In what ways do your programs teach the public about archaeology?

3) What archaeological concepts (stratigraphy, absolute/relative dating, theories, etc.) do you think are important to teach to fifth graders?

4) What aspects of the archaeological process (research, survey, excavation, analysis, curation, publishing, etc.) do you think should be taught to fifth graders?

5) What do you consider to be the best way to present archaeological information to children?

6) What methods of presenting archaeological information to children do you believe are unsuccessful?

7) If you had to pick five things that you would want a fifth grader to take away from an archaeological program what would they be? If you wish to give reasons for any of your choices please do so.

8) Would you be interested in incorporating an in-class archaeology fieldtrip into your current outreach efforts? Why or why not?

Appendix B

Fifth Grade Teacher Survey

Fifth grade teachers were provided with a brief description of the proposed in-class archaeology fieldtrip prior to answering the following questions.

1) How many fieldtrips, on average, does your class go on in a school year?

2) What influences the number of fieldtrips your class takes?

3) What history subjects do you teach to your fifth grade class that you believe archaeology could compliment?

4) Have you ever taken an archaeology course?

5) Would you be interested in having an outside program bring an in-class archaeology program to your class? Why or why not?

6) What topics of your fifth grade curriculum (math, science, writing, etc.) would you like to see incorporated into an in-class archaeology program?

7) What would be the biggest obstacle in bringing an in-class archaeology program to your class?

Appendix C

Assessment Instrument

Dig Up Some Information

Please answer the following questions based on what you know about archaeology.

Part One: Please mark the following statements as true ("T"), false ("F"), or don't know ("DK").

1) _____ Archaeology is the study of fossils.
2) _____ Some of the tools archaeologists use are bulldozers, shovels, and trowels.
3) _____ Archaeologists excavate sites to look for rare, valuable buried treasure.
4) _____ Archaeologists seek to understand past societies by studying what their citizens left behind.
5) _____ When all the objects have been removed from a site, the archaeological project is finished.
6) _____ It's ok to take cool artifacts when you are visiting an archaeological site.
7) _____ You can help protect archaeological sites.
8) _____ Where an artifact was found is not really important.
9) _____ Archaeologists look for dinosaurs.
10) _____ Everything a person learns using archaeology can be found in history books.
11) _____ A person does not need special training to be an archaeologist.
12) _____ An archaeological survey involves digging up artifacts

(Questions 1-9 taken from "The Truth About Archaeology" National Park Service, Jr. Ranger worksheet.)

Part Two: Please use your knowledge of archaeology to fill in the blanks.

1. List five tools that archaeologists use:
   1._____
   2. _____
   3. _____
   4. _____
   5. _____

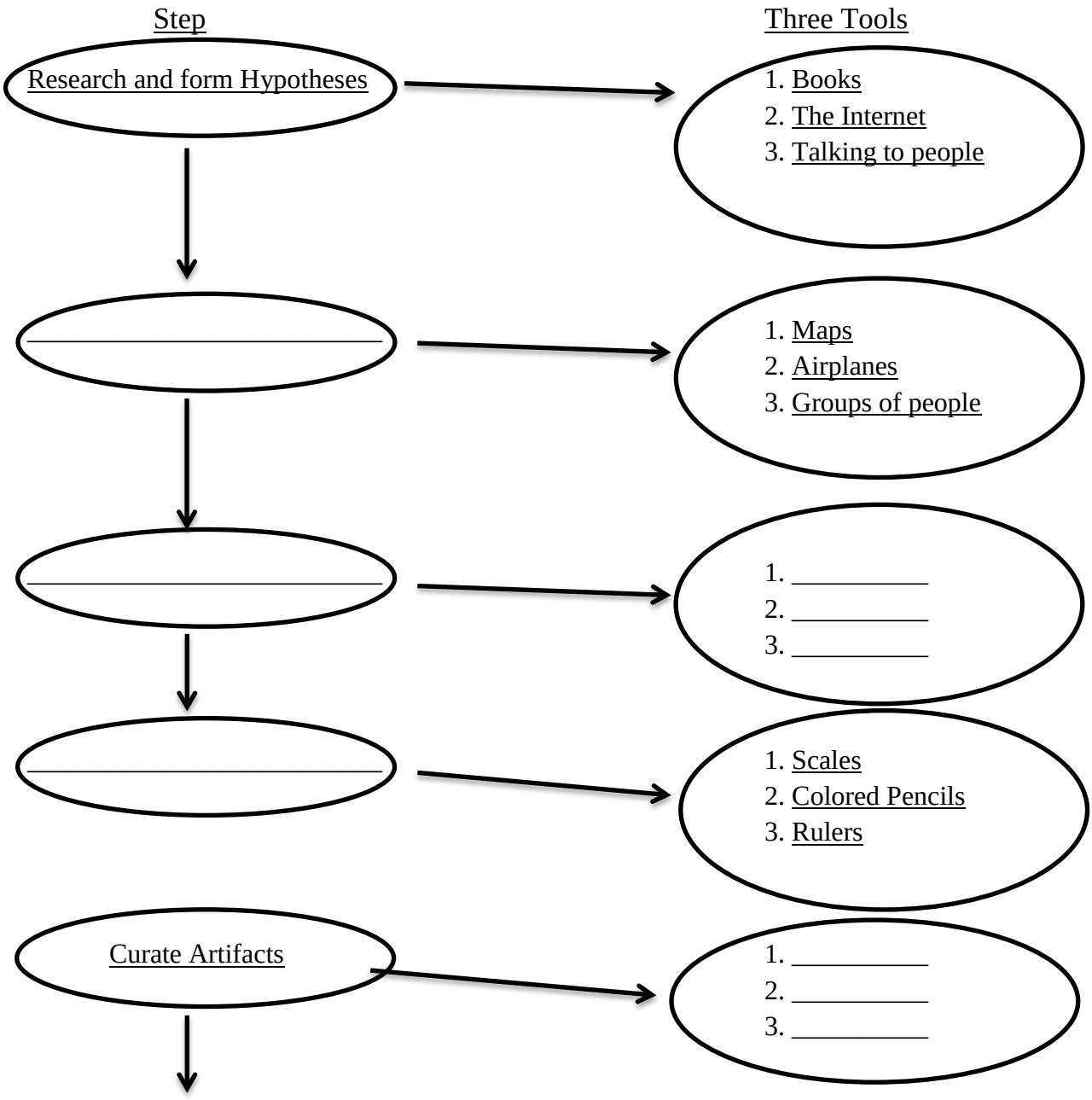
2. Use the following word bank to fill in the blanks:

Research	Protect	Excavate	Survey	Analyze
Walking	Questions	Artifact	Flying	Test
Hypotheses	Feature	Curate		

A. It is important that people _____ archaeological sites so they can be studied in the future.
B. The first steps in the archaeological process are to _____and form _____ about the topic that archaeologists want to study.
C. The second step in the archaeological process is to conduct a _____.
D. Archaeologists use _____ and _____ surveys to find archeological sites.
E. The third step in the archaeological process is to _____ the site.
F. An _____ is something that can be picked up at a site.
G. A _____ is something that **cannot** be picked up at a site.
H. The fourth step in the archaeological process is to _____ objects.
I. The fifth step in the archaeological process is to _____ objects.
J. The archaeological process can _____ hypotheses, and can also create new _____.

2. Please use your knowledge of archaeology to complete the concept map.

The Archaeological Process



Finally, the step in the archaeological process that is **ALWAYS** happening is the _____ of archaeological sites.

Appendix D

Outline of "What is Archaeology?" Lesson Plan

Student Objectives

1. At the completion of the segment students will be able to describe what topics an archaeologist would and would not study.
2. At the completion of the segment students will be able to provide a written question that they would like to try and answer using archaeology.
3. At the completion of the segment students will be able to work as a group to study and provide a written description of a modern object in the way that an archaeologist would describe an artifact.

Materials

For the teacher:

Chalkboard/Whiteboard and chalk/markers

Pictures of different things studied by archaeologists (temples, rock images, dig sites, etc.)

Pictures of things NOT studied by archaeologists (dinosaurs, oceans, etc.)

An empty soda can

For the students:

"What is Archaeology?" worksheets (1 per student)

Modern Mystery worksheet (1 per student)

4-5 Everyday objects (water bottle, coffee grinder, whisk, etc.)

Pencils and Crayons

Materials Preparation

No material preparation is needed for this segment.

Motivation

Ask students what they are learning about in their history class. Ask what things people use to learn about what happened in the past. "Archaeology is one way that people can learn about what happened in the past. Archaeologists try to learn about past groups by looking at the things that they left behind. Today we are going to learn what an archaeologist studies, write questions that archaeology could answer, and study some artifacts like an archaeologist would."

Learning Activities

Presentation

1. Ask students what objects an archaeologist would find if they were to look in their bedroom, give an example to begin ("An archaeologist would find a lot of books in my bedroom.").
2. Tell students that archaeology is one of many ways scientists study humans. Explain why it is important to have multiple fields of anthropology, and briefly describe the other subfields.
    a. Linguistics
    b. Ethnology/Cultural
    c. Physical/Biological
3. Describe exactly what types of things archaeologists study and introduce new vocabulary.
    a. Objects and evidence of past human activities
    b. Artifacts, features, and sites
4. Describe things that an archaeologist would NOT study.
    a. Dinosaurs, oceans, etc.

5. Emphasize to students that archaeology is not treasure hunting. Ask the class to come up with differences between archaeology and treasure hunting, and write answers on the board.
    a. Archaeology is a science and uses methodology, procedures, and has a code of ethics. Note keeping and protecting sites and artifacts is very important. Archaeologists want to share what they learn with others and work with diverse communities to learn about past human behaviors.
    b. Treasure hunting is done to gain money, notes are not kept, and the site/context is not protected. Treasure hunters care more about money than learning and rarely try to learn about past human behavior from their finds.
6. Discuss with students why archaeology is important. It can shed light on past human behaviors, and is one way to learn about diverse cultures, many of whom did not leave written records.
7. Distribute "What is Archaeology?" worksheets to students and have them complete the worksheets at their desks, offer help when asked for. After 10 minutes (or when most students have finished) quickly go over the worksheet with the class. Ask students what questions they would like to try and answer using archaeology (ex. Who was buried in pyramids? What used to be where the school is now?).

Modern Mystery Object Activity

1. Tell students that now that the class has an understanding of what archaeologists do, they will work in groups to describe some "mystery" objects in a way that an archaeologist would. "Now that you all know what an archaeologist studies we are going to examine some objects that I've brought in. You are going to work in groups to describe these objects just like an archaeologist would. For example I have this object (hold up a soda can), it seems to be made of metal and there is writing on the outside of it. There is a small opening at the top with an oval piece near the opening. The writing and the cylinder are different colors, and there are

some numbers written on it as well. The object is fairly light, and is empty. I think it may have been used to hold something, and may have been worn as a necklace by threading a string through the oval tab. Once you are in your groups I will handout the mystery objects and worksheets."

2. Have students sit with their groups, and distribute the items and worksheets. Answer questions when asked. Give students 15 minutes to complete the activity (or as much time is needed for all groups to finish).

Discussion

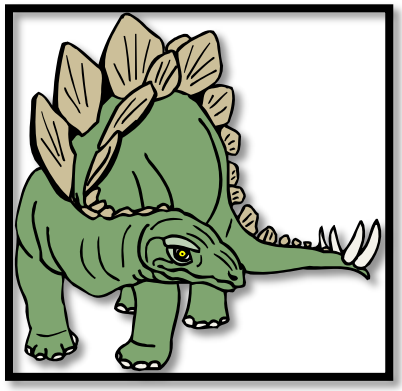
1. Once all groups have finished their worksheets collect the mystery items and have the whole class gather together. Hold up each mystery item and ask the group that studied it what they noticed about it and what they think it is. After the group that studied it has given their answers ask the rest of the class if they notice anything about the item or may know what it is. After giving students a chance to answer let the class know what the item actually is if they do not know already.
2. Ask the class what they used to study the objects (sight, touch, sound, etc.). Ask what other ways the objects could have been studied (weight, measurements, etc.).
3. Ask the students what all of the items have in common, and write responses on the board. If after students have had a chance to answer and nobody has stated that all of the objects were made by humans, put this response on the board and discuss that an archaeologist could study all of these things because they were all made by humans.
4. Discuss with the class how archaeologists are only able to learn about the past if archaeological sites are protected, and that if people do not protect sites it will be almost impossible to learn about past human behaviors using archaeology.
5. Ask students to think back on the questions they wrote on their first worksheet (what question would they like to try and answer using archaeology). Explain how once archeologists have a question that they want to answer, the next step in the archaeological cycle is to find a site that will help answer their question.

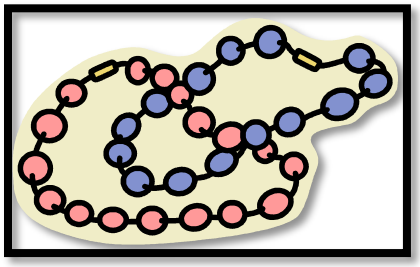
Assessment

Informal teacher observation, worksheets, and responses given during discussion will be used to determine if the learning objectives have been met.

What is Archaeology?

Look at the following pictures. Circle the picture if it is something that an archaeologist would study. Put an "X" over the picture if it is something that an archaeologist would NOT study.





What question would you like to try and answer using archaeology? What would you look for to help answer your question? Use the back of this page if necessary.

Modern Mystery Object

(Adapted from the National Park Service Midwest Archaeological Center's Junior Ranger Artifact Analysis Worksheet)

Type of Artifact

Describe the material that artifact is made from: bone, pottery, metal, wood, leather, glass, paper, cardboard, cotton, plastic, other material.

Special Qualities of the Artifact

Describe how the artifact looks and feels: color, shape, texture, size, weight, movable parts, anything printed, stamped or written on it.

The Artifact's Uses

What might it have been used for?

Who might have used it?

Where might it have been used?

When might it have been used?

What Does the Artifact Tell Us?

What does the artifact tell us about the technology of the time in which it was made and used?

What does the artifact tell us about the life and times of the people who made it and used it?

Sketch the Artifact Below

Appendix E

Outline of “Find the Site” Lesson Plan (Outdoor Option)

Student Objectives

1. At the completion of the segment students will be able to describe what an archaeological survey involves.
2. At the completion of the segment students will be able to orally interpret bar graphs of their findings during the archaeological survey.
3. At the completion of the segment students will be able to orally explain the advantages and disadvantages of different survey methods.

Materials

For the teacher:

Chalkboard/Whiteboard and chalk/markers

10 Small traffic cones or flags

450 white, orange, and green rotini noodles (150 of each color)

Caution Tape

For the students:

Survey worksheets (1 per student)

Noodle Survey Packet (1 per student)

Clipboards (1 per student)

Pencils

Crayons

Materials Preparation

Section off an area of the schoolyard located away from playground equipment and areas normally played in by school kids using the caution tape. This area should ideally measure approximately 20 meters by 20 meters, although the area can be altered due to available space and class size. Place the cones/flags four meters apart from each other along opposite ends of the sectioned off area. Scatter the rotini noodles around the area between the rows of cones/flags. Try to distribute noodles throughout the area although noodle density in different sections can vary.

Motivation

Ask students if they have ever forgotten where they put something and had to look for it. Ask what methods students used to find what they lost. "After archaeologists research something they want to study, they have to find a site that will tell them about what they want to learn. When archaeologists look for a site they are doing a survey. Today we will learn about different types of surveys archaeologists use and the benefits of each one. We will also conduct a survey in your playground using noodles and make graphs of our observations."

Learning Activities

Presentation

1. Ask students methods they use to look for things (toys, jackets, homework, etc.)

2. Tell students that archaeologists usually have to look for the sites they want to study.
    A. Ask students to recall the vocabulary covered in the first segment and explain what an archaeological site is.
3. Describe different types of surveys archaeologists conduct and the pros and cons of each type. Stress that regardless of the method chosen to survey, archaeologists always take notes and use a process or pattern (science not treasure hunting).
    A. Walking (pedestrian) survey
    B. Flying (aerial) survey

4. Distribute survey worksheets to students and have them complete the worksheets at their desks, offer help when asked for. After 10 minutes (or when most students have finished) quickly go over the worksheet with the students. Ask

students to describe the advantages and disadvantages of different types of surveys (ex. Flying surveys cover lots of ground but can only note large features, walking surveys can take time but spot small items).

Noodle Survey

1. Tell students that the class will now conduct its own survey in the schoolyard, and pass out the Noodle Survey packets attached to clipboards. "Now that we've learned what an archaeological survey is, we are going to conduct our own survey outside. Before we go though I need everyone to find a partner and a pencil, once you have both of those things line up with your partner at the door. Make sure you have your survey packet and clipboard!"
2. Walk the students out to the sectioned off area of the schoolyard and have two pairs of students sit down behind a cone/flag, keep all students on the same side of the area. Ask students to complete the top part of the first page of their Noodle Survey Packet, while you remove the caution tape from around the area.
3. While students are seated explain that they will be surveying the area between the cones/flags for noodles. Explain that the cones/flags will help students keep their spacing while the survey is being conducted. "The cones/flags have been set up four meters apart from each other. I want the first pair of students behind the cones/flags to stand up and move from your current spot to the cone/flag opposite of you. As you survey the area between your cones/flags count and record the number of noodles you see and what color they are in your packet." When the first group of students finishes the survey have them sit down and go over their findings with their partner while the second group of students performs the survey. When both groups have gone they should be seated behind the cones/flags opposite from where they started.
4. Now have student pairs stand in a single line equally spaced out between the edges of the survey area. Have students complete the survey a second time moving back to their original positions and record their findings in the Noodle Survey Packet. Stagger the number of students surveying at one time if necessary. While students are recording and comparing the results of the second survey collect the caution tape and cones/flags. Have students walk back to the classroom.
5. Once students are seated at their desks have them graph the results of both of their surveys on separate sheets of graph paper (included in the Noodle Survey Packets). "Alright, now that we have conducted our survey it is time to analyze what we found. In your Noodle Survey Packet you will find a sheet of graph

paper behind the data for each of the surveys you conducted. Use your pencils and crayons to make a bar graph that shows how many noodles of each color you found in each survey. Also add up the total number of noodles you saw in each survey."

Discussion

1. Once students have finished making their bar graphs (allow approximately 10 minutes for them to work), ask students to tell you how many noodles of each color they saw with their partner in the first survey. Write the number of noodles for each color found by the groups on the board, and total all of the findings so that the total number of each color noodle is displayed. Repeat this procedure for the second survey.
2. Ask students to look at their bar graphs. "Now that we've graphed our data and written the class's results on the board, does anyone notice anything particular about their graphs or the class's findings?" If necessary prompt students with questions. "Did people find more of one color noodle than another color? Did the class find more noodles in the first or second survey?"
3. Ask students why they think they got the results they did. "Why do you think we didn't see as many green noodles as white noodles? Why do you think we found more noodles in the second survey?" Once students have discussed their findings and reasons for their results ask them to think of other ways the survey could have been done. "How else could you have surveyed the area?"
4. Discuss with the class the importance of protecting the site that has been found. What groups might be interested in knowing the location of the site (descendants, treasure hunters, etc.), and if these groups would all care about protecting the site. Ask students how they would protect a site once they found it.
5. Explain to the class that once archaeologists conduct a survey and find a site the next step in the archaeological process is to excavate the site to learn about the people who lived there.

Assessment

Informal teacher observation and responses given during discussion will be used to determine if the learning objectives have been met.

Find the Site

Identify what the best survey method (walking/pedestrian or flying/aerial) would be to locate the following sites:

1. A village in a desert:
2. Rock images:
3. A blacksmith's shop at a fort:
4. A group of temples:
5. Projectile points:

List six things that you could use to help you conduct an archaeological survey:

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

You have been asked to help a team of archaeologists find an ancient Maya city located deep in the Guatemalan jungle. What survey method and tools would you use to help locate this site and why?

Noodle Survey

Date: _____ Team Name: _____

Team Members:

_____

Weather: _____

Surface Conditions:

_____

Survey Methods

Number of People: _____

Survey interval (circle one): 1 meter 2 meters 3 meters 4 meters

Direction of Survey (circle one): North-South East-West

Site

What did you find?

_____

Where did you find it?

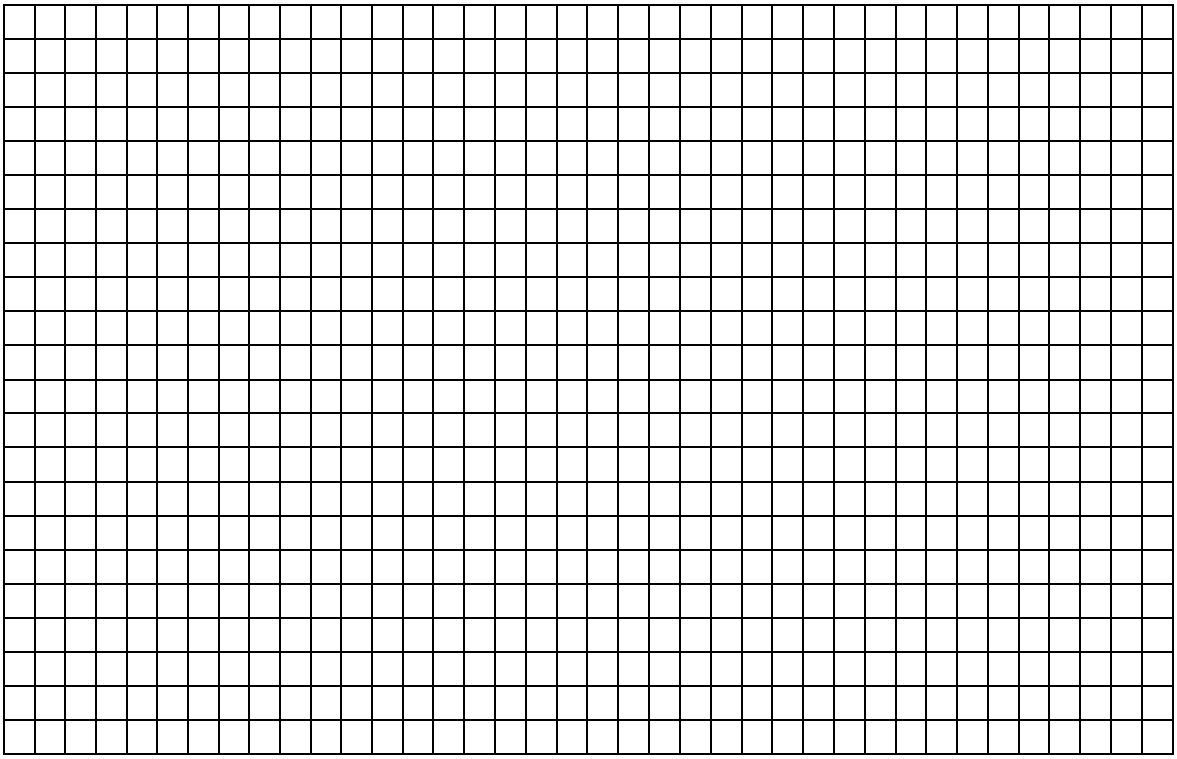
_____

Survey One

Tally the number of artifacts:

Orange Noodles	White Noodles	Green Noodles

Graph Your Findings

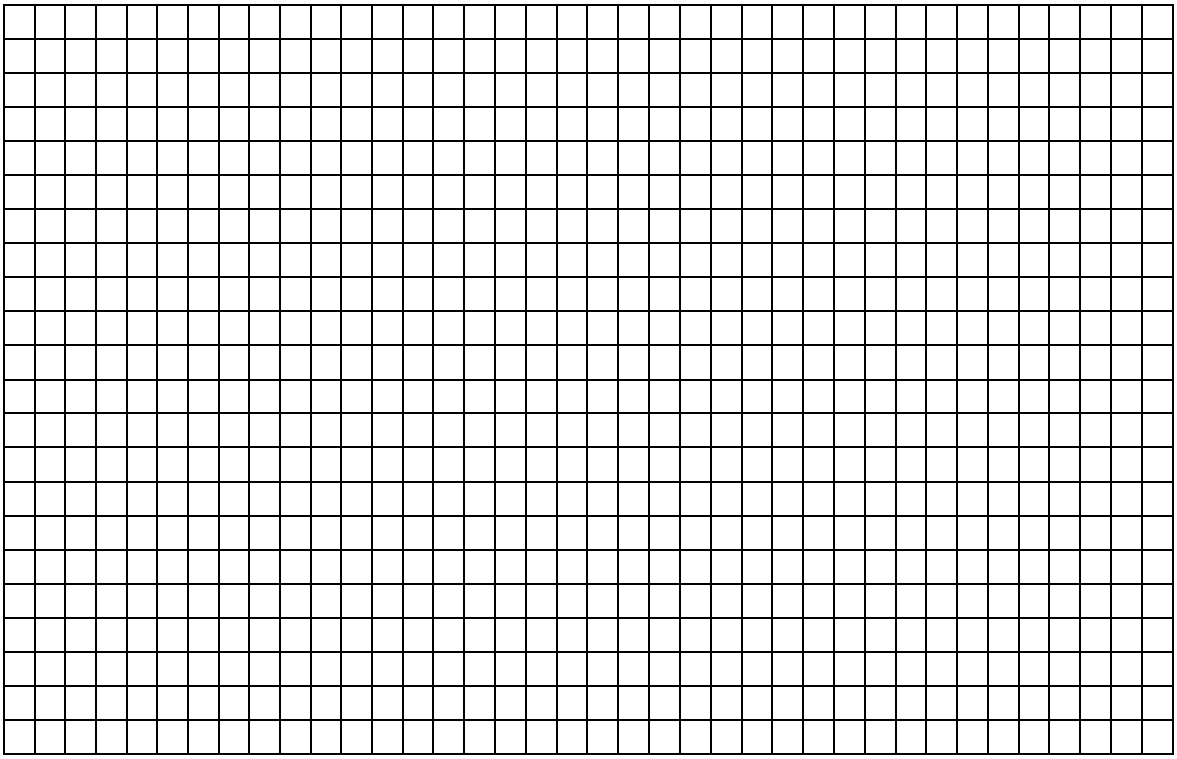


Survey Two

Tally the number of artifacts:

Orange Noodles	White Noodles	Green Noodles

Graph Your Findings



Appendix F

Outline of "Find the Site" Lesson Plan (Indoor Option)

Student Objectives

1. At the completion of the segment students will be able to describe what an archaeological survey involves.
2. At the completion of the segment students will be able to orally interpret bar graphs of their findings during the archaeological survey.
3. At the completion of the segment students will be able to orally explain the advantages and disadvantages of different survey methods.

Materials

For the teacher:

Chalkboard/Whiteboard and chalk/markers

10 Small traffic cones

Large bags of individually wrapped Jolly Ranchers, Lemon Drops, and Tootsie Rolls

For the students:

Survey worksheets (1 per student)

Candy Survey Packets (1 per student)

Clipboards (1 per student)

Pencils

Crayons

Materials Preparation

Clear a large area in the classroom, this area should ideally measure approximately 4.5 meters by 6 meters, although the area can be altered due to available space and class size. Place the cones two meters apart from each other along opposite ends of the longest side of the cleared area. Scatter all of the candy around the area between the rows of cones. Try to distribute candy evenly throughout the area although candy density in different sections can vary.

Motivation

Ask students if they have ever forgotten where they put something and had to look for it. Ask what methods students used to find what they lost. "After archaeologists research something they want to study, they have to find a site that will tell them about what they want to learn. When archaeologists look for a site they are doing a survey. Today we will learn about different types of surveys archaeologists use and the benefits of each one. We will also conduct a survey in your classroom using candy and make graphs of our observations."

Learning Activities

Presentation

1. Ask students methods they use to look for things (toys, jackets, homework, etc.)
2. Tell students that archaeologists usually have to look for the sites they want to study.
    a. Ask students to recall the vocabulary covered in the first segment and explain what an archaeological site is.
3. Describe different types of surveys archaeologists conduct and the pros and cons of each type. Stress that regardless of the method chosen to survey, archaeologists always take notes and use a process or pattern (science not treasure hunting).
    a. Walking (pedestrian) survey
    b. Flying (aerial) survey
4. Distribute survey worksheets to students and have them complete the worksheets at their desks, offer help when asked for. After 10 minutes (or when most students have finished) quickly go over the worksheet with the students. Ask students to describe the advantages and disadvantages of different types of surveys (ex. Flying surveys cover lots of ground but can only note large features, walking surveys can take time but spot small items).

Candy Survey

1. Tell students that the class will now conduct its own survey in the classroom, and pass out the Candy Survey packets attached to clipboards. "Now that we've learned what an archaeological survey is, we are going to conduct our own survey here in the classroom. Before we start though I need everyone to find a partner and a pencil, once you have both of those things sit down with your partner behind a cone. Make sure you have your survey packet and clipboard!"
2. Help arrange the students so that there are an equal number of groups behind each of the cones on one side of the survey area. Ask students to complete the top part of the first page of their Candy Survey Packet.
3. While students are seated explain that they will be surveying the area between the cones for candy. Explain that the cones will help students keep their spacing while the survey is being conducted. "The cones have been set up two meters apart from each other. I want the first pair of students behind the cones to stand up and move from your current spot to the cone opposite of you. As you survey the area between your cones count and record the number of each type of candy you see in your packet." When the first group of students finishes the survey have them sit down and go over their findings with their partner while the second group of students performs the survey. When both groups have gone they should be seated behind the cones opposite from where they started.
4. Now have student pairs stand in a single line equally spaced out between the edges of the survey area. Have students complete the survey a second time moving back to their original positions and recording their findings in the Candy Survey Packet. Stagger the number of students surveying at one time if necessary. While students are recording and comparing the results of the second survey collect the cones and candy. Have students return to their desks.
5. Once students are seated at their desks have them graph the results of both of their surveys on separate sheets of graph paper (included in the Candy Survey Packets). "Alright, now that we have conducted our survey it is time to analyze what we found. In your Candy Survey Packet you will find a sheet of graph paper behind the data for each of the surveys you conducted. Use your pencils and crayons to make a bar graph that shows how many of each type of candy you found in each survey. Also add up the total amount of candy you saw in each survey."

Discussion

1. Once students have finished making their bar graphs (allow approximately 10 minutes for them to work), ask students to tell you how many of each candy they saw with their partner in the first survey. Write the number of each candy found by the groups on the board, and total all of the findings so that the total number of each candy is displayed. Repeat this procedure for the second survey.
2. Ask students to look at their bar graphs. "Now that we've graphed our data and written the class's results on the board, does anyone notice anything particular about their graphs or the class's findings?" If necessary prompt students with questions. "Did people find more of one candy than another? Did the class find more candy in the first or second survey?"
3. Ask students why they think they got the results they did. "Why do you think we didn't see as many Lemon Drops as Tootsie Rolls? Why do you think we found more candy in the second survey?" Once students have discussed their findings and reasons for their results ask them to think of other ways the survey could have been done. "How else could you have surveyed the area?"
4. Discuss with the class the importance of protecting the site that has been found. What groups might be interested in knowing the location of the site (descendants, treasure hunters, etc.), and if these groups would all care about protecting the site. Ask students how they would protect a site once they found it.
5. Explain to the class that once archaeologists conduct a survey and find a site the next step in the archaeological process is to excavate the site to learn about the people who lived there.

Assessment

Informal teacher observation and responses given during discussion will be used to determine if the learning objectives have been met.

Find the Site

Identify what the best survey method (walking/pedestrian or flying/aerial) would be to locate the following sites:

1. A village in a desert:
2. Rock images:
3. A blacksmith's shop at a fort:
4. A group of temples:
5. Projectile points:

List six things that you could use to help you conduct an archaeological survey:

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

You have been asked to help a team of archaeologists find an ancient Maya city located deep in the Guatemalan jungle. What survey method and tools would you use to help locate this site and why?

Candy Survey

Date: _____ Team Name: _____

Team Members:

_____

Lighting (Natural, Overhead, etc.):

_____

Surface Conditions (Wood, Carpet):

_____

Survey Methods

Number of People: _____

Survey interval (circle one): 1 meter 2 meters 3 meters 4 meters

Direction of Survey (circle one): North-South East-West

Site

What did you find?

_____

Where did you find it?

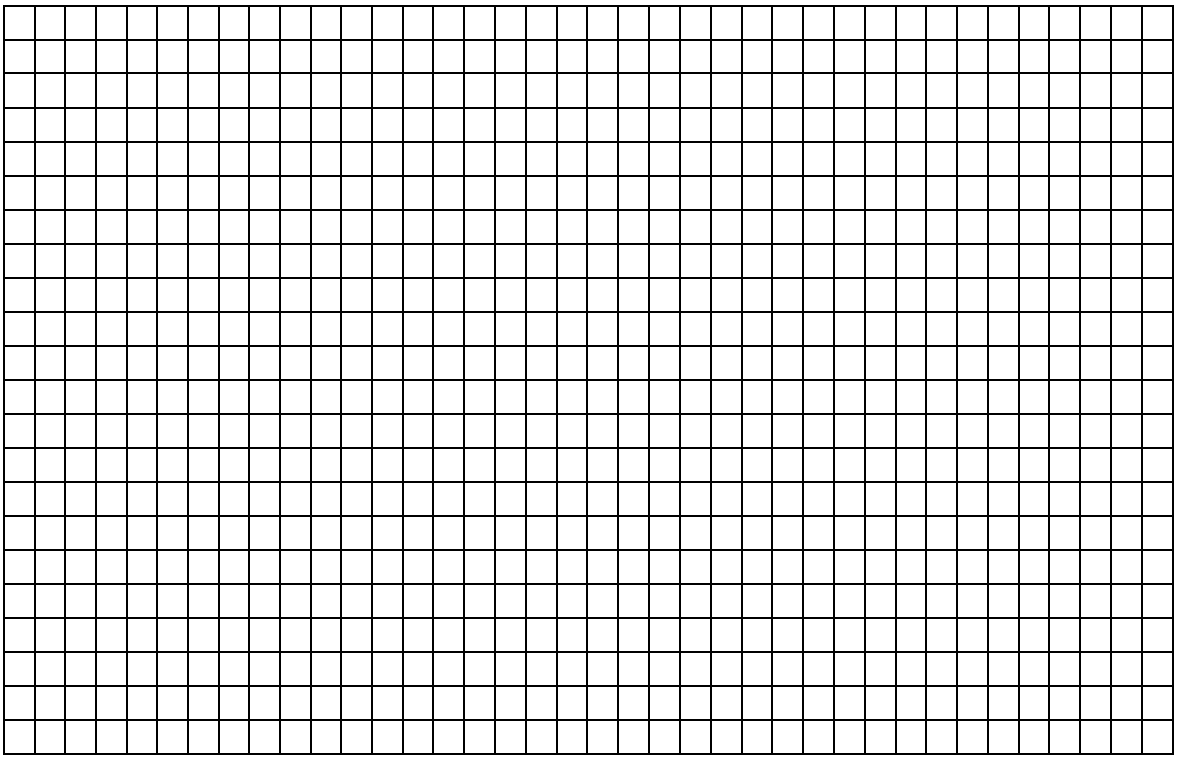
_____

Survey One

Tally the number of artifacts:

Lemon Drops	Jolly Ranchers	Tootsie Rolls

Graph Your Findings

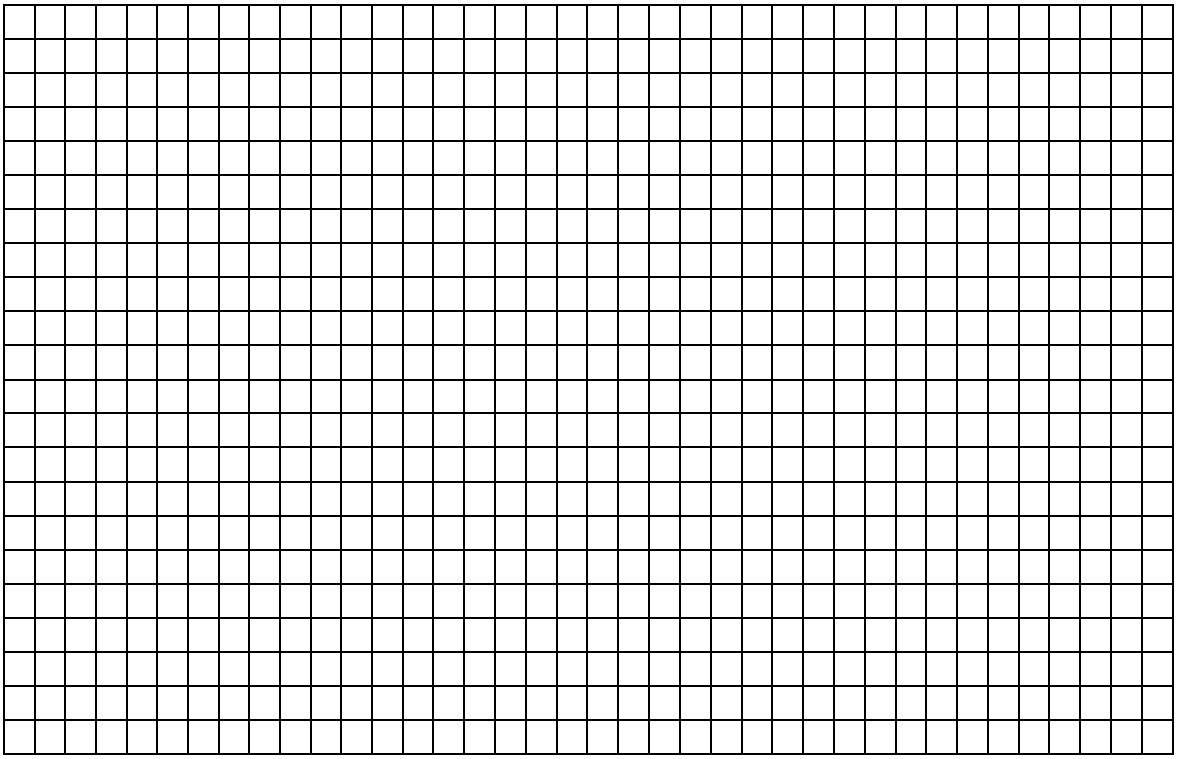


Survey Two

Tally the number of artifacts:

Lemon Drops	Jolly Ranchers	Tootsie Rolls

Graph Your Findings



Appendix G

Outline of “The Art of Digging” Lesson Plan (Outdoor Option)

Student Objectives

1. At the completion of the segment students will be able to use proper trowel techniques.
2. At the completion of the segment students will be able to take metric excavation measurements.
3. At the completion of the segment students will be able to interpret their findings during their excavation.

Materials

For the teacher:

Chalkboard/whiteboard and chalk/markers

8 Portable Excavation Units

1 Portable Sifting Site

1 screen

Caution tape

For the students:

Buckets (1 for every four students)

Trowels (1 for every two students)

Measuring tapes (1 for every four students)

Line levels (1 for every four students)

Artifact bags (1 for every four students)

Clipboards (1 per student)

Pencils

Excavation worksheets (1 per student)

Excavation packets (1 per student)

Materials Preparation

Place the portable excavation units and the portable sifting site in the schoolyard away from playground equipment and busy areas (the same area that was used in the Noodle Survey would be appropriate); make sure excavation units are placed far enough apart to allow people to walk around them easily. Hang caution tape around the excavation units to keep students away from the area. In each bucket place a measuring tape, two trowels, and one artifact bag, place buckets in the classroom.

Motivation

Ask students if they think that archaeologists can always find artifacts by just walking and looking at the ground. While this may be true sometimes, where would archaeologists find older objects? "After archaeologists find a site that they want to study they often need to conduct an archaeological excavation to learn about the people who lived there. Today we will learn about how archaeologists conduct excavations, use different tools, take and record measurements, and interpret their findings. We will also conduct our own excavation outside on your playground."

Learning Activities

Presentation

1. Now that students understand how archaeologists locate sites, the next step in the archaeological process is to excavate the site. Remind students that archaeology is a science and so it is important to have a careful procedure for excavating sites. Once a site is excavated it can never be re-excavated, so archaeologists must take very careful and detailed notes. Ask students what groups might be interested in archaeological sites and why.
2. Ask students what tools they think archaeologists use to excavate, and correct misconceptions.
    a. Trowels, shovels, paint brushes, picks, backhoes, etc.

3. Ask students what things an archaeologist might find when they excavate a site, and write down the examples on the board. When writing examples on the board group examples of artifacts and features separately but do not explain the separation. Ask students what the items in each group have in common. Once students have identified what items in each group have in common, ask them to give a few more examples of artifacts and features.
    a. Artifact: Something that can be picked up and moved
    b. Feature: Something that cannot be removed from a site
4. Discuss basic stratigraphy with students. "Now that we know what tools archaeologists use to excavate and some things an archaeologist might find at a site, how do you think archaeologists determine what artifacts have been at a site the longest?" After listening to student responses explain stratigraphy and the law of superposition using a dirty clothes hamper as an example. "Imagine you are getting ready for bed. When you change into your pajamas you put your dirty clothes in a clothes hamper, and every night before you go to bed you put the clothes you wore that day into the hamper. Now, each layer in your hamper represents a day in time, archaeologists call these layers strata. A stratigraphic layer is a layer of earth that represents a period of time, if could be a day–like the clothes in your hamper–or it could be hundreds of years. Now if you think about your dirty clothes hamper again, the clothes at the bottom of the hamper were put in first and have been there the longest. Archaeologists use this same idea to determine what artifacts have been at a site the longest; artifacts that are deeper underground have been there longer than artifacts near the surface, this is called the law of superposition." Ask students if they have any questions about stratigraphy or the law of superposition.
5. Discuss how stratigraphy and the law of superposition can help archaeologists give relative dates for artifacts (X is older/younger than Y). Mention that sometimes archaeologists can conduct tests that will give them the exact (absolute) date of an artifact.
6. Distribute excavation worksheets to students and have them complete the worksheets at their desks, offer help when asked for. After 10 minutes (or when most students have finished) go over the worksheet with the class.

Mock Dig

1. Tell students that now that they know more about how archaeologists excavate it is their turn to perform an excavation. Review proper excavation techniques with the class and write each technique on the board.

   a. Before you begin to excavate take measurements of how deep the soil is using the measuring tape, string, and line level.
   b. Use the side of the trowel to pull small amounts of dirt towards you. Do not use the pointed end of the trowel.
   c. Remove all of the dirt from around an artifact before you take it out, do not pull out artifacts.
   d. Record any artifact you find in your excavation packet, include notes on how deep the artifact was, how big the artifact is, and draw a picture of the artifact.
   e. After you record the location of an artifact place it in your artifact bag.
   f. Once you have filled your bucket go to the sifting station with a partner. Help each other sift the dirt and place any artifacts you find in your artifact bag.

2. Have students form groups of four, one group per excavation unit. During the dig two students will dig while the other two sift and record (students will rotate tasks). Distribute clipboards, excavation packets, and buckets to student groups. Have students line up at the door and walk to the portable excavation units. Have students place their buckets around the edge of the caution tape and enter the excavation site. Briefly demonstrate the excavation procedure to students before asking them to get their buckets and sit down in front of an excavation unit. Have students write down two things they want to learn about the people who used the site (these can be general questions like "Who used this site?" or "What did people do at this site?"). Have students take their beginning measurements while you remove the caution tape from the area.
3. Have students excavate their units, checking to make sure correct techniques are being used and that students are recording their findings. Allow excavation to continue for approximately 30 minutes. After the time allotted for the excavation is over ask students to take their final measurements before placing their artifact bags in their buckets along with their trowels and measuring tape and setting their buckets in the middle of their excavation units. Have students walk back to the classroom and return to their desks.

Discussion

1. Congratulate students on a great excavation. Ask students to share what artifacts and features they discovered.
   a. What did the artifact/feature look like?
   b. Was the artifact/feature complete?

    c. How deep was the artifact/feature?
2. Ask students what they think their site was used for. "Wow, you guys found a lot of really interesting things! What do the things you found tell us about the people who used the site?" Ask students to support their conclusions with evidence they found by asking why they think certain things, write students' conclusions on the board.
3. Ask students if what they learned in the excavation allowed them to answer the questions they wrote before they started to dig, why or why not? Ask students what other things they would like to learn about the people who used the site they excavated, what would they would need to find to answer these new questions.
    a. Point out that excavations do not always answer the questions that archaeologists were looking for. Also discuss how findings from an excavation can lead archaeologists to ask new questions which can start the archaeological process over again (this is a good thing!).
4. Ask students if they could put the site back together again (every single dirt molecule in the same place they found it). Discuss how archaeology is a destructive process, which is why note taking is so important. Tell the class to think of archaeological sites as non-renewable resources, once the site is excavated it is gone. Ask students to think of ways to protect archaeological sites (excavate only part of a site, do not excavate at all, tell an archaeologist if you find a site, etc.).
5. Explain to students that after archaeologists excavate a site they need to analyze the artifacts they've found and discover ways to protect their findings. "Now that we've performed our excavation, the next step in the archaeological process is to learn as much as we can from the artifacts that we found. Archaeologists also need to think about ways to protect the artifacts that they excavated as well as the sites that the artifacts came from."

Assessment

Informal teacher observation and responses given during discussion will be used to determine if the learning objectives have been met.

The Art of Digging

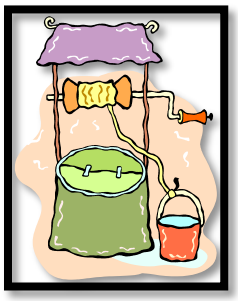
List six tools an archaeologist may use to excavate a site:

1._____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

Are the following items artifacts or features?



_____

_____

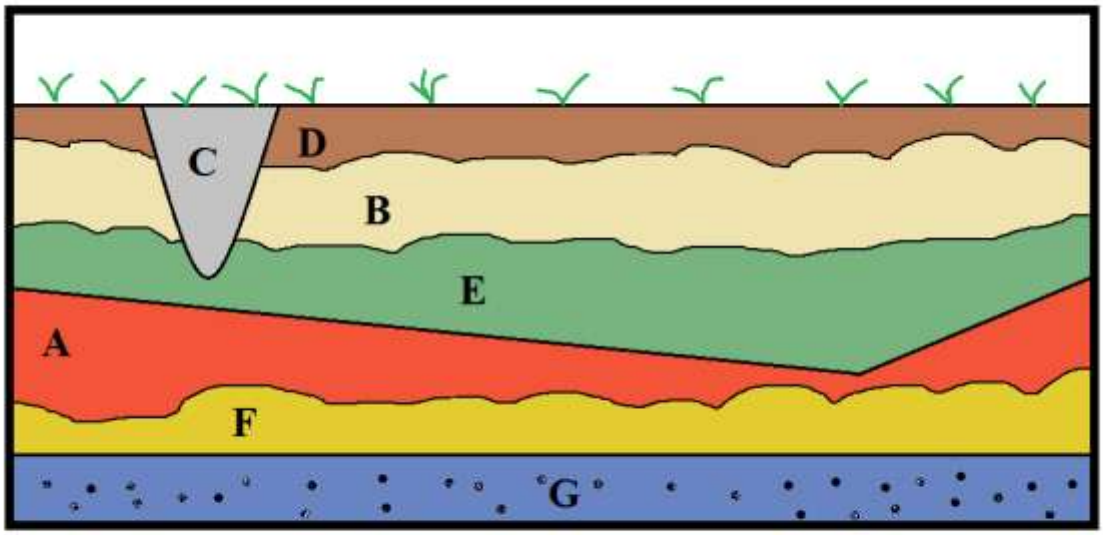
_____

_____

_____

_____

List the stratigraphic layers from oldest to youngest: _____.



The Art of Digging Excavation Packet

Date: _____ Team Name: _____

Team Members:

_____

Weather: _____

Soil Type (Sand, dirt, gravel):

_____

Excavated Artifacts/Features

Artifact/Feature 1:

Depth and Grid Coordinates:

Material (bone, pottery, metal, wood, etc.):

Color:

Shape:

Size:

Other Observations:

Sketch the Artifact:

Artifact/Feature 2:

Depth and Grid Coordinates:

Material (bone, pottery, metal, wood, etc.):

Color:

Shape:

Size:

Other Observations:

Sketch the Artifact:

Artifact/Feature 3:

Depth and Grid Coordinates:

Material (bone, pottery, metal, wood, etc.):

Color:

Shape:

Size:

Other Observations:

Sketch the Artifact:

Artifact/Feature 4:

Depth and Grid Coordinates:

Material (bone, pottery, metal, wood, etc.):

Color:

Shape:

Size:

Other Observations:

Sketch the Artifact:

Artifact/Feature 5:

Depth and Grid Coordinates:

Material (bone, pottery, metal, wood, etc.):

Color:

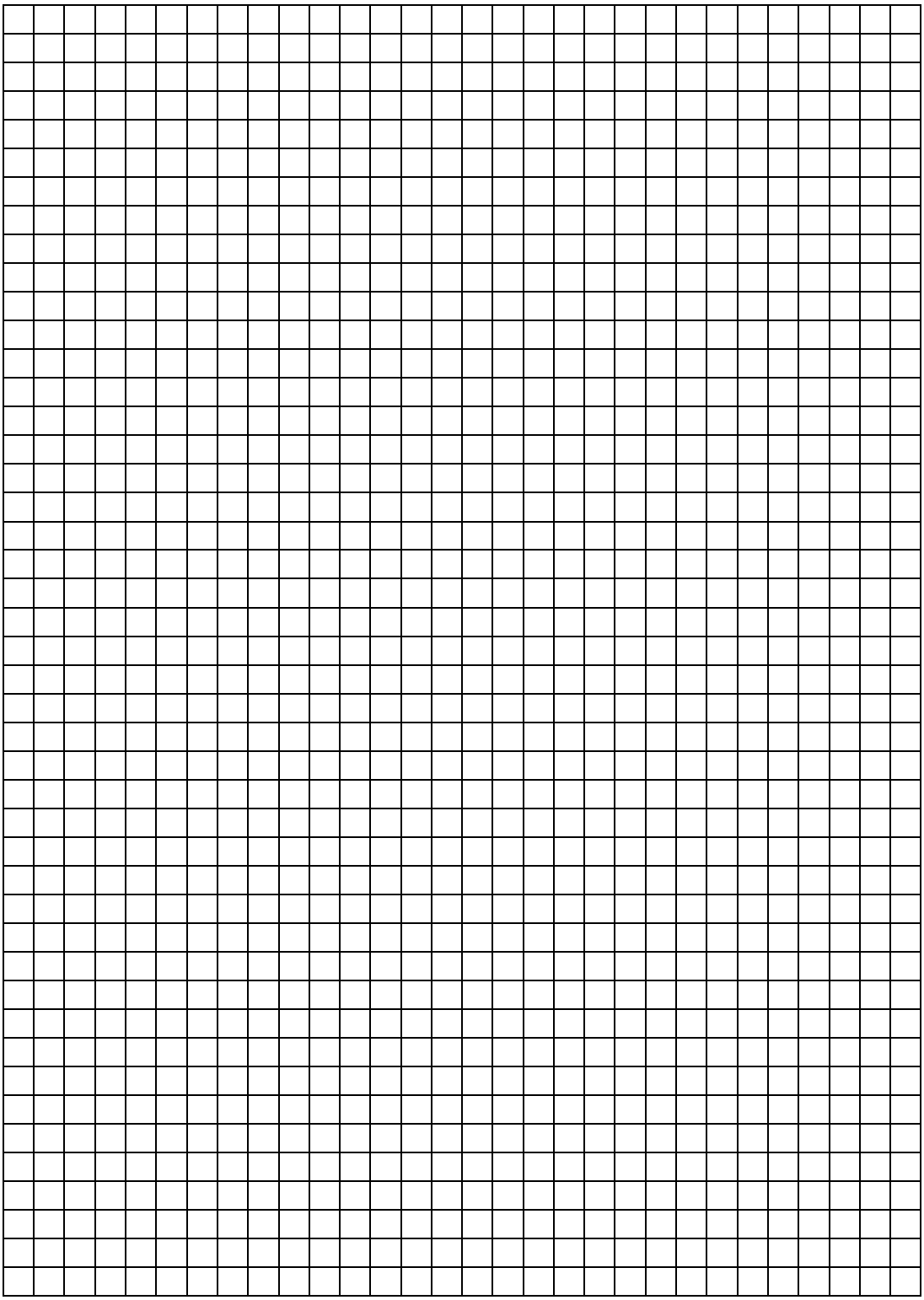
Shape:

Size:

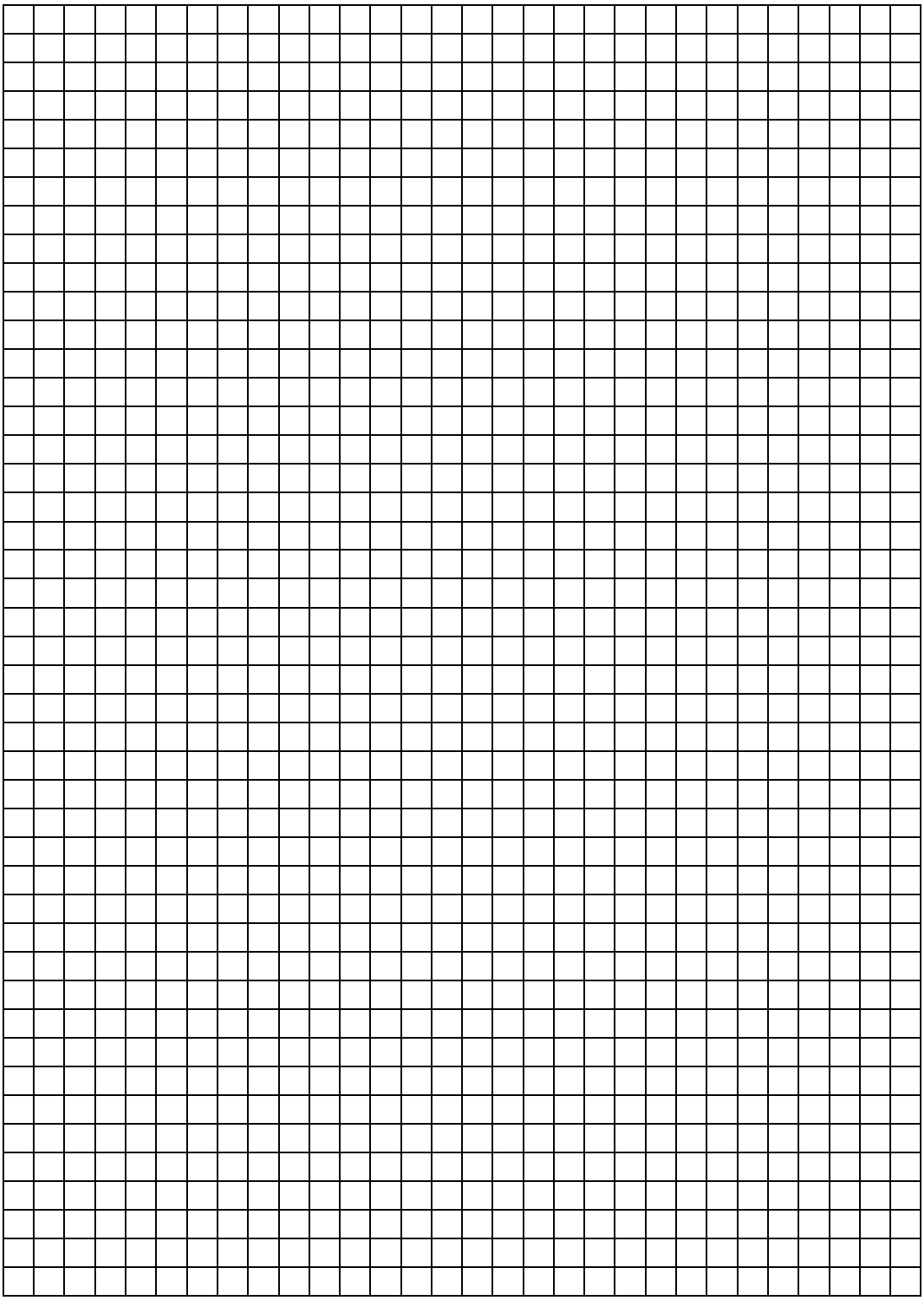
Other Observations:

Sketch the Artifact:

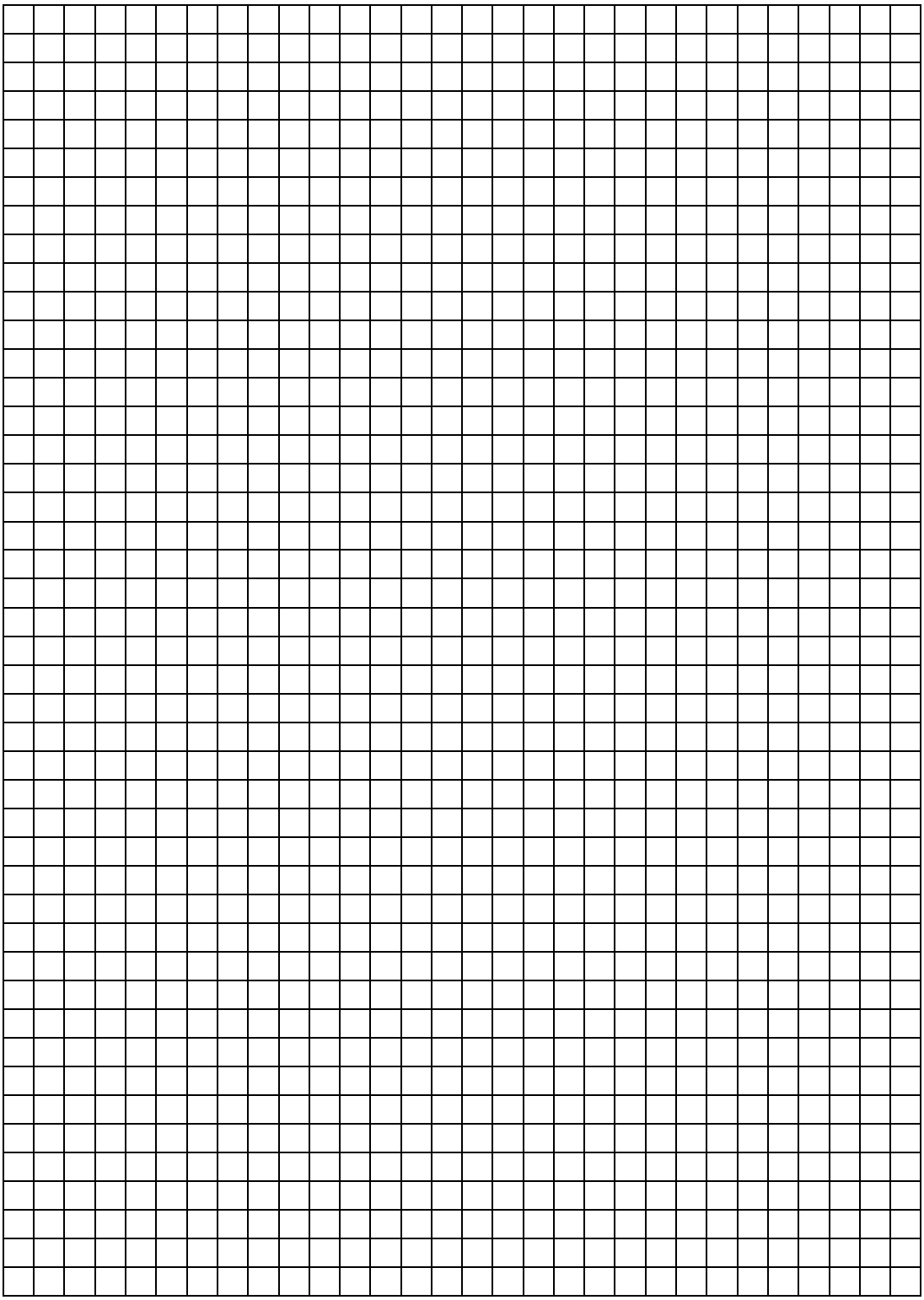
Graph Your Excavation Unit at Surface Level



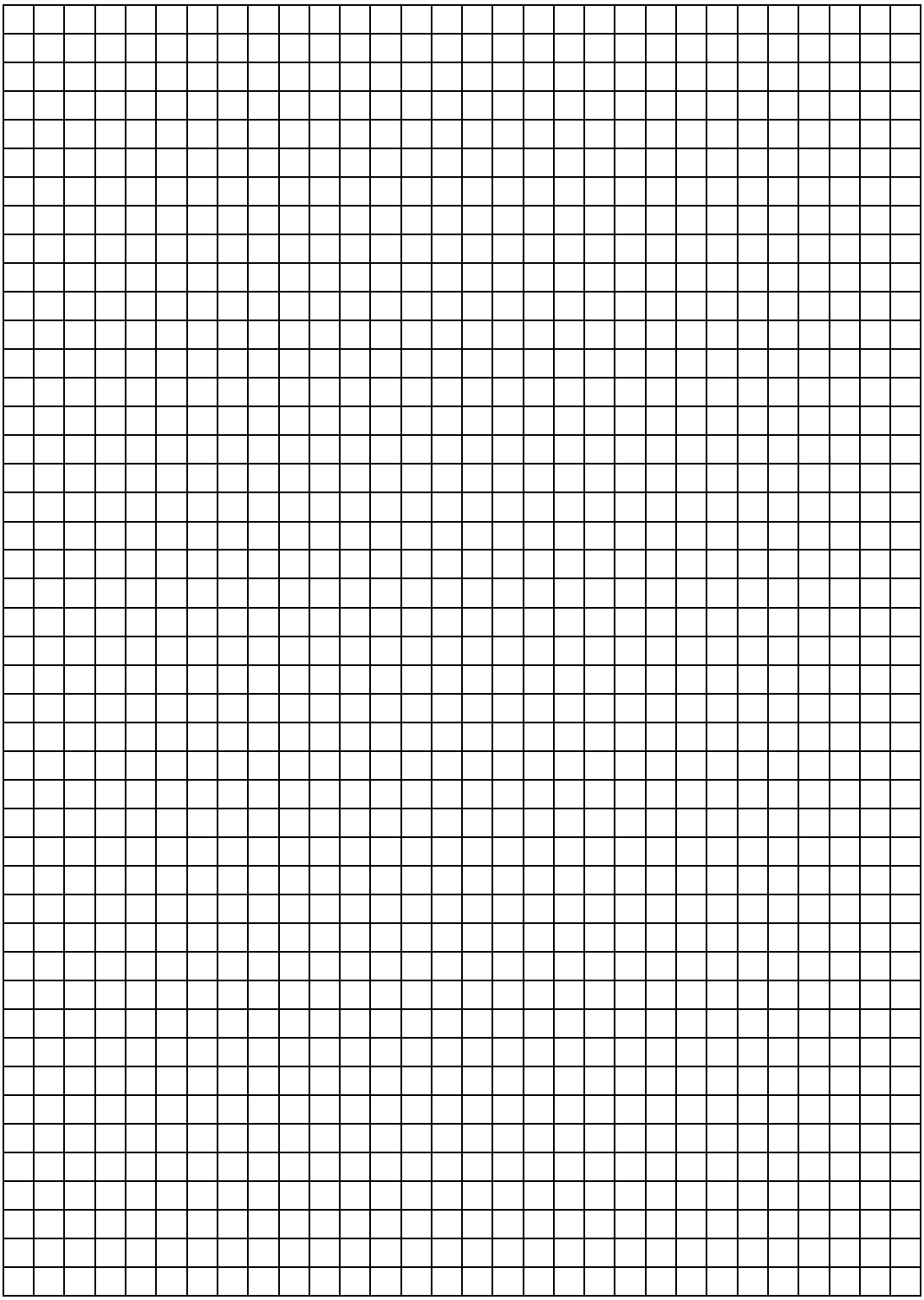
Graph Your Excavation Unit at 10 cm



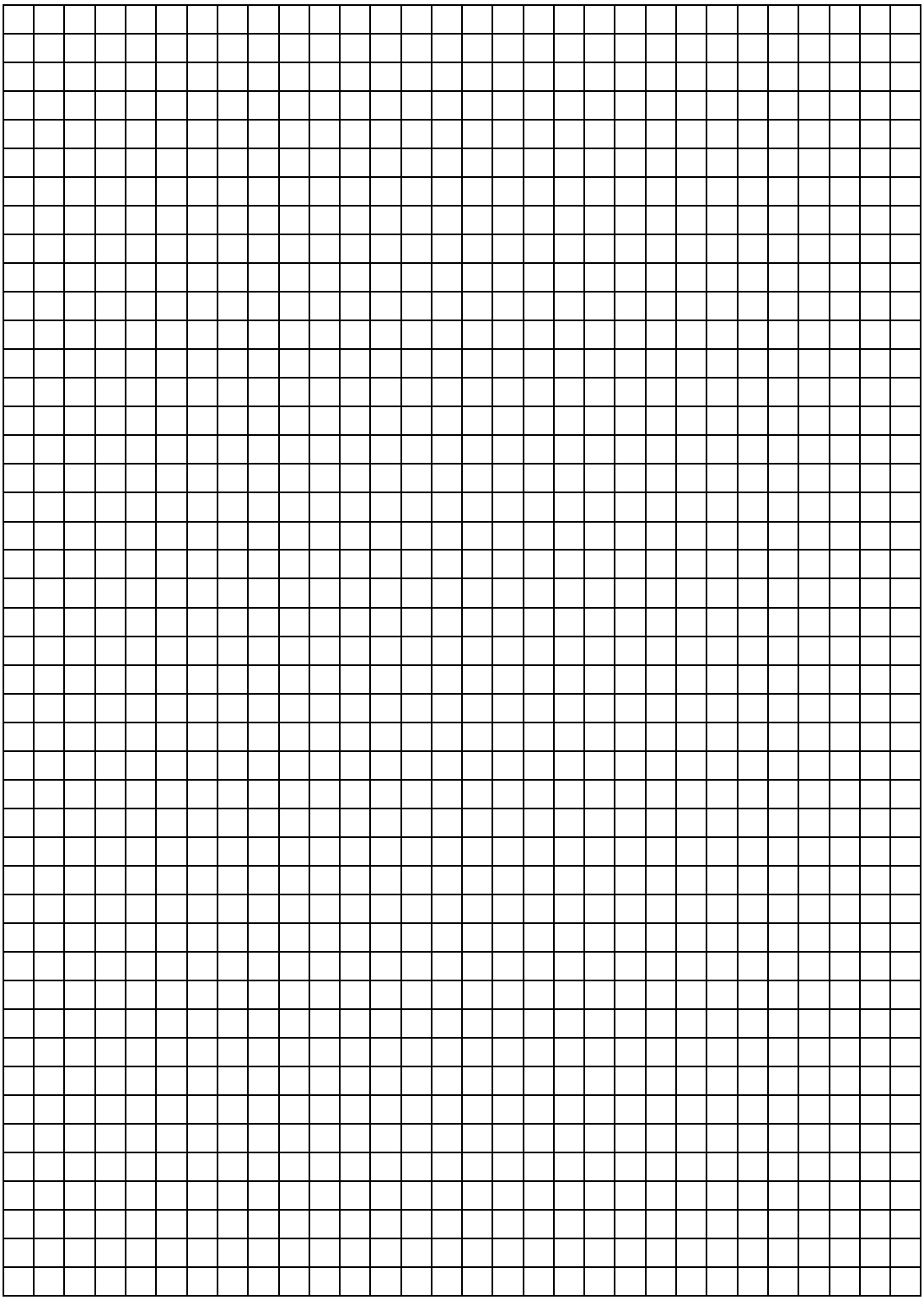
Graph Your Excavation Unit at 20 cm



Graph Your Excavation Unit at 30 cm



Graph Your Excavation Unit at 40 cm



Appendix H

Outline of "The Art of Digging" Lesson Plan (Indoor Option)

Student Objectives

1. At the completion of the segment students will be able to record art using a metric grid.
2. At the completion of the segment students will be able to construct and defend interpretations of images.
3. At the completion of the segment students will be able to discuss reasons for differing interpretations of rock images.

Materials

For the teacher:

Chalkboard/whiteboard and chalk/markers

Transparency paper with "graffiti" markings

Pieces of construction paper (some cut into odd shapes)

Pictures of rock images from around the world

Tape

For the students:

Pencils

Markers (three different colors)

Measuring tapes (1 for every two students)

Clipboards (1 per student)

"The Art of Digging" worksheets (1 per student)

Rock image packets (1 per student)

Large sheets of butcher paper (1 per group)

Yarn graphs (1 per group)

Materials Preparation

Cut four large pieces of butcher paper so that there is one long sheet per group of students (the class will be evenly divided into four groups). Place the butcher paper sheets in different areas of the classroom so that the groups will be separated when working. Put markers of three different colors out at each butcher paper station.

Motivation

Ask students what people can use to learn about the past. Ask the class for examples of things they have used to understand the past (books, pictures, artifacts, etc.). "Sometimes when archaeologists want to learn about the past they conduct an excavation, other times they are able to look at pictures made by the people they want to learn about. Many different people throughout time have created images on rocks that archaeologists can study to learn about the artists. Today we are going to learn about rock images, how archaeologists study rock images, and create and interpret our own rock image panels."

Learning Activities

Presentation

1. Tell the class that after archaeologists find a site, the next step in the archaeological cycle is to study the site. In some cases this means excavating, but other times archaeologists can study sites without having to do any excavation at all.
    a. Rock images
    b. Temples and ruins

2. Discuss the different types of rock images (pictographs and petroglyphs) and where examples of each have been found around the world. Show the class pictures of different rock images, and if desired a short movie clip of rock images can be shown. Talk about how some rock images are thousands of years old.
3. Ask students why they think people would create rock images. Discuss some of their theories as well as the ideas held by archaeologists. Also discuss with students things that archaeologists can learn from rock images and how rock images can help archaeologists understand past cultures.

4. "Alright, now that we know about different types of rock images, why they may have been made, and what we can learn from them, we are going to do a quick worksheet to review what we've learned before we create our own rock images."
5. Distribute "The Art of Digging" worksheets to students and have them complete the worksheets at their desks, offer help when asked for. After 10 minutes (or when most students have finished) go over the worksheet with the class.

Rock Images Activity

1. Evenly divide the class into four groups and space the groups around the classroom. Give each group a large sheet of butcher paper as well as markers in three different colors. Instruct the students to draw some "rock images" on their butcher paper. "Now that you are in your groups it is time to create some rock images. Your group can draw a scene of something you enjoy doing or you can draw patterns, what you draw in entirely up to you. You will have about ten minutes to work."
2. Give the class about ten minutes, or until most groups are done, to work on creating their rock images. Once the panels are finished have them write in their packets what they decided to draw and why.
3. Walk around the classroom and cover parts of the rock image panels with construction paper and the transparency graffiti paper so that some of the images on the panels are covered or hard to see. Next have the groups rotate so that they are sitting in front of another group's panel.
4. Explain to the groups that over time rock images can fade, crumble away, or be hurt through weathering or vandalism, and that the construction paper and graffiti represent the passage of time. Ask the groups to record the rock image panel that they are now looking at. Instruct them to set up the yarn graphs over the panel and use the graph paper in the packet to help them with their recording. Suggest that they record what colors were used and what the drawings look like. Have students each select one picture on the rock image panel that they want to focus on and draw the picture in more detail. Have students write their interpretations of the pictures they chose in their packets. Next have the group work together to interpret the rock images they are recording.
5. If desired, the groups can rotate two more times and interpret the other rock image panels (more copies of the rock image packet will need to be made if this option is chosen).

Discussion

1. Gather the class together again. Ask the groups to present their interpretations to the class. After a group has presented ask the group that created the rock images

to describe what they originally drew. After each of the groups has gone ask the students why some/all of the interpretations were different than what the painting was designed to mean. "You all did a really good job creating and interpreting your rock image panels. As the groups were presenting we found that some of the interpretation were different than what the pictures were created to represent. Why do you think this is?" Give students time to think and respond, if needed provide prompts, "Do you think the passage of time or graffiti may have affected your interpretation?"

2. Have the class discuss how rock images can be protected. Ask the class if they think archaeologists should tell the public where rock image panels are located. Why or why not?
3. Explain to students that after recording their findings in the field the next step of the archaeological process is to analyze what they have found. For rock images this can mean looking at other rock image panels to find similarities and differences, or studying the plants that may have been used to create the paint. If archaeologists are doing an excavation the next step of the archaeological cycle is to analyze the artifacts they have found and discover ways to protect their findings. "Recording rock image panels is similar to how archaeologists record excavation sites. While rock image panels cannot be taken away from their location, the artifacts that archaeologists uncover are sometimes taken back to laboratories for closer study."

Assessment

Informal teacher observation and responses given during discussion will be used to determine if the learning objectives have been met.

The Art of Digging

List three tools an archaeologist may use to record a panel of rock images:

1._____

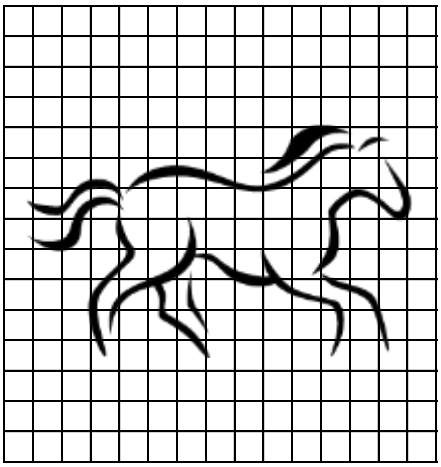
2. _____

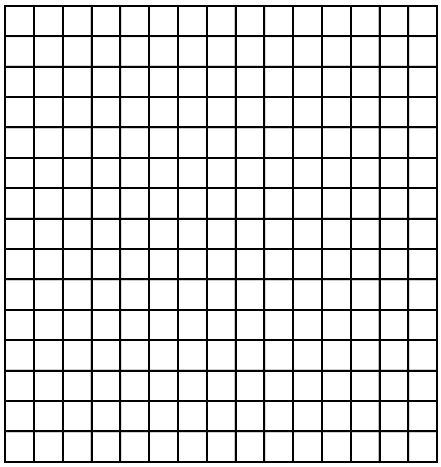
3. _____

Which of the following images is a pictograph and which is a petroglyph?

_____ _____

Practice your archaeology skills and copy the image in the blank graph.





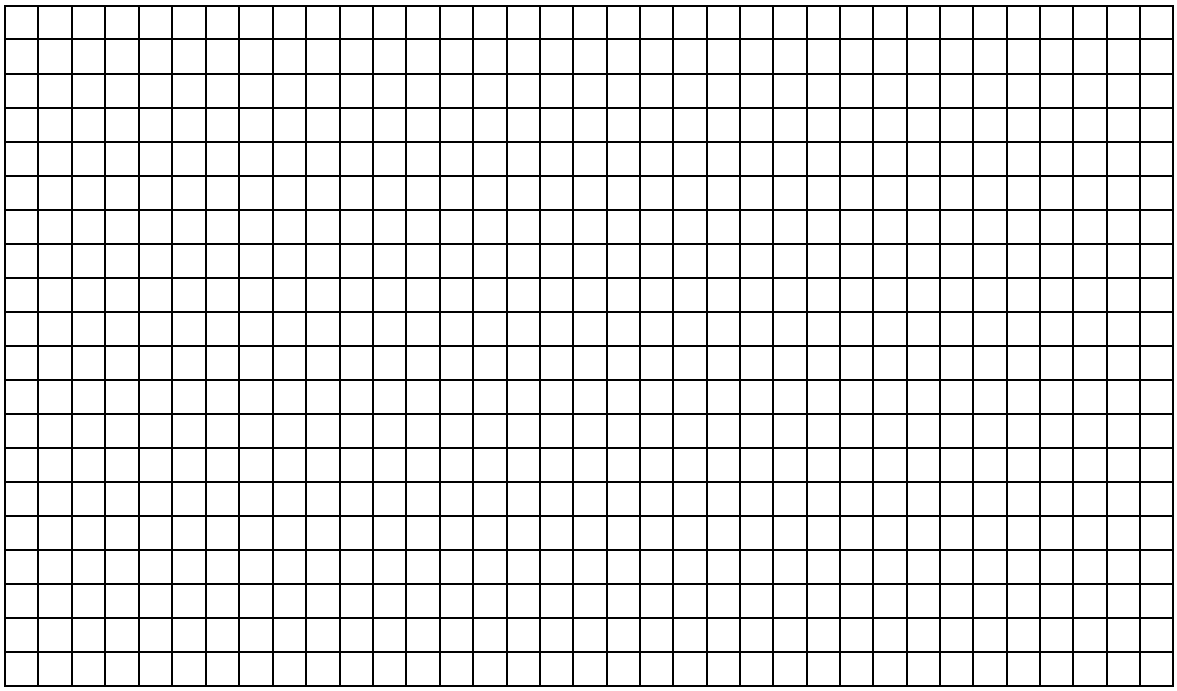
The Art of Digging

Rock Image Packet

Sketch your group's rock image panel:

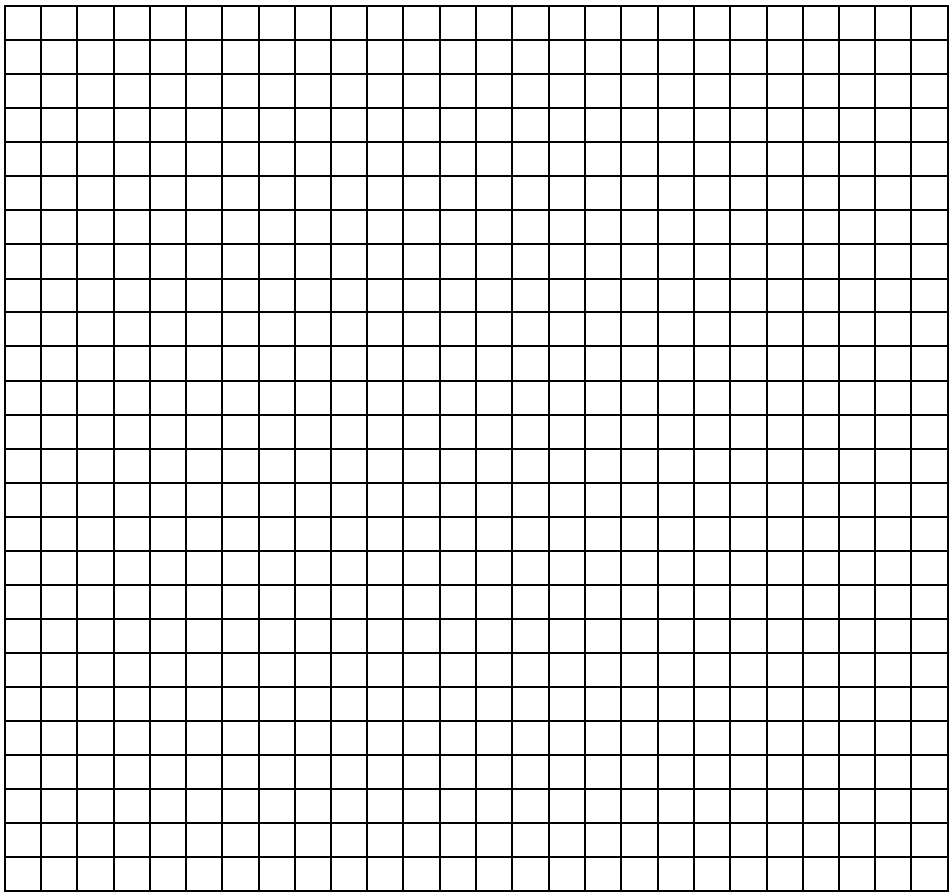
What did your group decide to draw? Why?

Record the rock image panel that your group is studying:



What does your group think the rock image panel represents? Why?

Record the picture you decide to study (remember to record what color it is and how big it is):



What do you think the image represents? Why?

What are some things you could do to help preserve rock images?

Appendix I

Outline of "Artifact Analysis" Lesson Plan

Student Objectives

1. At the completion of the segment students will be able to properly clean artifacts.
2. At the completion of the segment students will be able to record measurements (weight, size, color, etc.) of a given artifact.
3. At the completion of the segment students will be able to write an interpretation of the artifact they are studying.

Materials

For the teacher:

Chalkboard/Whiteboard and chalk/markers

Artifact

For the students:

*"*Artifact Analysis" worksheet (1 per student)

"Artifact Analysis" packet (1 per student)

Artifacts (1 per student)

Pencils

Crayons/Colored pencils

Q-tips

Brushes

Paper towels

Small dishes (for holding water)

Measuring tape (1 for every 5 students)

Scales (1 for every 5 students if possible)

Scissors (1 per student)

Ziploc bags (1 per student)

Materials Preparation

Make sure that there are enough artifacts for each student to have their own object to study. Make sure that the artifacts are dirty so that students will have something to clean off of the artifacts. Do not distribute the artifacts until after the students have completed the "Artifact Analysis" worksheets.

Motivation

Ask students how they learn about something they have never seen before. "Sometimes the artifacts that archaeologists excavate are items that they are unfamiliar with. Whether or not an archaeologist is familiar with an artifact they analyze it to learn as much as possible. Today we are going to learn more about what archaeologists do when they analyze artifacts and we will learn how to clean, record, and interpret artifacts like archaeologists."

Learning Activities

Presentation

1. Ask students what archaeologists study (artifacts and features) and why they want to study these things.
2. Ask students what scientists do when they study something.
    a. Do they use a certain method?
    b. What do they look for/record?

3. Show the class an artifact and ask them what they would do to learn about the object. If the artifact is not fragile it can be passed around the classroom as students brainstorm ways to study it.
4. Discuss with the class some of the tests that archaeologists run to learn about artifacts. Be sure to mention how studying artifacts can help determine their age (relative/absolute dating).
    a. Residue analysis
    b. Absolute dating tests (radiocarbon dating. thermoluminesence dating, etc.)
5. Asks students why it is important to record observations about an artifact. Stress that archaeology is a science with a goal of learning as much as possible about past human behaviors (not treasure hunting).
6. Distribute "Artifact Analysis" worksheets, scissors, and crayons/colored pencils to students and have them complete the worksheets at their desks, offer help when asked for. After fifteen minutes (or when most students have finished) quickly go over the worksheet with the class. Ask students what they wanted to record about their artifacts. Ask the students how taking away pieces from the pot puzzles affected the reconstruction and interpretation of the puzzle (Was it harder to rebuild? Was the picture complete?).

Artifact Analysis

1. Arrange the students' desks so that they are sitting in groups. Place a small dish of water with each group and set the cleaning supplies (Q-tips, brushes, paper towels, etc.), pencils, crayons/colored pencils, and measuring tapes near the dish of water. Distribute the "Artifact Analysis" packets and artifacts to students.
2. Ask the students to first clean their artifacts (they do not need to use water if they/the teacher does not want to). Once their artifacts are clean they can draw a picture of the artifact and start recording their observations. When all of the artifacts have been cleaned collect the water dishes and distribute the scales so students may weigh their artifacts.

3. When students are finished recording their observations ask them to clean up their work spaces before writing their artifact interpretations. Allow students five to ten minutes to complete their interpretations before gathering the class for the discussion.

Discussion

1. Ask the class if anyone would like to share what they recorded and what their interpretations were. If more than one student had the same (or a similar) artifact ask if they all had the same measurements or the same interpretations.
2. Ask students how they cleaned artifacts that were made of different materials. Is there anything that could be learned from the dirt covering artifacts? Remind the class about residue analysis and how sometimes archaeologists can get pollen or food samples from artifacts, so it is important to think about what studies could be run before an artifact is cleaned.
3. Ask the class why it is important to record their observations. Collect all of the artifacts and put them out of the class's sight. Ask the class again why it is important that scientists record as much information about an artifact as possible. "Now that you no longer have the artifacts is there anything you wish you would have recorded?" Remind students that archaeology is a science and that the process of taking notes is important, then if anything happens to the artifact or if somebody else needs to study it there are still notes that can be used for research. Ask students if there are any other ways to study or analyze artifacts that were not done in class.
4. Ask students who might be interested in the artifact they have been studying. Would it be a good idea to work with other people when looking at artifacts? Why or why not? Discuss the importance of artifacts to different cultural groups.
5. Explain to the class that once archaeologists have cleaned and analyzed artifacts the next step in the archaeological cycle is to think of ways to share what they have learned and protect the artifacts and archaeological sites they have been studying.

Artifact Analysis

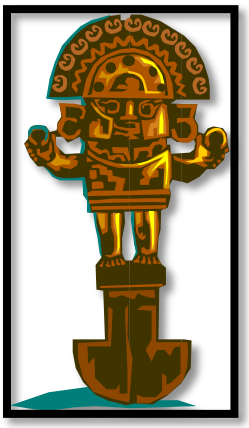
List three tools that an archaeologist could use to study an artifact:

1. _____
2. _____
3. _____

List four things that an archaeologist could record about an artifact:

1. _____
2. _____
3. _____
4. _____

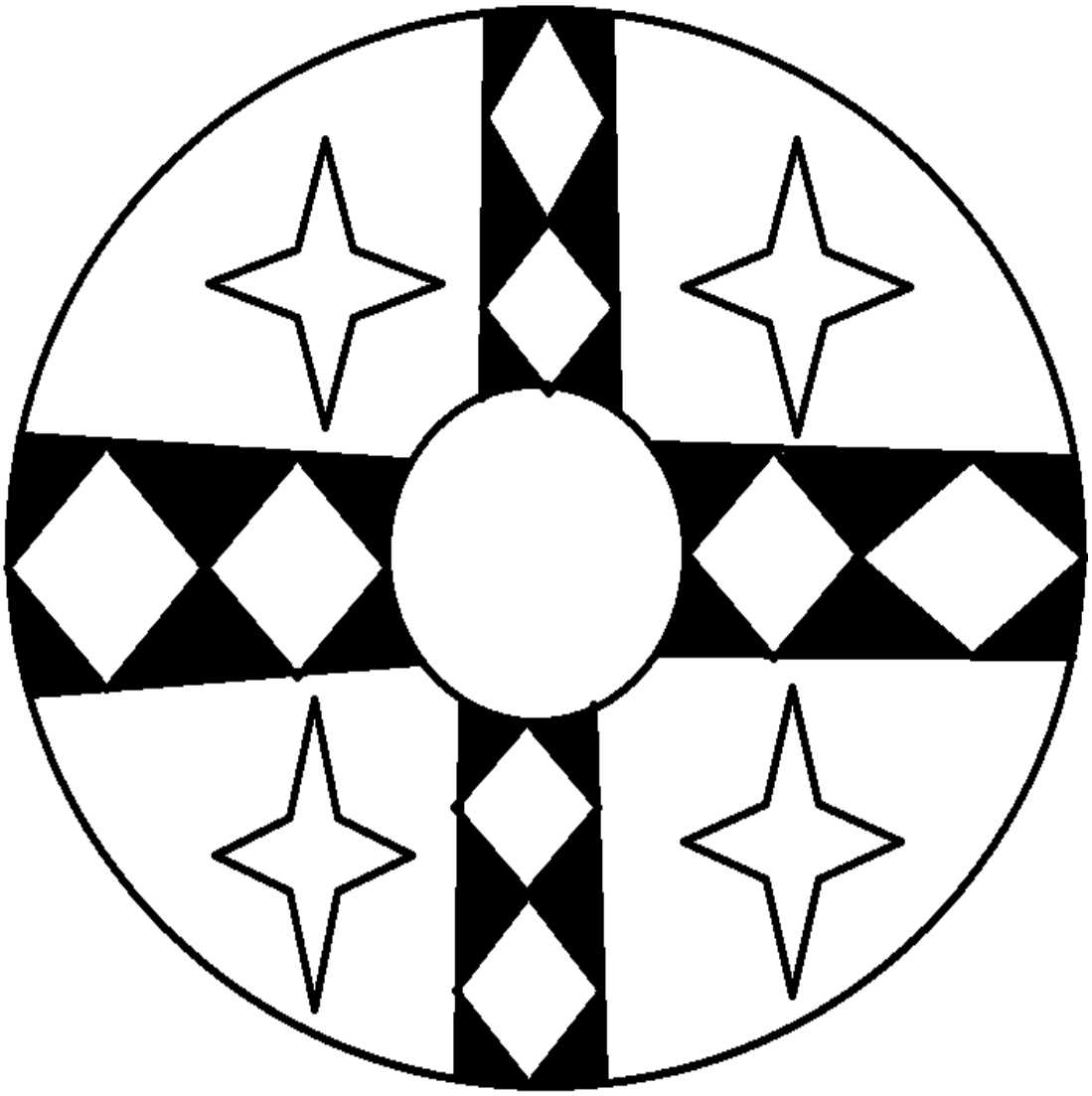
A person hands you a picture of an artifact, what are three things that you would want to know about the artifact? Why would you want to know these things?

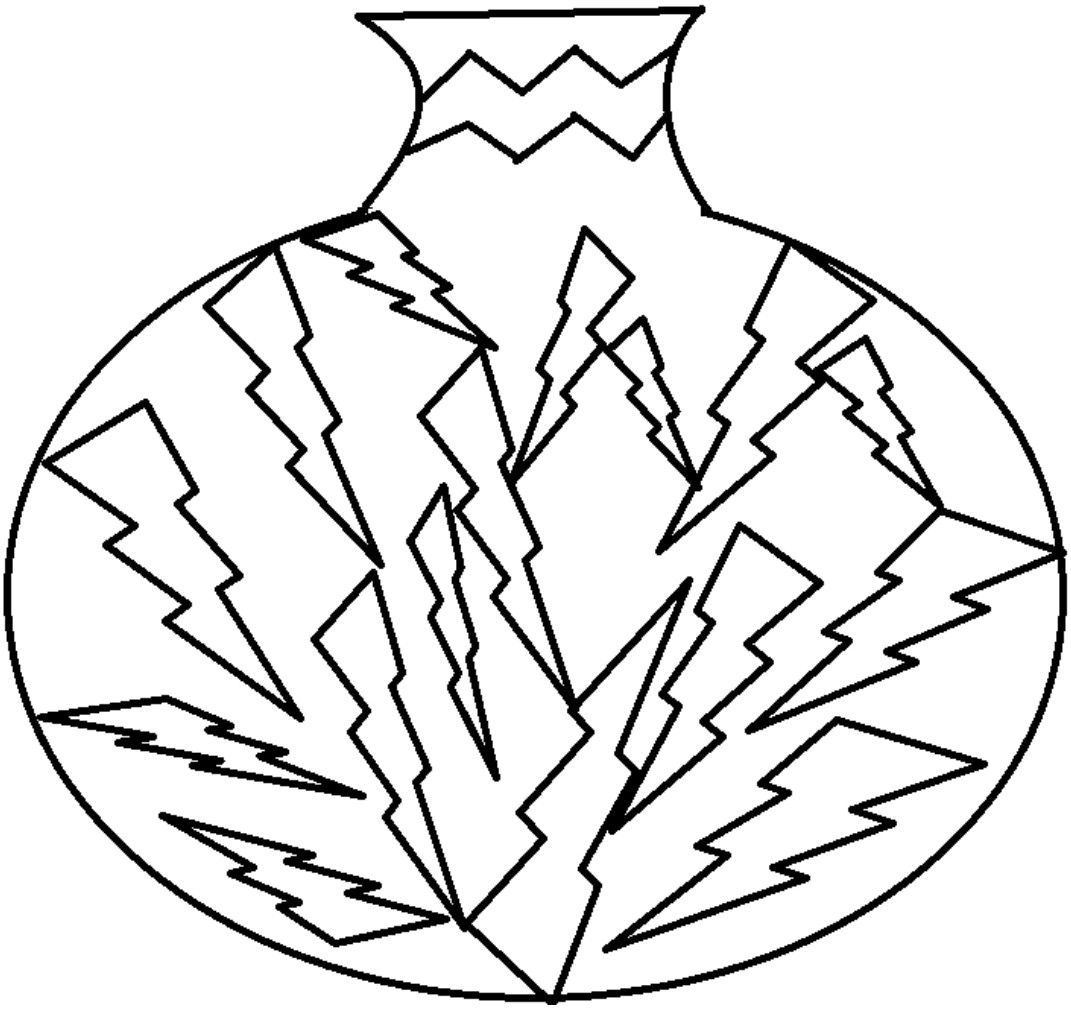


Pot Puzzle

Pot puzzle activity adapted from *The Pottery Village Site,* in Archaeologyland! Activities (Ellick 2012).

Color in one of the pots on the following pages. When you have finished coloring cut your pot into ten pieces and write your name on the back of each piece. When you are finished trade your pot pieces with another student and have them try to reassemble your pot. After they are done find another student and have them try to reassemble your pot, only this time take away three of the pieces before you give them the puzzle. While they are trying to put your pot back together try and see if you can reconstruct the pot that they made. When you are done be sure to put your pot puzzle away in a Zip-Lock bag to take home!





Artifact Analysis Packet

Name:

Date:

Artifact Observations:

Material (bone, pottery, metal, wood, etc.):

Color:

Shape:

Length:

Width:

Height:

Weight:

Other Observations:

Sketch the Artifact:

What do you think your artifact was used for? Why?

Appendix J

Outline of "Present and Protect" Lesson Plan

Student Objectives

1. At the completion of the segment students will be able to describe why it is important to share scientific information with others.
2. At the completion of the segment students will be able to create a short list of possible modes of presenting information,
3. At the completion of the segment students will be able to explain different ways of protecting archaeological resources.

Materials

For the teacher:

Chalkboard/Whiteboard and chalk/markers

For the students:

"Present and Protect" worksheet (1 per student)

Pencils/Markers/Paint/Crayons

Butcher paper/Poster bored/Cardboard boxes

Artifacts (1 per student, ideally the same artifacts analyzed in "Artifact Analysis")

Materials Preparation

No materials preparation is required for this segment.

Motivation

Ask students where they go to learn about the past. "There are a lot of different ways to learn about the past. We can read books, visit museums, or go to National Parks. Every

time we use these resources we are looking at work that somebody put together to share what they learned. In order to help people understand what we have been studying it is important to find ways to share our work. It is also important to protect the resources that we are studying, like archaeological sites and artifacts, so that others can enjoy them too. Today we are going to brainstorm and create our own ways of presenting information and protecting archaeological resources."

Learning Activities

Presentation

1. Ask students what they use and where they go to learn about the past (books, museums, National Parks, etc.).
2. Tell students that in almost all of these places they are able to learn about the past because somebody wanted to share what they learned. Ask students why somebody would want to share what they learned and why it is important to share information.
3. Ask students why somebody would want to share information they learned using archaeology.
    a. Remind students about the importance of context and how once a site is excavated it can never be excavated again.
4. Tell students that archaeologists try very hard to protect archaeological resources and ask students why they think archaeologists want to protect sites and artifacts.
5. Distribute the "Present and Protect" worksheet to students and have them complete the worksheet at their desks, offer help when asked for. After 10 minutes (or when most students have finished) quickly go over the worksheet with the class. Ask students to share some of their answers. Remind the class that archaeological sites and artifacts are one-of-a-kind and that once they are excavated they cannot be re-excavated. Also tell the class that protecting artifacts and sites is important because somebody may want to study them to try and answer a question that nobody has thought of before.

Create an Artifact Display

1. Tell students that now that they understand why it is important to share what they have learned and protect the resources they have used they will develop their own way of sharing archaeological information with others.
2. Instruct students to get whatever supplies they want (paper, cardboard, paint, etc.) to create a way of sharing what they have learned with others. Let the class know that how they chose to share their information is entirely up to them (posters, dioramas, essays, etc.), but that their display must convey what they have learned about the artifact (weight, size, interpretation, etc.) and how they will protect the artifact and the site it came from. Suggest that students use their packets and worksheets from previous segments to help them with their display.
3. Allow the class enough time so that most students are able to finish their work, offer help when asked. Make sure that students include information about their artifact (size, color, context, etc.) as well as present an option for protecting the artifact and the site it came from.

Discussion

1. Congratulate the students on creating wonderful displays. Ask if any students want to share their work.
    a. What method of sharing information did they chose?
    b. What is their plan for protecting archaeological resources?
2. Ask students if they can think of any examples of when sharing information might not be a good idea. "You have all come up with some very good and creative ways of presenting and protecting archaeological information. Now I have a harder question for you, can you think of any examples of when it would not be a good idea to share information with people?" Ask them to explain their answers and use examples if possible.
    a. Burial grounds
    b. Religious artifacts

3. Explain that most of the time it is best to share information, but that sometimes archaeologists need to work with others to come up with the best way to share what they have learned (work with indigenous groups, descendants, etc.). Ask students who they might ask to help them share what they have learned and why.
4. Congratulate students again on their great work during the segment (and other segments if applicable). Thank students for their hard work and suggest that they share what they have learned with their families, mention the archaeological showcase if the teacher has decided to allow parents to come after school to look at the students' work. "Thank you again for all of your hard work today you are truly some great junior archaeologists."

Assessment

Informal teacher observation and responses given during discussion will be used to determine if the learning objectives have been met.

Present and Protect Worksheet

List five ways that you could share something you learned using archaeology:

1. _____
2. _____
3. _____
4. _____
5. _____

List three things you could do to protect an archaeological site:

1. _____
2. _____
3. _____

List three things you could do to protect an artifact:

1. _____
2. _____
3. _____

In your own words, why is it important to share archaeological information with other people?

In your own words, why is it important to protect archaeological sites and artifacts?

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