

Archaeology and the Common Core

Using Objects and Methodology to Teach Twenty-First-Century Skills in Middle School

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We are in our eighth year of implementing a sixth-grade program titled [Think Like an Archaeologist](#). Partner institutions are the [Haffenreffer Museum of Anthropology, Brown University](#); the [Joukowsky Institute for Archaeology and the Ancient World](#),

Brown University; and the [RISD Museum](#) at the Rhode Island School of Design. This program has allowed the partners to expand their outreach to local schools while meeting their missions and building strong relationships with local teachers

ABSTRACT

Museum educators and graduate students at Brown University's Haffenreffer Museum of Anthropology and the Joukowsky Institute for Archaeology and the Ancient World, along with the RISD Museum at the Rhode Island School of Design, are entering their eighth year of partnering with sixth-grade social studies teachers in Providence Public Schools in a five-session classroom and museum-based archaeology program called *Think Like an Archaeologist*. This experiential program uses the study of archaeological methods to address state and national social studies standards and bridges social studies content with the literacy standards of Common Core State Standards (CCSS) that aim at moving students toward twenty-first-century skill building. Students not only understand the science behind the content in their textbooks but also learn how to use museum objects and archaeological artifacts as primary resources. Students also learn to "read" artifacts, express their ideas in spoken and written language as historians, and use academic vocabulary as required by CCSS while thinking like archaeologists. Through teacher feedback and student evaluations, we know this program to be a successful example of the benefits of teaching archaeological skills in middle school curricula—so much so that it has now been re-created at additional schools in other regions.

Los educadores y estudiantes graduados del Museo Haffenreffer de Antropología y del Instituto Joukowsky de Arqueología y Mundo Antiguo de la Universidad de Brown y del Museo de la Escuela de Diseño de Rhode Island llevan ocho años creando vínculos con los maestros de sexto año básico en ciencias sociales de las escuelas públicas de Providence, con el programa llamado *Think Like an Archeologist* (Piensa como un Arqueólogo). Este programa, basado en la experiencia, utiliza el estudio de los métodos arqueológicos para abordar estándares de estudios sociales estatales y nacionales, posibilitando a los estudiantes no solo a entender la ciencia que hay detrás del contenido de sus textos escolares, sino que también a aprender cómo usar los objetos expuestos en los museos y los artefactos arqueológicos como fuentes primarias. Además, el programa usa el estudio de la arqueología como puente entre los contenidos de los estudios sociales con los nuevos Common Core State Standards CCSS nacionales (Estándares Estatales Centrales Comunes), con el objetivo de crear estándares de alfabetización que promuevan en los estudiantes el desarrollo de habilidades propias del siglo 21. Los estudiantes aprenden cómo "leer" los artefactos, expresar sus ideas en lenguaje oral y escrito como historiadores y usar vocabulario académico requerido por el CCSS mientras piensan como arqueólogos. A partir de las respuestas de los profesores y las evaluaciones de los estudiantes, hemos sido capaces de saber que este programa ha sido un ejemplo exitoso de los beneficios que implica enseñar habilidades arqueológicas en el currículum educacional durante sexto año básico. Este programa ha sido tan exitoso que incluso ha sido recreado en otras escuelas de otras regiones.

Advances in Archaeological Practice 4(4), 2016, pp. 517–536
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DOI: 10.7183/2326-3768.4.4.517

TABLE 1. Participating Schools' Demographics (2014–2015 School Year).

	Bishop	DelSesto	Greene	Williams
Ethnicity:				
AmerInd/Alaska Native	8	5	8	9
Asian/Pacific Islander	28	27	56	33
Black	168	28	188	150
Hispanic	332	753	662	558
White	185	58	60	32
Two or more races	25	22	26	7
Total	746	893	1000	789
Subsidized Lunches:				
Free Lunch Program	456	786	750	664
Reduced-Price Lunch	30	38	90	23

Note: Data from National Center for Education Statistics (nces.ed.gov).

and each other. Over the years of the program, the partners have collaborated with nine teachers and school librarians and have worked with over 3,500 students—about 450–550 students each academic year at four middle schools in the [Providence Public School District](#). In this article, we will explain the program and the problems it attempts to solve, and demonstrate the program's effectiveness in addressing the Common Core State Standards.

PROGRAM OVERVIEW AND GOALS

Think Like an Archaeologist is a five-session program consisting of four classroom sessions and an off-site session at the RISD Museum at the Rhode Island School of Design and Brown University's Haffenreffer Museum of Anthropology.¹ The sessions introduce sixth-grade social studies students to the process of archaeology, from choosing an excavation site and recording a dig to analyzing and caring for artifacts. Each session is hands-on, led by faculty, staff, and graduate and undergraduate students from Brown University and the RISD Museum.

The goals of the program are to enhance the social studies curriculum by helping students to think about how people learn about the past; develop critical thinking skills, especially emphasizing how to examine historical "facts"; practice writing skills, collaborative problem-solving, group work, and public speaking skills; learn key archaeological concepts and vocabulary, such as stratigraphy, mapping, and dating; learn to synthesize different sources of information on different scales; and work with real archaeologists, anthropologists, and museum educators.

The *Think Like an Archaeologist* team chose these goals in an attempt to answer some of the educational problems faced by

students at the underserved urban schools we have partnered with. Schools in lower-income neighborhoods often do not receive the funding they need to include nontraditional learning experiences, out-of-school experiences, and guest scholars who offer a particular expertise in their regular curriculum. Supplies and other materials needed to run specialized programs are also expensive. Students may not receive alternative, experiential skills-building learning opportunities that help them to be successful according to the mandate of the Common Core Standards. Students may never be exposed to scholars who are models for future career opportunities and the various aspects of a field of study. Students from underserved communities may thus not consider a field like archaeology as a career path because they may not know much about it other than what they see on television and in movies. Finally, this program is designed to train undergraduate and graduate students aiming to become professional archaeologists to talk about their work to various audiences outside of academia, a skill that is often overlooked in academic institutions. Our student interns teach the program and learn how to explain archaeological concepts at a level understandable to sixth-graders.

SCHOOL DEMOGRAPHICS

Students from the four middle schools are diverse, with the majority identified as Hispanic (Table 1). Most students are from lower socioeconomic backgrounds, as demonstrated by the high number of students who qualify for free or reduced-price lunch. All of the schools are designated as Title I under the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6301 et seq.; United States Department of Education 1965). In addition, none of the schools met their targets in Reading Proficiency under the last reported assessment (Table 2). Within these schools, we have worked with English Language Learners (ELL) and students with an Individual Education Program (IEP)—including a blind student—some of whom had an additional aide in the classroom. This demonstrates that *Think Like an Archaeologist* is and has been accessible to a wide range of public school students with varying learning needs and back-

TABLE 2. Participating Schools' Standardized Test Scores: Percent of Students Who Tested at Levels 4 and 5 (Met or Exceeded Expectations).

Name of School	Reading	Math
Governor Christopher DelSesto	2.5	1.8
Nathan Bishop	28.8	18.6
Nathanael Greene	28.3	18.9
Roger Williams	16.8	6.0

Note: Based on 2015 PARCC (Partnership for Assessment of Readiness for College and Careers) testing that aligns with Common Core Data from 2015 PARCC Rhode Island Results Public Data (<http://www.ride.ri.gov/InstructionAssessment/Assessment/AssessmentResults.aspx>).

grounds. The structure of the program addresses the needs of visual, auditory, and kinesthetic learners (Jorgensen-Esmaili 1988:220).

Over the years, program coordinators and educators have adjusted how they teach and facilitate the sessions, having honed teaching strategies and revised materials to make sure that as many learners as possible find the content accessible and relevant. Examples of adjustment include more actively evaluating vocabulary with all learners, not just ELL students, translating key terms and concepts into Spanish, adding a collaborative mapping exercise as preparation for our survey session, and using Spanish during classroom and museum visits. Improvements are an ongoing process enhanced by strong collaboration with the classroom teachers over several years.

THINK LIKE AN ARCHAEOLOGIST AND COMMON CORE STATE STANDARDS

We started *Think Like an Archaeologist* before the national Common Core State Standards (CCSS) were rolled out in 2010 (implemented in Rhode Island in the fall of 2013), yet the program aligns well with CCSS in English Language Arts (ELA) in particular. Each session has a listing of individual CCSS ELA standards, which can be viewed on the program's website. Overall, CCSS emphasizes shifts toward skills-based literacy (and math in the case of the Mathematics Standards). With an emphasis placed on learning skills while learning content, rather than simply memorizing content, it is thought that students will be able to transfer skills to other aspects of their lives, including college and future careers. The main shifts the CCSS ELA standards aim to increase are literacy skills across all subjects, including science and social studies. There is an increased focus on the comprehension of informational, subject-based texts and on thinking and writing critically, and less focus on fictional texts. This includes comprehension and correct usage of academic vocabulary, the ability to comprehend and use primary source materials in all subjects, and the ability to formulate evidentiary arguments and write critiques (CCSS Initiative 2015; EngageNY 2012).

Think Like an Archaeologist addresses CCSS in social studies courses. From the first in-class session to the museum visit,

students are asked to "read," or analyze, artifacts. They learn to describe what they see, make inferences about artifacts, support their thinking, and consider context, the same skills required by the CCSS when working with informational texts. This close reading of artifacts is accessible to learners at varying levels, even students who have challenges in reading grade-level texts, and may help them to understand how to use analytical skills before applying them to texts that may be difficult for them.

In addition to gaining subject-based literacy skills, through *Think Like an Archaeologist* students develop a critical understanding of how we know about the ancient civilizations presented in their textbooks. They come to appreciate the science behind the information and learn about various aspects of archaeology, such as photography, drawing, mapping, lab analysis, documentation, and museum conservation, that extend their knowledge beyond digging.

SESSION INFORMATION AND EVALUATIONS

Instructors include staff members of the institutions, along with trained undergraduate and graduate students from Brown and RISD. Students work with the program for at least one semester and come with backgrounds in archaeology, anthropology, public humanities, and museum studies.² There are two to four instructors in the class at one time. Each session is designed for a class period of 50 minutes, although we adjust for shorter and longer class periods because the schedule is not uniform across class periods.

Session One: Introduction to Archaeology and Ancient Cultures

The first session introduces the study of ancient history, material culture, and the field of archaeology. In this session, students make connections between archaeological artifacts and the civilizations they have been studying in social studies, such as ancient Mesopotamia and ancient Egypt.

The program begins with a short introduction to archaeology and the concepts that will be learned in the other sessions. Students are introduced to the archaeologists, museum educators, and team members from other disciplines who will be teaching the sessions.

After the introductory lesson, students learn to analyze objects. They are divided into groups of three to five and given a pair of objects to examine and consider. Some of the objects are replicas, some are gathered from antique shops, and others are contemporary objects not always recognizable for what they are, such as a tea strainer or toothpaste tube roller. Unfamiliar objects are specifically chosen so that students are forced to use descriptive terms when recording, such as "it is made of metal and has moveable parts," rather than getting stuck on "it's a cup." Students are informed that sometimes archaeologists find things that they cannot clearly identify. The objects do not need to come from the cultures they are currently studying, given that this is an exercise in learning to read any object; it is skills based, not content based.



FIGURE 1. Session Two survey activity (photography by Gerylnducady, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

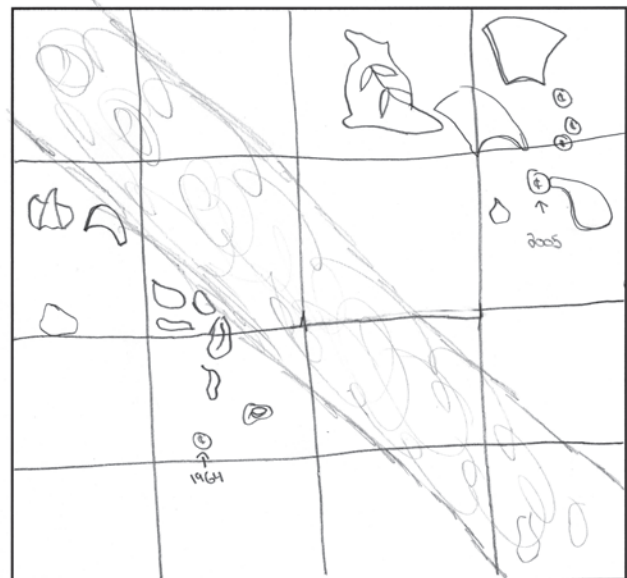
Students learn to describe the objects and to organize their thoughts using a Venn diagram and a set of prompts that help them to determine the similarities and differences of the objects. They then hypothesize about the objects' uses and what they might reveal about the societies that made and used them. Groups present their objects in front of the class, state their conclusions, and back up their thinking using their object descriptions as evidence. The activity was adopted from a lesson that RISD Museum educators developed for schools as part of their own two-part *Think Like an Archaeologist* tour theme (RISD Museum 2014).

Sample worksheets comparing the two objects demonstrate that students can provide detailed observations of different elements, including information discerned from the senses, such as smell. Notes include descriptions and questions speculating about an object's material makeup, its origin, and use, as well as realizations that objects can be fragmentary. Along the lines of the skills suggested in CCSS, students learn and properly use academic vocabulary, "read" the two objects in the activity, and make evidentiary arguments based on the objects.

Session Two: Archaeological Concepts: Survey and Stratigraphy, and Reconstructing the Past

Session Two focuses on how archaeologists use spatial information to reconstruct the past. It introduces the key concepts of stratigraphy, mapping, and dating that archaeologists use to reconstruct the past from its fragments. Field survey and

Archaeological Survey



Questions:

Why do you think the things in the square look like this?

maybe this

Are these things left over from one event? Or more than one?

What might lie underneath?

FIGURE 2. Session Two student sample worksheet.

stratigraphy are the focus of this session, which also includes discussion of how decomposition affects what archaeologists find and how archaeologists combine sources of information to reconstruct the past (Figure 1).

The session begins with a slide show showing photographs and illustrations of strata and survey maps from real archaeological sites. Then, students participate in two activities to learn about field survey and stratigraphy as two ways that archaeologists date and map artifacts. In the survey exercise, four squares are laid out in a grid with surface objects such as broken pots and pennies, along with a feature that can be interpreted as a rock wall or stone foundation. The placement of objects is deliberate but may lead to different interpretations. The patterns of distribution of the objects are analyzed and recorded by students (working three or four per square), who then deduce information about the societies that left them behind. As a group, students discuss their part of the site and, after considering the site as a whole, make evidence-based conclusions for what is going on by looking at the artifacts and features present and their spatial relationship to one another. They may also decide that they would theoretically want to excavate a certain area of the site to find more evidence. Interpretations for what is going on at the site vary. There is no wrong answer as long as students back up their conclusions with

evidence from the site. There have been instances of heated debate with no agreement on a conclusion, much like real archaeology!

The second activity introduces stratigraphy by asking students to excavate through layers of clothing to reveal embedded objects and then to infer the objects' relative ages based on where they were found. Layers of clothing represent dirt, and students describe the color and texture of the fabric along with "inclusions" in the matrix, such as buttons or zippers. This is compared to the way that archaeologists describe soil color, texture, and inclusions such as pebbles or cobbles in the field. Students describe artifacts found using the skills learned in Session One. Objects are contemporary, and some have dates imprinted on them. The instructor illustrates the layers and artifacts on a whiteboard and leads a discussion as the students make arguments for their conclusions based on the information we now have about the site. Students are also informed that some objects without dates imprinted on them can be tested for age, which might change our conclusions.

Sample worksheets from the survey lesson reveal students' strategies for, and challenges with, mapping their site (Figure 2). Strategies include dividing the square into smaller sections, limiting the numbers of artifacts depicted, using different levels of details and symbols for representing artifacts, and making written notes about the artifacts to distinguish among them. Challenges include difficulties rendering the different scales of the objects and their orientation. The team has addressed some of these issues by modeling how to survey the classroom before students do the survey activity and by clarifying the questions accompanying the survey worksheet. Again, this lesson addresses Common Core shifts toward using academic vocabulary, having students "read" and understand the spatial survey grid and vertical stratigraphy and give answers based on the "text" (in this case, the context of the objects). In both exercises, students have a discussion with the instructor about their findings or make hypotheses of what is going on at the sites and give evidence to back up their thinking.

Session Three: Simulated Dig

In Session Three of the program, students participate in a simulated dig to help them understand archaeological methods, site mapping, and spatial relationships. The ultimate result is to reconstruct a New England Native American homesite, thus allowing students to see how archaeologists piece together evidence gathered at sites to learn about ancient cultures. Students also discuss what the artifacts they found tell them about the people who lived there.

For this activity, 10 dig boxes representing excavation units are set up in the classroom in a grid. Artifacts and ecofacts such as hearth stones, charcoal, turkey and deer bones, broken pottery, shells, stone tools, and stone flakes are placed deliberately throughout the boxes and buried within a matrix of buckwheat hulls (real dirt is too heavy for taking from school to school and messier to clean up). Students are informed that they are looking at one stratigraphic layer of a site. Imagining that the excavation is taking place in the yard of their school, students discuss what could have been found in top layers, citing what types of artifacts would be found as evidence, e.g., jewelry

and pens in the top layer, since they are at a school; if they hypothesize that a house was on the property before the school, they would expect to find broken dishes and nails in the next layer (or farming tools, if they think it was farmland). Two to three students are assigned to each dig box where, working as a team, they carefully excavate and map the artifacts that they find (Figure 3).

After excavation, the teams meet as a larger group to report what they found. A class map showing all the excavation units is drawn on the whiteboard. Together, students point out patterns that they notice on the larger site map, which include a rock circle and charcoal, indicating a fire pit; a ring of postholes, indicating a fence or house structure; and a pile of shells, indicating a trash pit (Figures 4 and 5). Students discover that they have excavated the remains of a Narragansett home (*wetu*). They also discuss what the artifacts they found tell them about the people who lived there. For example, turkey bones and clamshells give evidence of the kinds of foods the people ate. Students also have a discussion of how this simulated dig is and is not like a real archaeological excavation, e.g., we carefully record what we find, like real archaeologists would, but we don't encounter pests, and we are not dealing with weather conditions or the soil conditions that can vary in the field. The Session Three dig was adapted from the Haffenreffer Museum's existing *Dig It! Discovering Archaeology* outreach program (Haffenreffer Museum of Anthropology 2015).

CCSS are being met through this exercise with the addition of further academic vocabulary, the "reading" of the context of the artifacts within the greater map, and interpreting the site using the scientific evidence that the students discovered. An issue associated with Session Three is that a lot of instruction is required before they can dig. Students need to understand the importance of excavating carefully and mapping their object locations precisely. Many students come with the thought that the object is to find things rather than to "read" the context. Some students have difficulty with multi-step instructions and, despite the directions, still move objects around in their attempt to find things. We have been working on ways to make directions more succinct and to write them step-by-step on the board so that students can continue to refer to them. In most cases, there may be one or two groups whose unit map comes out incorrectly. These can be turned into examples of why careful excavation is necessary when looking at the units in comparison with the class map; it is obvious who disturbed their portion of the site (as in unit B1 in Figure 5).

We understand that some archaeologists believe that children should not be taught to excavate, lest they are encouraged to dig around real sites, or that classroom simulated digs don't teach real methodology (Thistle 2012:67–69). Again, the careful recording required of this mock excavation, along with the class's reading of the team map, demonstrates to students that context is key and that simple treasure hunting yields little information. Throughout the program, students are reminded that training is required to do this work and that there are many steps in the process. Ethical considerations of heritage and context are also explicitly addressed throughout the program, and we emphasize to students that conducting informal excavations is extremely destructive to the collective study of the past.



FIGURE 3. Students working on the Session Three simulated dig (photography by Sophia Sobers, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

Session Four: Interpreting Artifacts in the Lab

In Session Four, students learn what archaeologists do with artifacts in a lab after excavation by working in teams of three to five to reconstruct ceramic vessels from broken fragments (Figure 6). The vessels themselves are not connected to the previous class excavation. Most are modern vessels, such as a coffee mug, bowl, ceramic container used to store flour, etc. Some have maker's marks or other writing such as "Made in Italy." Group members analyze their reconstructed vessel based on guiding questions and then present the vessel and their theories on the object's uses and origins to the class. The entire class makes hypothetical interpretations about all the reconstructed vessels as constituting archaeological assemblages within different hypothetical scenarios. For example, students are asked to imagine what conclusions they might be able to draw about the vessels and the people that used them if they discovered that

all the artifacts were found in one archaeological layer. In this sense, students learn to synthesize different sources of information on different scales.

This session concludes with a discussion of how a museum curator might prepare the items for display to the public. Students discuss what topics or themes can be covered using the different types of pots, how they would organize their exhibit, and which pots they would choose to display and why. Some students have suggested that the pots can be organized by culture, use (such as a display of kitchen utensils), or aesthetics. This exercise leads to the final sessions at the RISD and Haffenreffer museums.

Asking students to "read" their group's assembled object reinforces Common Core skills. In small groups, they answer questions on the worksheet that encourage them to write their interpretations and support their arguments with evidence.

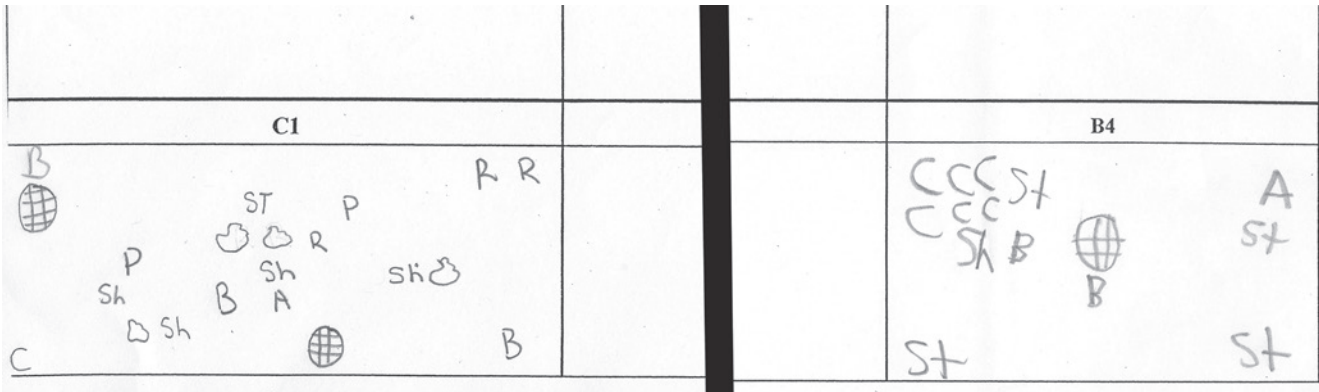


FIGURE 4. Session Three examples of student work.

Some students within the same groups may have different arguments and may point to different evidence to support their arguments. Groups present their objects and evidence to the class. In discussing possible scenarios in the larger class and in looking at the individual objects as assemblages, students continue making hypotheses and using evidence for their arguments. In answering questions about the reasons for incomplete objects and missing pieces, students' worksheets reveal reasons discussed in prior sessions.

Session Five: Visit to RISD Museum and Haffenreffer Museum

In the concluding session, students visit either the RISD Museum or the Haffenreffer Museum to see real archaeological collections on display and to consider how artifacts are interpreted in museum contexts. In the early years of the program, each student visited both museums. We decided to change this so that half of the students visit one museum while the other half visits the other, due to problems with student concentration ("museum fatigue") and scheduling difficulties as the size of the program grew. At the RISD Museum, students examine material

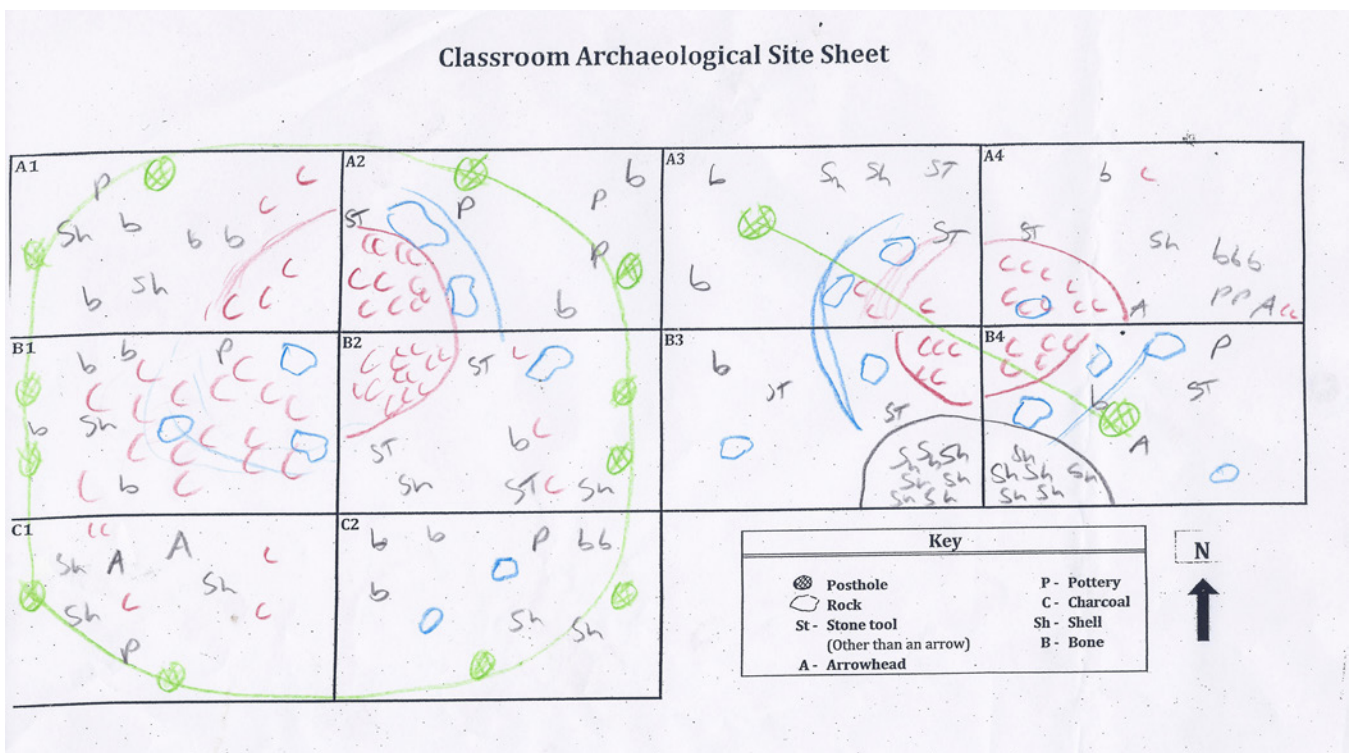


FIGURE 5. Session Three classroom team map.



FIGURE 6. Student working on the Session Four activity (photography by Sophia Sobers, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

artifacts from Egyptian, Greek, Etruscan, and Roman civilizations by applying the skills of observation, analysis, and critical thinking they have developed in the classroom, in order to form hypotheses about age, likely location, and function. In one lesson, students in small groups take on the roles of archaeologist,

conservator, and curator by addressing questions that concern each expert (including issues of care, the ethics of taking objects out of their original context, and interpretation). Each expert group then discusses their insights and shares their conclusions. Attention to decisions about the display of objects in a museum setting allows students to think about the ways that museums encourage us to interpret objects to construct an understanding of the civilizations they belong to. The visit uses what instructors learned about the students during the class sessions by taking into account their varied abilities in terms of language, cognitive abilities, interests, and learning styles. Worksheets offer opportunities for students to draw and write their analysis of artifacts, which helps to scaffold the steps needed for looking closely at objects to notice details (Figure 7). Drawings provide information on how students think about the whole artifact and select key details, while the open-ended questions regarding materials, possible use, and condition allow educators to assess students' knowledge and perspectives.

At the Haffenreffer Museum, students work in groups to analyze objects from different cultural groups. Since the museum does not have permanent exhibits, skills-based lessons are transferable with the changing exhibitions. Students use their critical thinking skills to discuss how an object was used within its culture and time period. They also learn how cultural objects are utilized in an anthropology museum to tell a story about a culture or cultures, and they see how archaeological information is interpreted for the benefit of public knowledge (Figure 8). We've recently added a drawing component to this visit, in which

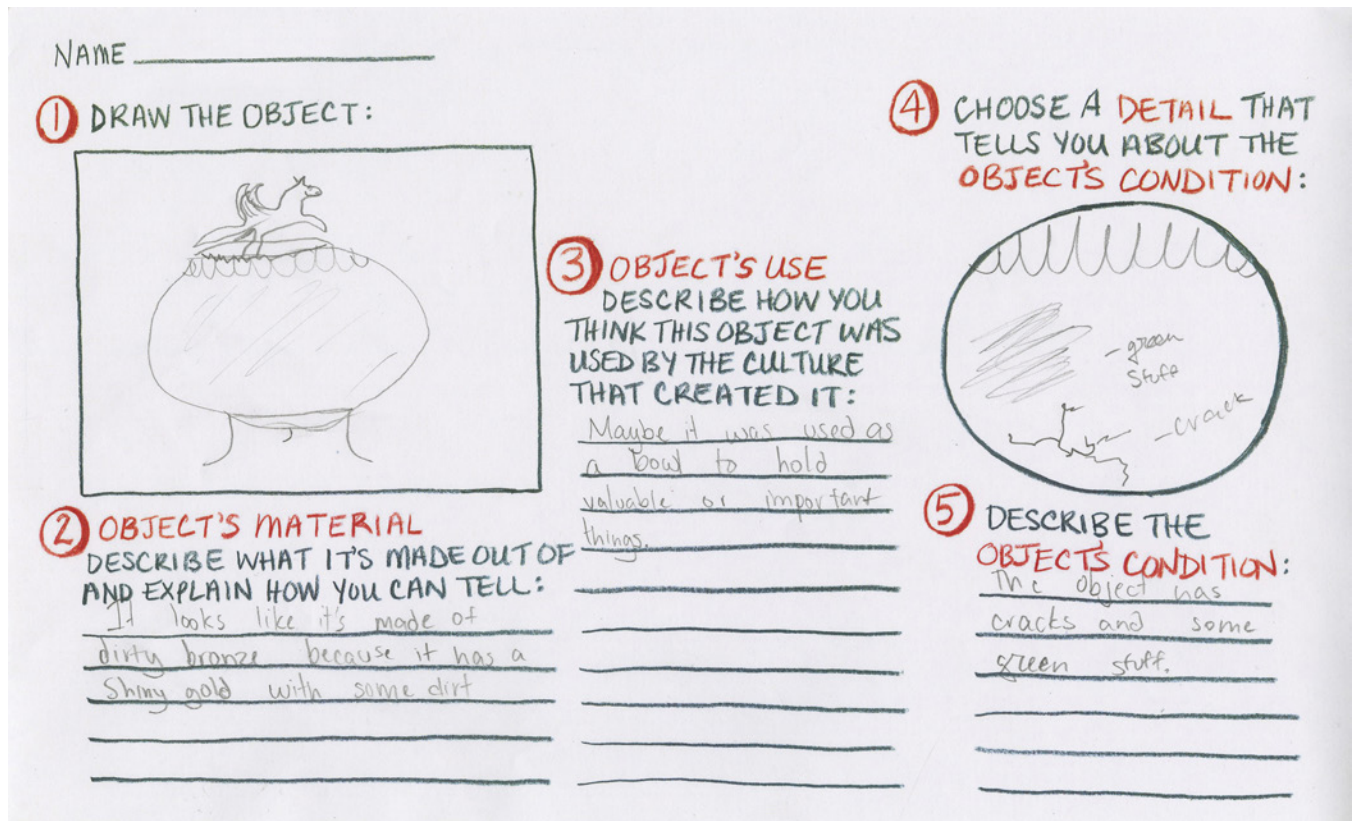


FIGURE 7. Example of student work at the RISD Museum.



FIGURE 8. Students from Nathaniel Greene Middle School at the Haffenreffer Museum (photography by Sophia Sobers, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

students are forced, through the practice of sketching, to take a close look at an object's features and design details, much like in an archaeological drawing (Figure 9). Students continue to practice their skills at "reading" objects, whether through sketching or through verbal discussions with the museum educators. Students also learn that not all objects in the museum are archaeological and are introduced to anthropology.^{3,4}

PROGRAM ASSESSMENT

During the 2014–2015 academic year, pre- and post-program questionnaires were given to student participants at the Roger Williams and Nathan Bishop middle schools (Appendices A and B). We not only wanted to compare students' knowledge of archaeology before and after the program but also wanted to compare student use of Common Core–based skills, such as understanding and use of academic vocabulary and, especially, student ability to "read" objects/situations and make evidentiary arguments for their conclusions. A total of approximately 420 students participated in the program that school year. However, 170 students took the pre-program test and 193 took the post-program test, as more students were absent the day of the pretest. Both the pre- and posttests were a mix of open-ended

and multiple choice questions, in English, including a mix of similar and different questions, for later comparison. We plan to revise the tests in the future to refine the information we are able to gather from them, based on our observation that not all questions yielded significant information and not all were correctly understood by the students.

Ways of Learning about the Past

In the first question of the pre- and post-program surveys, the students were asked to brainstorm ways in which they thought they could learn about the past. The question was free-answer, so to quantify the results we divided responses into five types: text, digital, oral, archaeology, and museum. An answer was coded as "text" if it mentioned books, reading, or textual evidence of other kinds and "digital" if it included mention of the Internet, websites, videos, or other digital media. "Oral" answers included mention of spoken communication ("Ask your grandmother or grandfather if they might know a little bit about the past," "we can learn about the past by talking to an archaeologist . . ."); "archaeology" answers included mentions of artifacts, excavation, survey, and other archaeological techniques; and "museum" answers included any mention of museums (Table 3).

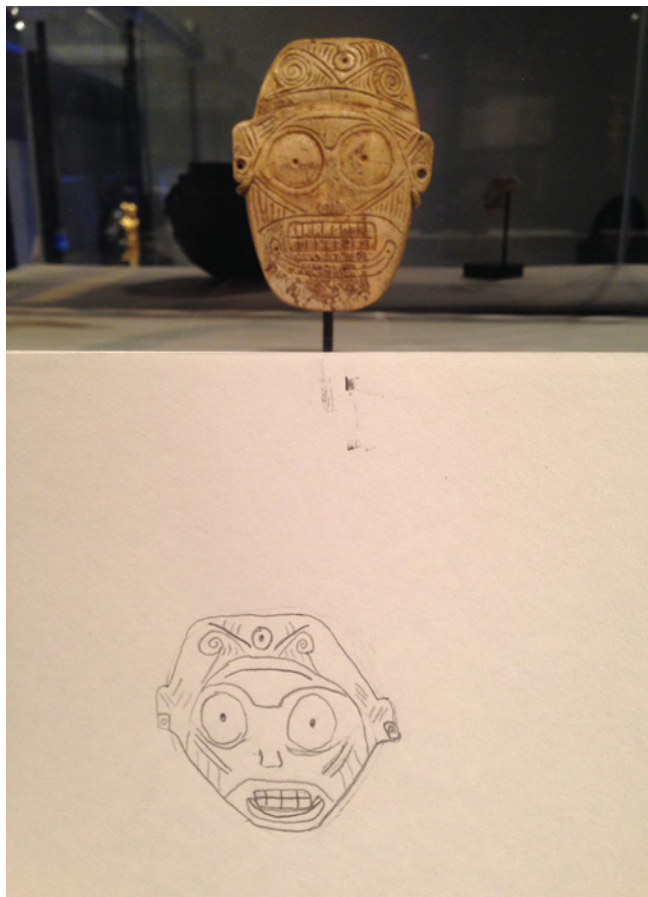


FIGURE 9. Example of student work at the Haffenreffer Museum (photography by Geralyn Ducady, courtesy of the Haffenreffer Museum of Anthropology, Brown University).

Before participating in *Think Like an Archaeologist*, text was the most common answer type (49.41 percent of respondents), followed by archaeology (41.18 percent), and digital resources (38.24 percent). After program participation, consideration of archaeology as a way of knowing about the past rose almost 19 percent to 60.10 percent, corresponding with large decreases in mentioning text and digital information. Mentions of museums and oral ways of learning were the least common in both the pre- and post-program surveys. Such an increase in awareness about archaeology as a source of knowledge is heartening, but it could be due in part to the fact that students tend to highlight the subjects they have learned about most recently, and our program emphasizes archaeological methods.

Using Evidence to Support Conclusions

Another test question asked of the students was to describe three things about an object (provided in pictures on the survey forms). We looked to see how many of their answers were descriptive vs. interpretive. By asking this question both before and after the *Think Like an Archaeologist* program, we were able to see how effective our lesson on object “reading” was. The point of this lesson was to have the students understand how to describe an object and the importance of doing such a description before coming to a conclusion/interpretation of

TABLE 3. Survey Question: What Are Some Ways We Can Learn about the Past?

	Percent Pre-Program	Percent Post-Program	Percent Change
Text	49	33	-16
Digital	38	28	-10
Museum	16	18	2
Archaeology	41	60	19
Oral	15	13	-1
Multiple	49	44	-6

Note: This was an open-ended question that was coded.

what the object was, who owned it, etc., particularly in terms of the Common Core skill of reading a text, in this case an artifact, and making evidence-based arguments about it.

A total of 126 students ($n = 170$) provided at least one answer for this question in the pre-program surveys, with 269 “descriptive” answers given and 82 “interpretive” answers. The other 44 students left the answer blank. For the post-program surveys, 181 students ($n = 194$) provided at least one answer, with 448 “descriptive” answers and 103 “interpretive” answers. Thus, not only did the percentage of students who could answer the question increase after the program (74.12 to 93.30 percent), but so too did the ratio of “descriptive” to “interpretive” answers (3.28:1 to 4.35:1). Students tended to talk about the designs or decorations present (or absent) on the vessels, as well as their shapes, how “new” or “old” they looked, and what they were made out of, but they did often also make guesses about what the objects were, especially with Object C (“teacup”), but also with object A (“flowerpot” or “bowl”). This ability to use descriptive evidence to reach conclusions is a skill reinforced throughout the *Think Like an Archaeologist* program and is a main skill required by the CCSS.

In the post-program surveys only, the students were also asked to choose which of the pictured objects they thought was the oldest. The vast majority of students (167, or 86.53 percent) chose Object A, an undecorated bowl, but 11 students chose Object B, 3 students chose Object C, and 3 students chose A and B. Their reasons for their choices mostly had to do with the objects’ textures and decorations, or simply that it “looks old.” Several descriptive words recurred frequently in descriptions of Object A, including “crusty,” “wrinkled,” “rusty,” “fragile,” and “dirty.” They also sometimes ventured guesses at what the object was made out of (“rock,” “clay,” “soil,” etc.). In explaining their answers, 173 students used descriptive words, bridging to the next step of backing up their choices (“What it was used for tells you about what people did, how they did it, what materials they had, and how they made things.”) Seven students appeared not to understand the question, and only 13 did not use descriptive terms to back up their choices. In this question, we were not expecting students to know the correct answer (which one really is the oldest), but we were looking to see how many students continued to “read” the artifact by using observational and descriptive evidence to back up their response.

TABLE 4. Survey Question: Why Do Archaeologists Work Slowly and Carefully?

	Percent Pre-Program	Percent Post-Program	Percent Change
"Their finds are often fragile"	62	79	18
"They must map and record where each artifact is found"	45	54	10
"They are all lazy"	2	1	-1
"They often need to put broken things back together"	43	59	16
"They need to interpret their finds to understand past cultures"	36	48	12
(None)	25	6	-18
(Answer included multiple of the above)	55	67	12

Note: This was a multiple-choice question, and students could pick more than one answer.

Knowledge of the Field before Program Participation

In the pre-program surveys, the students were asked what they expected to see at their museum visit at the end of the program. This was a free-answer question, but we classified the answers into "natural" (i.e., natural history, animals, dinosaurs, etc.), "cultural" (e.g., "artifacts," pottery, tools), and "art" (e.g., paintings, sculptures). Of the 170 students surveyed, 133 answered with something that could be categorized as at least one of these. Forty-one students (24.12 percent of total) gave "natural" answers, 116 (68.24 percent) gave "cultural" answers, 41 (24.12 percent) gave art-based answers, and, in total, 58 students (34.12 percent) gave answers in more than one category. As seen in other questions, the timing of the *Think Like an Archaeologist* program in relation to their other lessons affected their answers, and classes that had just studied human evolution were much more likely to mention hominids and related terms.

In the pre-program surveys, they were also asked what they expected to hear about from the visiting archaeologists. Responses varied widely on this question. Many students said "fossils," as well as early farming, bones, ancient tools, and artifacts. It is hard to tell whether these answers represent what students know about archaeology or simply what they had been studying in class in the weeks leading up to the *Think Like an Archaeologist* program. Many students wrote that they expected the archaeologists to talk about their job—what they did, what tools they used, and what they had found, etc.

At the end of the pre-program survey, the students were asked what they hoped to learn from the program. Many students wanted to know what archaeology was like as a job and how it worked as a process. ("I am hoping to learn about what archaeologists do, how they do it, how a museum choses [sic] what to exhibit, and how they do it," "I would like to learn about how people date artifacts and figure out what they would be used for.") But many of the students wanted to know specific things about the past, often relating to the units they had just covered in class (e.g., early agriculture or ancient Egypt). Many expressed general excitement for the program or wanted to learn "many things."

The answers to these last few questions demonstrate confusion over what archaeologists study. Anecdotally, many of the *Think Like an Archaeologist* teachers received answers from students thinking that archaeologists study fossils and dinosaurs, a typical response other archaeologists have experienced. These answers also point to the general interest of students wanting to learn about another career option while meeting real professionals.

Knowledge of the Field after Program Participation

A multiple-choice question asked on both the pre- and posttests was, "Why do archaeologists work slowly and carefully?" (Table 4). All of the answers except for C were correct, and so it was heartening to see significant positive change for each answer when comparing the pre- and post-surveys. The fragility of the finds was the most chosen option both before and after the program, and it also showed the greatest percentage increase. The percentage of students who did not choose any answer fell dramatically, almost 18.5 points, and the proportion that chose more than one answer rose by 11.55 points. It is somewhat surprising and disappointing that the "map and record" option rose the least (9.70 percent), as the importance of archaeological recording was emphasized strongly in the program (mapping was done in the Session Two survey exercise and the Session Three mock excavation).

In the post-program surveys, the students were asked how they thought the items they had seen on their museum visit got there. Quite a few of the students from all classes answered a different question than the one we were trying to ask, focusing on the physical transport process rather than the human processes. But, many students did make the connection between objects that had been excavated and those in the museum, even remarking on how those objects have to be studied and conserved first. ("People excavated them [or found them] [whole or in fragments] and a curator chose which objects fit best in which space and installed them.") Only a few students mentioned that the museum could buy items.

Finally, the students were asked what surprised them the most about the *Think Like an Archaeologist* program. There was quite a range of answers to this question. Many students said

TABLE 5. Student Use of Vocabulary on the Tests.

Terms	Pre-Program Count	Post-Program Count	Change
Archaeology/archaeological	14	5	-9
Anthropology/anthropologist	1	1	0
Survey	0	4	4
Stratigraphy	0	2	2
Excavate/excavation	6	9	3
Artifact	79	46	-33
Decompose	0	1	1

that the program was fun and that they had not expected it to be so hands-on. This was expressed both with regard to the in-class activities—especially the mock excavation and the pottery reconstruction exercises—and to the museum visit, where they were surprised that they got to handle real artifacts (“that we got to touch artifacts and get deeper into the unique cultures that some of us don’t know,” “That we actually got to touch actual artifacts + that we got to act like actual archaeologists. Also, that we got to meet archaeologists.”) Quite a few students were also surprised by the amount of effort and time that archaeologists needed to put into studying artifacts and the past (“how much work they put in to just one objects [sic] & how many people are needed.”) Students also mentioned learning new aspects of archaeology they didn’t know about (“I think that what surprised me the most was the survey part because I knew about most of the other stages but this was new and I didn’t think they had to map it all out.”) Several students were surprised that archaeologists got to travel all around the world for their research or that archaeology could be done underwater. Still others appreciated meeting real professionals (“What surprised me about the Think like an Archaeologist program is that we were getting taught [sic] by real archaeologist [sic].”)

The Use of Academic Vocabulary

We had also hoped to see an increase in the use of academic vocabulary in the posttests. Unfortunately, students rarely used the newly learned terms, although a handful used “survey,” “stratigraphy,” and “decompose” in the posttest. A few more students used the word “excavate/excavation” in the posttest (nine), as compared to the pretest (six) (Table 5). Our test questions didn’t ask students to specifically recall learned vocabulary. Future surveys need to be redesigned to elicit more use of vocabulary. We can then test whether students are able to correctly use the terms learned over the course of the program.

Informal Assessment by Teachers

Aside from the formal assessment of the pre- and post-surveys, teachers praise the program for its connection to science and social studies, for its focus on critical thinking skills, and for the fact that it gives students the chance to meet real archaeologists.⁵

Based on my observations, the students are totally engaged in the programs. The various sessions have sparked a new-found interest in archaeology at our

school. What I like best about the program is its core commitment to critical thinking. Students are learning that objects do not just appear in museums. In essence, these programs make archeology come alive for students. (Christopher Audette, then sixth grade teacher at Nathan Bishop Middle School)

Archaeology is naturally a “hands-on” science, and each year my middle school students respond excitedly to the “Think Like an Archaeologist” program brought to us compliments of the RISD and Haffenreffer Museums and the Joukowsky Institute. My students are introduced to the field of archaeology by “real” archaeologists who eagerly share their expertise and experiences. Having participated in the program for the past several years, it has certainly become one of the highlights of my 20+ years of Social Studies teaching at the Nathanael Greene Middle School in Providence. I know that this program has helped many of my students develop a lifelong interest in the field of archaeology, and the related sciences. (Susan Pangborn, Social Studies Teacher, Nathanael Greene Middle School, Providence Public Schools)

Assessment Conclusions

Overall, looking at the students’ formal pre- and posttests and considering on-site observations of students by instructors, students demonstrated an increased ability to look at a singular object or a group of objects in context with each other and use observations as evidence to support their conclusions about the object or objects. This is a fundamental Common Core skill, and students had the opportunity to do that verbally and in writing. The pre- and posttests did not demonstrate a significant increase in producing academic vocabulary. Students did, however, increasingly recognize and produce new vocabulary in class as the sessions progressed. We need to improve the testing instrument to demonstrate formally that students have accomplished this skill. In the future, we would like to be able to improve the testing instruments to demonstrate student achievement in more of the Common Core skills—perhaps by including additional multiple-choice questions to which there are clear correct and incorrect responses. Although *Think Like an Archaeologist* did not focus on specific civilizations, teachers made the point that they were able to refer back to the program during their studies of different civilizations and it was helpful to have a basis for the science behind how we know how people

lived in the past. Since the Session Three dig was of a Native New England homesite, students also learned that archaeology can happen locally and not solely in the far-off places they study during this grade in school.

We did not formally test whether English Language Learners performed better or worse than their peers on the tests. Through in-class observation, we did notice that English Language Learners were able to pick up on the vocabulary and concepts of archaeology; the hands-on nature of the program makes it accessible for students who may have trouble with learning solely from text-heavy books. Students did leave with a better understanding of, and, based on the posttest, appreciation for, archaeology and archeological processes.

CONCLUSIONS

Through formal assessments, students demonstrated an increase in their ability to “read” artifacts and maps by using descriptive terms to identify them. They showed an increase in using evidentiary arguments in their interpretations of artifacts and in their readings of site maps. Students also showed an improved understanding of what archaeology is, what archaeologists do, and how archaeology is a tool for learning about the past. Students did not demonstrate increased knowledge of academic vocabulary in the written post-program surveys, but did use the vocabulary verbally in successive sessions of the program. A better-designed survey instrument may prove an increase in academic vocabulary, as called for by CCSS in the future.

Teachers wish to continue the program because they see that it fits with Common Core and that it forces students to think critically. They also see an added bonus in having real archaeologists and museum professionals in the classroom as examples of possible professions for their students. In addition to what students demonstrated in the formal assessments, teachers have noted the program’s success teaching archaeological skills and using experiential learning to reach students at various learning levels and to reinforce the twenty-first-century skills required by CCSS.

The partner institutions consider *Think Like an Archaeologist* a successful program for the ways in which it fulfills their missions pertaining to public education and outreach, as well as engaging and collaborating with our university communities. Further, the program provides an in-depth training opportunity for university undergraduate and graduate students who are invested in public education in museums, public archaeology, and other formal and informal learning environments. It is considered a successful model that can be used elsewhere.

Although we cannot test how going through *Think Like an Archaeologist* affects a student’s performance on Common Core assessments, known as Partnership for Assessment of Readiness for College and Careers (PARCC), we have established that the program answers the need, stated earlier, for partner schools to provide enriching learning experiences that also address the skills mandated by the Common Core (Rhode Island Department of Elementary and Secondary Education 2015). In addition, the program introduces students to career

path examples—such as field archaeologist, lab archaeologist, illustrator, photographer, museum educator, and more—to students who otherwise may never have known that there are so many ways to build a career through archaeology. And by training university students as program teachers, including students who are on an academic career path, we are training future professional archaeologists in how to speak to and include public audiences in their academic work. Perhaps we may influence a few to make public archaeology a vital part of their careers.

Acknowledgments

We would like, foremost, to thank Providence teacher Christopher Audette. He helped us start the program in the middle schools, introduced us to important administrators at Providence Public Schools, instructed us on the Common Core shifts, and showed us how *Think Like an Archaeologist* was already connected to the new standards. Providence teachers Susan Pangborn and Patricia Schmiedeknecht helped gather permission forms from the parents of students featured in this article’s photographs. Brown University and RISD undergraduate and graduate students, museum educators, and other staff have contributed to the program’s changing curriculum and have helped make it successful. Nicole Larrondo translated this article’s abstract and the program worksheets into Spanish. Sophia Sobers took photos of program sessions for the purposes of this article. Sionan Guenther helped gather photo permissions and prepare photographs and scans of student worksheets. The program is funded by our partner institutions: Haffenreffer Museum of Anthropology, Brown University; Joukowsky Institute for Archaeology and the Ancient World, Brown University; RISD Museum, Rhode Island School of Design.

Data Availability Statement

All *Think Like an Archaeologist* session descriptions, lists of educational standards, session scripts, PowerPoints, and worksheets are available for free at www.brown.edu/go/thinkarch. Digital copies of blank pre- and posttests are also available on our website. Physical copies of student pre- and posttests are maintained at the Joukowsky Institute for Archaeology and the Ancient World, Brown University. To maintain privacy, original tests and other student work will not be made available for viewing. An Excel spreadsheet containing primary data of pre- and posttests is archived on our website under password protection. Researchers who need to access this information may contact Sarah Sharpe at Sarah_Sharpe@brown.edu for the password.

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3. The partner institutions split the costs of the buses, supplies, and staff/intern time. We ask the schools for \$3.00 per student toward the bus and to place value on the program. Some schools collect the money from the students, some fundraise, and others find bus grants.
4. More information about the five sessions can be found at <http://www.brown.edu/go/thinkarch>. Session descriptions, scripts, and worksheets are all available on that site to anyone who wants to duplicate the program. Materials are updated as the program evolves.
5. In the summer of 2013, partners provided two one-day teacher professional development workshops. It was the only social studies professional development approved by Providence Public Schools that summer. This was an experiment in program expansion that, by training the teachers to teach some of the sessions on their own, would allow us to run some of the sessions at more schools rather than all of the sessions at some schools. At the moment, however, most teachers continue to want us to run the entire program since they are more comfortable having experts run the sessions, and the program materials may be beyond classroom budgets.

NOTES

1. *Think Like an Archaeologist* began as an elective after-school program for fifth graders at William D'Abate Elementary School in the spring of 2010 through a partnership between Brown University and the RISD Museum. Following this initial trial run, the program was reshaped to be incorporated into the regular school day as a five-session program for sixth graders to better support the Rhode Island curriculum and to form stronger partnerships with teachers.
2. Undergraduate and graduate student interns have developed and refined program curricula over the years. Students have used their experiences for course papers and have presented at the 2012 Society for American Archaeology Annual Meeting. An offshoot of our program was developed in 2012 at the Memorial Art Museum in Rochester, New York, by former *Think Like an Archaeologist* graduate student Alexander Smith, and a Brown University course on community archaeology and outreach was taught by former graduate student Katherine Harrington in the fall of 2014.

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Appendix A

Think Like an Archaeologist Pre-Program Survey

Name: _____

School: _____ Teacher: _____

1. What are some ways we can learn about the past?

2. You are going to a museum! What do you think you will see there?

3. Pick **one** of these objects and write down three things that describe it.



a



b



c

1. _____

2. _____

3. _____

4. You are going to meet archaeologists! What do you think they might talk about?

5. Which of these is a tool used by archaeologists? *(There may be more than one right answer! Circle as many as you think are correct.)*

- a. Trowel
- b. Microscope
- c. Satellites
- d. Bulldozer
- e. Map

6. Why do archaeologists work slowly and carefully? *(There may be more than one right answer! Circle as many as you think are correct.)*

- a. Their finds are often fragile.
- b. They must map and record where each artifact is found.
- c. They are all lazy.
- d. They often need to put broken things back together.
- e. They need to interpret their finds to understand past cultures.

7. An artifact can't talk, but it can still tell you many things. Which question do you think is most important?

- a. How old is it?
- b. Who made it?
- c. What was it used for?
- d. Where was it found?
- e. Who owns it?

8. What are you hoping to learn about archaeology, museums, and the past?

Appendix B

Think Like an Archaeologist Post-Program Survey

Name: _____

School: _____ Teacher: _____

1. What are some ways we can learn about the past?

2. Pick **one** of these objects and write down three things that describe it.



a



b



c

1. _____
2. _____
3. _____

3. Which of the three objects in Question 2 do you think is oldest, and why?

4. How do you think the things inside a museum got there?

5. Why do archaeologists work slowly and carefully? *(There may be more than one right answer! Circle as many as you think are correct.)*

- a. Their finds are often fragile.
- b. They must map and record where each artifact is found.
- c. They are all lazy.
- d. They often need to put broken things back together.
- e. They need to interpret their finds to understand past cultures.

6. An artifact can't talk, but it can still tell you many things. Which question do you think is most important?

- a. How old is it?
- b. Who made it?
- c. What was it used for?
- d. Where was it found?
- e. Who owns it?

Why did you choose the answer you chose?

7. What surprised you most about the Think Like an Archaeologist program?
