Archaeological Science for All Phase I: National Delphi Survey

Project Report (12/31/10)

NSF Award# 0840065

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Summary

Archaeology education activities in informal science learning settings are an underutilized, but effective strategy for teaching science inquiry skills in socially and culturally relevant contexts. This project investigated the potential for archaeological content and inquiry strategies to help informal science learning institutions increase learning with diverse ISE audiences. The project was based on foundational research for the development of a national research framework for archaeology education and a plan for developing high-quality science learning opportunities for under-represented audiences in ISE. In order to determine the specific knowledge, skills and dispositions and assess specific informal science learning outcomes related to culture and ecology the research team designed and administered a Delphi survey to 125 informal science educators, archaeologists, and archaeology educators. The results determined what archaeological concepts, skills, and dispositions should be taught, and the optimum social/cultural/ecological contexts for enhancing informal archaeological learning in ISE for under-represented audiences. The results of Archaeological Science for All (ASFA) I suggest full development of collaborative inquiry teaching and learning strategies based on assessment of culturally relevant, informal archaeology education experiences with specific under-represented groups in STEM (e.g., African Americans and Native Americans). Dr. Michael Brody, science educator, and Dr. Jack Fisher, archaeologist, directed the project with the assistance of Ms. Jeanne Moe and Ms. Crystal Alegria, both archaeology educators, and Ms. Helen Keremedjiev, doctoral student in archaeology. The core ASFA Team worked collaboratively with a group of national advisors who are experts in informal science education, the social and cultural contexts of learning, and archaeological science (Dr. John H. Falk, Oregon State University; Dr. Elaine Franklin, Western Carolina University; Mr. Ron Giesler, Saint Louis Science Center; Dr. Shirley Gholston Key, University of Memphis; Ms. Maureen Malloy, Society for American Archaeology and Smithsonian Institution; and Dr. Sarah Wille, The Field Museum). These national advisors assisted with development and administration of the Delphi survey, analysis of the results, formulation of a national research framework and collaborative inquiry model and of a full development plan for archaeological science learning nationwide (NSF proposal #1114533). ASFA I established a research foundation for archaeology education in informal learning environments and the results provide ISE professionals with solid principles and concepts for full development of the collaborative inquiry model to better serve under-represented audiences.

Introduction

This study was supported by National Science Foundation award# 0840065 to Montana State University, Bozeman, MT. The principal investigator is Michael Brody, Department of Education, College of Education, Health and Human Development and the co-principal investigator is John Fisher, Dept. of Sociology and Anthropology, College of Letters and Science. The purpose of the project was to conduct a national Delphi survey to determine the consensus of archaeologists, informal science educators and cultural resource management professionals on the essential archaeological-knowledge, skills and dispositions that could provide the foundation and benchmarks for effective instructional strategies for under-represented audiences in ISE. The research was conducted in collaboration with National Project Archaeology (US Bureau of Land Management and MSU) during 2009 & 2010.

Theoretical Background

Archaeology is the scientific study of the human past (Sutton and Yohe, 2003). It is categorized as a social science because it studies humankind, yet it also employs the content and methodologies of many natural and physical sciences such as biology, botany, geology, ecology, chemistry, and physics to analyze and interpret data. Archaeology is essentially an interdisciplinary discipline based on scientific inquiry. As such, archaeology provides a meeting ground between the natural/physical sciences and the humanities and a nexus for cross-disciplinary teaching and learning. Archaeological inquiry is an effective approach for informal science learners of all ages and backgrounds to engage in the scientific process and integrate multiple facets of scientific knowledge. Examples of cross-disciplinary archaeological topics include, analysis of soil chemistry to determine how people used their living space, ethnobotany to examine human diet breadth and nutritional quality, GIS (Geographic Information Systems) technology to query artifact databases and identify activity areas, physics and chemistry for radiocarbon dating of archaeological materials to determine their antiquity, and earth sciences to examine site stratigraphy and environmental changes over time.

The goal of science education is to "… bridge the gap that already exists between most peoples' everyday experiences and a scientific analysis of the world" (Martin 2001, p. 194). For many students, who are not members of the dominant culture in industrialized countries, the gap may be more difficult to bridge than it is for many Euro-Americans students. For under-represented students (African Americans, Native Americans, and Hispanic Americans), science and especially school science, is a foreign culture (Phelan et.al. 1991; Aikenhead and Jegede, 1999; Key, 2003). Students of all racial and ethnic groups often operate in a series of "microcultures," as they move between home, family, peer groups, and school. Some students move easily between the microcultures of home/family and school, but others do not. The difference between home/family and school science is often one of the most difficult transitions for students to make because science often is not relevant to non-dominant cultures or connected to relevant social issues. No matter what their cultural background may be, students in mainstream education are "… expected to construct scientific concepts meaningfully even when those concepts conflict with indigenous norms, values, beliefs, expectations, and conventional actions of students' experiences" (Aikenhead and Jegede 1999, p. 270). Many students, especially in under-represented populations in STEM, find it difficult, if not impossible, to cross these cultural boundaries and be successful in school science.

Educators have long called for culturally relevant teaching and curricula in schools to improve academic achievement among under-represented students (e.g., Darder, 1991, Gay, 2000, Key, 2003). Working with a large population of diverse students in Florida schools, researchers Lee and Lukyx (2006) detected significant improvements in science learning when culturally relevant teaching and curricula were employed. Informal educators (e.g., Sachatello-Sawyer & Cohn, 2005) have successfully used culturally relevant methods for teaching scientific concepts and content. Research indicates that museums and science centers can attract a diversity of audiences, if they are successful at providing culturally relevant content delivered in culturally relevant ways (Sandell, 1998; Steiner, 2007).

Archaeology provides the basis for culturally relevant science learning both in school (e.g., Clark

et al., 2008) and in informal settings. For example, Crow Canyon Archaeological Center, an archaeological center for research and informal education regularly uses archaeology to engage Native American learners in scientific inquiry in culturally appropriate ways at their campus near Cortez, Colorado (Davis, 2001). Similarly, the Archaeological Pathways for Native Learners Project funded by NSF through the Mashantucket-Pequot Museum was designed to connect Native American youth in Connecticut and Arizona with their own history (NSF #0307858). The digNubia! Project (NSF #9901979) interactive website and traveling exhibits were disseminated to African American youth throughout the nation. Pre- and post-inventories conducted in association with digNubia! measuring interest in science showed a statistically significant increase in interest about ancient Nubia and the ways archaeologists understand the past (Nettles, 2003, p. 40-41). In the past ten years, the San Diego Archaeological Center has provided National Project Archaeology (NPA) programs for thousands of children, families, and docents though informal education. Lessons from NPA's *Intrigue of the Past* allow staff and volunteers to bring scientific inquiry to a very broad and diverse audience with a variety of learning skills (A.Cox, personal communication, May 13, 2008).

The ASFA I goal was to develop a comprehensive framework and effective strategies for delivering high quality archaeological science education to informal audiences throughout the nation. To accomplish the goal we: (A) designed and administered a Delphi survey to determine what scientific archaeology concepts, skills, and dispositions should be taught and the social/cultural contexts of informal archaeological learning, (B) followed up with in-depth telephone interviews with a representative number of archaeologists and ISE professionals; (C) convened a 3-day workshop for the Project Team (the core researchers) and the National Expert Advisors and Collaborators, and (D) used the survey, workshop, and interview results to design a broad, national research framework including collaborative inquiry strategies to address ISE among under-represented populations in archaeological education programs. We conclude that archaeology education activities in informal science learning settings are an underutilized, yet potentially very effective strategy for teaching science inquiry skills in socially and culturally relevant contexts.

Research Methodology

The Delphi research methodology is a systematic approach to the collection of informed opinion on a specific topic. It is based on the premise that pooled intelligence enhances professional judgment and captures the collective knowledge of experts. In this case, we propose a traditional Delphi research approach focusing on the prioritization of concepts, skills, and dispositions essential to effective archaeology education in informal science settings. The Delphi research methodology is appropriate for research oriented towards eliciting informed judgment and expert consensus on a specific issue (Beretta, 1996; Green et al., 1999). Originally developed by the Rand Corporation for technological forecasting, Delphi research has been reported in business (Kaynak et al., 1994 Addison, 2003; Ilbery et al., 2004), military defense (Roberts, 1969; Gilbride, 2002), and education (Dailey & Homberg, 1990; Volk, 1993) and has become an increasingly popular research approach in nursing and medicine (Lofmark & Thorell-Ekstrand, 2004). In the field of science education, an innovative application of Delphi methodology investigating ecology and social practice appeared in *BioScience* (Wallington & Moore, 2005). The research results indicated multiple ways of relating scientific theory to public understanding and to science as a social activity. Similar to public conceptions of archaeology, this study informs our understanding of how the public views scientific endeavors. Dr. Michael Brody (1995), principal investigator for this project, reported the use of Delphi research to determine the foundational science concepts, skills, and dispositions related to water education and National Project WET (Water Education for Teachers). The Brody study provided the direction for the development of water education materials that are now popular throughout the United States and in several other countries.

The Delphi research methodology is a structured process that uses an iterative series of questions or rounds to gather information that is continued until group consensus is reached. The popularity of the Delphi research approach is based on the fact that the process allows the anonymous inclusion of a large

number of individuals across diverse locations and expertise and defuses a situation where any expert might dominate the consensus process. Due to the flexible and emergent nature of this research methodology, many modified forms of the strategy have been reported in the literature, leading to an informative critique of its methodological rigor and the necessity for a high degree of methodological precision. In particular, issues related to problem identification, sample selection, and consensus must be addressed. Fortunately, authors have recently addressed these issues in terms of what makes an expert (Baker et al., 2006), stability of expert opinion (Yang, 2003), reliability and generalizability (Hsu & Sandford, 2007), stability of response characteristics (Akins et al., 2005), and anonymity and computer mediated data acquisition (Turoff & Hiltz, 1996). The combined critiques have led to important innovations and subsequent increased methodological rigor of the Delphi research we conducted.

In the process of developing this proposal, problem identification had already occurred through the deliberations of the Project Team in consultation with the Project Expert Advisors and Collaborators. Clearly, archaeology education activities have the potential to be culturally relevant and to promote science learning. In informal learning institutions, however, there is no well-defined national framework that delineates the essential science concepts, skills, and dispositions that can be addressed in informal archaeology education activities. Consequently, we formulated the following three basic research questions:

- What are the essential science concepts, skills and dispositions for effective archaeology education activities in informal learning environments?
- What are the specific cultural and ecological connections with archaeology that can help promote knowledge acquisition, process skills, and development of positive dispositions in science for under-represented populations?
- How can informal science learning professionals effectively incorporate effective archaeology education strategies for under-represented audiences?

The Delphi research methodology addressed these questions by establishing national consensus on a specific set of science teaching and learning standards and benchmarks, guidelines for archaeology education learning materials development, and collaborative inquiry strategies for conducting archaeology education activities in informal science learning environments.

Sample Selection

This study used individuals who have knowledge of the topic and problems being addressed. This type of sample is purposeful and is sometimes referred to as a 'panel of informed individuals' or 'experts.' Like the Project WET Delphi Study (Brody 1995) this project identified experts in science, education, and archaeological resource management to participate in the study. These people were geographically distributed throughout the US and represent expertise in Informal Science Education, Archaeological Science, and Archaeology Education (archaeological resource managers generally have expertise in either science or education). Educators represent the range of informal settings from rural to urban (see Appendix A for list of participants). In consensus research and especially Delphi methodology, the use of experts is fundamental to reliability. Several of the key characteristics considered in sample selection are: knowledge as represented by professional qualifications and publications, experience as represented in years of experience and recognition of practical contributions to archaeological and informal science education, and strategic planning as represented in senior staff and program designers in informal science learning environments (Baker et al., 2006). The Project Team used the snowball technique to find and solicit participants (e.g., Barnard 1994; Yow 2006).

Research Methodology and Data Acquisition Methods

This research project provided an opportunity to confirm the effectiveness of the innovation of applying the Delphi survey through an online forum, instead of the traditional method of mailed-in

responses. Desire to Learn (D2L) was the selected web-based, asynchronous, computer application, which was administered by Montana State University in Bozeman. Through an online Delphi survey participants have an "asynchronous interaction" with other participants (Turoff & Hiltz 1996).

Through three iterated survey rounds, participants were asked a series of questions in order to determine areas of agreement, identify group disagreement, facilitate reconciliation, and finally reach consensus. The research project focused on what was essential archaeological information to convey to an audience in an informal science educational environment. Round One had five open-ended questions for the participants:

1. What is the essential knowledge (concepts, content, principles, themes, theories, etc.) for effective archaeology education activities in informal learning environments?
2. What are the essential science skills (methods and processes) for effective archaeology education activities in informal learning environments?
3. What are the essential science dispositions (attitudes, values, and beliefs) for effective archaeology education activities in informal learning environments?
4. What are the specific social and cultural connections inherent in archaeology that can help promote knowledge acquisition, process skills, and development of positive dispositions for effective archaeology education activities in informal learning environments?
5. What knowledge of specific aspects of ecology is necessary for effective archaeology education activities in informal learning environments?

Participants, who were anonymous to each other, created a discussion thread and/or responded to other participant discussion postings. Round One occurred from November 24, 2009 to December 29, 2009. The extensive initial raw responses were analyzed for themes and patterns, including commonly used key words and phrases. The Project Team created simple statements for Round Two based on the frequency of key words and phrases. The statements were then grouped by general concepts related to archaeology. Although the research project focused on *what* information should be communicated in an informal learning environment, participants also made recommendations for *how* information could be best conveyed with under represented audiences in STEM. The latter responses were not included in Rounds Two and Three but were considered in the National Expert Advisors workshop and the follow up interviews. The idea of collaborative inquiry as an effective teaching and learning strategy was considered throughout the study.

Based on responses from Round One, Round Two consisted of five sets of statements that were listed under the categories of Knowledge, Skills, Dispositions, Culture, and Ecology, with each of these categories constituting a separate survey. -Each survey had up to 25 statements. The statement format was a Likert five-point scale, from *Very Unimportant* to *Very Important*, and participants had to rank each statement accordingly. Participants also had an opportunity to provide optional comments for each statement. Round Two occurred from January 29, 2010 to February 28, 2010 (see Appendix C). The Project Team then reviewed the statement rankings and comments. Based on their feedback, the Project Team kept, modified, or dropped statements for Round Three.

In general, Round Three of a Delphi survey presented the same Likert statements as Round Two, but its purpose was to refine group consensus. There were five online surveys, labeled Knowledge, Skills, Dispositions, Culture, and Ecology; and each survey had up to 23 statements. Unlike Round Two, Round Three did not allow participants the opportunity to provide optional comments after each statement. The third round occurred from March 19, 2010 to April 23, 2010 (see Appendix D for results).

Archaeological Science for All Collaborators' Workshop

The Archaeological Science for All Collaborator's Workshop, in May 2010, provided an opportunity for a panel of experts in informal education to review project results, analyze data from the Delphi survey, make recommendations for consolidating and presenting the Delphi statements, and

provide guidance for future research. All proceedings were captured through various methods including videotape, written notes, flip charts, and still photography.

The general goals of the meeting were to:

- Build a national collaborative working group
- Develop a conceptual framework for future education and research activities
- Develop a plan for implementing effective archaeology education strategies in informal learning settings

Expected meeting outcomes were to:

- Field test selected Delphi statements
- Produce a draft of a research framework and a national plan
- Plan and outline a full development proposal to NSF
- Identify additional collaborators for future projects
- Begin building a national network of ISE professionals

Michael Brody and Helen Keremedjiev introduced the National Expert Advisors and Collaborators to the Delphi survey methodology (see above) and reviewed survey results to date. The National Expert Advisors and Collaborators and members of the Project Team reviewed the survey results using a three-step data analysis procedure. Step One was designed to identify expectations and assumptions about the data. Step Two was guided by four main questions, specifically:

- What important points "pop out"?
- Are there any patterns or trends? Describe.
- What seems surprising or unexpected?
- Is anything missing? Describe.

Step Three provided an opportunity to draw conclusions about the data and formulate hypotheses for further investigation. Participants worked in teams of two on each of the five sets of statements (knowledge, skills, dispositions, culture, and ecology). The analyses were used to address the first two research questions:

1. What are the essential science knowledge, skills, and dispositions for effective archaeology education activities in informal learning environments?
2. What are the specific social and cultural connections with archaeology that can help promote knowledge acquisition, process skills, and development of positive dispositions in science for under-represented populations?

To address research question three (How can informal science learning settings effectively incorporate archaeology education activities for under-represented audiences?) we used brainstorming graphic organizers to help define "underserved" and "under-represented audiences" and to establish the relevance of these concepts for ASFA and ISE. Three questions guided the activity:

- What do I know about under-represented audiences? Use an example, e.g., "Native Americans."
- What do I do about under-represented audiences? For example, "I listen to under-represented audiences."
- What do I feel about under-represented audiences? For example, "I feel naïve about under-represented audiences."

Participants placed a single idea on a single index card and each participant could use as many cards as needed to answer all three questions and express all ideas. Working as a whole group, participants placed their cards on a blank wall in relation to all other cards. Michael Brody used tape to connect ideas similar to form a graphical organization similar to a concept map. The large display of

essential practices, including the emphasis on collaborative inquiry as a learning strategy, served to focus further discussion on the results and conclusions of the study.

Selected Delphi statements were briefly field tested in the Native American hall at the Museum of the Rockies. Groups of three or four workshop participants selected a statement and determined how that statement might be addressed using the exhibits in the Native American hall.

Interviews of Selected Delphi Survey Participants

Telephone interviews with a representative number of the Delphi respondents were conducted to understand and fully investigate the range of needs, opportunities, and new strategies that may not have been revealed in the Delphi survey. Interviewees were selected based on their rich and thoughtful Delphi survey responses in Round One and their known experience with under-represented audiences. Prior to the interview, participants received a letter explaining the interview, the Archaeological Science for All Phase II Abstract, the Delphi survey final statements, and the interview questions. The digitally recorded interview included probes on confirmatory results of the Delphi survey, under-represented audiences, and the collaborative inquiry model in archaeology. Digital audiotapes are on file in the PIs office and the summaries of the interviews found in Appendix F.

Results: Survey Response Rate

A total of 121 people were involved with the first round of the Delphi survey. Round Two had 188 participants, and Round Three had 117 participants. Overall, the response rate was good. *Table One* shows the number of participant responses for each round.

Table One. Participation Numbers and Percentages for each Delphi Survey Round

Survey	Round One*	Round Two#	Round Three^
Knowledge	80 (66%)	84 (72%)	79 (68%)
Skills	60 (50%)	81 (69%)	76 (65%)
Dispositions	57 (47%)	78 (66%)	70 (60%)
Culture	46 (38%)	77 (65%)	76 (65%)
Ecology	52 (43%)	75 (64%)	73 (62%)

(*N = 121; #N = 118; ^N = 117)

As the above table demonstrates that overall there were high response rates for all three rounds. See previous response rates reported in previous Delphi surveys (e.g., Brody 2005; Keeney et al. 2006). Table Two breaks down the participation percentages for each professional association.

Table Two. Participation Numbers and Percentages for each Delphi Survey Round by Professional Association

Round One

Professional Association	Number of Participants	Number and Percentage of Participants who Responded	Number and Percentage of Participants who Did Not Respond	Number and Percentage of Participants who Dropped Out
Scientist/Researcher	35	26 (74%)	6 (17%)	3 (9%)
Resource Manager	29	16 (55%)	13 (45%)	0 (%)
Educator	55	40 (73%)	15 (27%)	0 (%)
All	1	0 (0%)	1 (100%)	0 (%)
Not Categorized	1	1 (100%)	0 (0%)	0 (%)
Total	121	83 (69%)	35 (29%)	3 (2%)

Round Two

Professional Association	Number of Participants	Number and Percentage of Participants who Responded	Number and Percentage of Participants who Did Not Respond	Number and Percentage of Participants who Dropped Out
Scientist/Researcher	32	25 (78%)	7 (22%)	0 (0%)
Resource Manager	30	21 (70%)	9 (30%)	0 (0%)
Educator	55	41 (74%)	13 (24%)	1 (2%)
All	1	0 (0%)	1 (100%)	0 (0%)
Not Categorized	N/A	N/A	N/A	N/A
Total	118	87 (74%)	30 (25%)	1 (1%)

Round Three

Professional Association	Number of Participants	Number and Percentage of Participants who Responded	Number and Percentage of Participants who Did Not Respond	Number and Percentage of Participants who Dropped Out
Scientist/Researcher	32	21 (66%)	11 (34%)	0 (0%)
Resource Manager	30	23 (77%)	7 (23%)	0 (0%)
Educator	54	36 (67%)	18 (33%)	0 (0%)
All	1	0 (0%)	1 (100%)	0 (0%)
Not Categorized	N/A	N/A	N/A	N/A
Total	117	78 (67%)	39 (33%)	0 (0%)

Although the Round One questions asked participants their opinions on *what* information should be taught, many focused on the *how* aspect of teaching archaeological concepts. Many participants provided useful recommendations on how to teach archaeological concepts, but the majority of these respondents ranked certain topics lower than other concepts because they were more concerned about the practicality of teaching than the content of an archaeology lesson. The contributions on how to teach under-represented audiences helped focus discussions on teaching strategies in the National Expert and Collaborators meeting and the selected follow up interviews.

As for reaching consensus on the different statements, the standard deviation for each mean score was minimal overall for responses in Rounds Two and Three (see Appendices C and D). There were no

distinctive tiers for the level of agreement on the statements that indicates general consensus on all the knowledge, skills, disposition, and ecological/cultural statements.

The innovative online version of the Delphi Survey had advantages when compared with the traditional mail survey approach. The online forum provided an opportunity lively discussion between participants that facilitated the extension and elaboration of participant contributions. Unlike the mail survey approach, in this study, participants had extensive discussion among themselves about selected topics. The on-line forum allowed the ASFA Project Team to modify statements based on associated discussions for Round Three. These asynchronous discussion postings about the statements and their ranking provided in depth explanations of the participants' reasoning and the detail of responses enabled the research team to reach a strong consensus on final statements (see Appendix E for final results of survey).

Results: Delphi Survey

The results of the three rounds of the Delphi survey are found in appendices B, C and D. Each round represents a continued progression toward refinement of the statements and increasing consensus on the results. Appendix E contains the final framework of essential archaeological knowledge, skills and dispositions as well as the cultural and ecological connections to archaeology and to ISE.

Results: National Experts and Collaborators Workshop

Major outcomes include:

- Analysis and guidance for consolidating the Delphi statements,
- Refined definition of under-represented populations in ISE and relationship to ASFA
- Confirmation of collaborative inquiry as teaching-learning approach for under-represented audiences in ISE.
- Identification of future research questions especially as they relate to collaborative inquiry.
- Elaborating on the foundational network for ISE in archaeology for under-represented audiences
- Recommendations for completing the ASFA I project research

Based on the recommendations of the National Expert Advisors and Collaborators, the Project Team consolidated the Delphi Round Three statements and organized them into themes and general topic areas. The Final Delphi statements are found in Appendix E.

Results: Interviews of Selected Delphi Participants

In general, we conclude that the results of the Delphi are substantiated and validated by the follow-up interviews. The majority of the interviewees described the results of the Delphi survey as a good framework for informal science education, providing a wide range for of relevant ISE content with an emphasis on public engagement as practiced in the collaborative inquiry model in archaeology. Although the majority of interviewees found the statements to be comprehensive, one participant described the results as adequate. Some omissions within the statements were suggested, including: archaeological dating, qualitative data science processes, enhancing ethnographic pieces, model building, and protection preservation. Suggestions for further work with the statements included refining the statements by creating a schema and developing a set of unifying ideas – a set of enduring understandings of archaeology. As part of the full development proposal we propose a series of CAISE forums to continue discussion and work on the conceptual framework and results of ASFA I.

A common theme throughout the interviews was archaeology's relevance to all people; we all have our past as a relevant connection (see Appendix F for summaries of interviews). Excerpts from interviews on the importance of relevance to under-represented audiences include:

- Relevance is essential to good programming; it is critical to include other worldviews, not just the dominant view.
- Make under-represented audiences' perspective relevant.
- Until science embraces other worldviews, sincerely embraces that under-represented audiences' beliefs are of value and worthy of respect, it will be viewed as just posturing.
- Good archaeology and related effective ISE programming~~,~~ provide~~s~~ a tangible hands-on experience; it draws from many disciplines and facilitates under-represented audiences learning about their history and people.
- There is a social responsibility to provide relevance; have both views incorporated into scientific methodology.
- Show within the museum process the importance of their community, their history. More interest in science will surface due to under-represented audiences' history being relevant.
- Archaeology is unique to other disciplines; its multidisciplinary vantage point places archaeology in a unique position to bridge science and culture to understand a population in cultural terms.

The Collaborative Inquiry Model of Archaeology (CIMA) was heartily endorsed by the majority of interviewees. Representative survey participant and follow-up interviewee comments included:

- "The biggest contribution of this study is the focus on collaborative inquiry. The process of endorsing different backgrounds, valuing what is brought to the table is powerful. It does not require sacrificing archaeological integrity."
- "The use of the model (CIMA) is an ethical imperative. In order to understand, to reach compromise, you have to be collaborative."
- "As a conceptual model, CIMA facilitates an individual thinking about things outside their own current understandings."
- "CIMA is an incredibly powerful tool – a truly collaborative way for developing cultural relevancy, useful materials, and engagement – resulting in better products. Under-represented audiences are more involved."
- "There is a tendency in archaeology – not top down – of being seen as holders, purveyors of knowledge. The dialogue started through this forum (CIMA) would be hugely beneficial; it would not be coming from the same thought processes. It would take into account under-represented audiences, knowledge, skills and views towards science and cultural contexts."

Conclusions

ASFA I results provide a foundation to plan a national strategy for integrating collaborative inquiry within NPA with the general ISE community. The ASFA I Delphi surveys have successfully combined expert information and reached consensus regarding archaeological content skills and dispositions related to teaching science inquiry to under-represented populations. The planning research has proven useful for reconciling disparate viewpoints and coalescing perspectives from geographically dispersed respondents. Results of this comprehensive survey inform the development of a national plan to assist ISE professionals throughout the nation. Our next proposed step, ASFA II: Collaborative Inquiry, will help build capacity and implement collaborative inquiry strategies in ways that are most appropriate for ISE professionals.

NSF planning support has allowed us to engage scientists, educators and ISE professionals in a broad and thoughtful dialog about how resources may be shared, reconcile differing institutional agendas, and develop networks from a common platform of commitment to informal science learning in archaeology and collaborative inquiry. Archaeology is useful to ISE professionals for its ability to provide multidisciplinary science inquiry and culturally relevant education. As such, it offers considerable potential to increase and diversify the participation of public audiences in informal learning. Through the consensus building process, ASFA I helps build a network of informal educators, archaeologists, and museum professionals to distribute research results and to plan, develop, test, and deliver culturally

relevant archaeology education materials and training. Through the Delphi process, we have collaboratively developed an archaeologically based informal science education framework that will guide future ISE teaching and learning.

ASFA I provides a foundation for a national framework to adapt existing NPA materials and/or develop new services and products that meet the needs of informal science educators. Through the NPA network, the research framework will become the focus of professional development for ISE professionals and will inform future programs based on the collaborative inquiry model to better serve under-represented audiences. The combination of science and history learning opportunities made possible through archaeology will increase and diversify attendance by families and youth who seek to understand the contributions of all Americans. Ultimately, new educational projects that blend science and history learning in ways that are attractive to family learners will be developed, and the capacity to attract diverse audiences may be increased.

The primary research deliverable for this project is the Archaeological Research and Education and Framework (AREF) for science education in informal settings and the identification of the collaborative inquiry model as an effective ISE strategy with under-represented audiences. This study concludes that ISE professionals to better serve under-represented audiences can effectively use the ASFA and the collaborative inquiry model. The Archaeological Education and Research Framework and the collaborative inquiry model with under-represented audiences are critical to future professional development in ISE education with under-represented audiences throughout the USA. We propose these innovations for full development in NSF proposal # 1114533.

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Appendices (see attached)

Appendix A: Delphi Participants, associated professional organization and geographic distribution

Appendix B: Round One: A sample of participants' responses.

Appendix C: Round Two: statements, mean scores and standard deviation.

Appendix D: Round Three: statements, mean scores and standard deviation.

Appendix E: Round Three: final combined statements.

Appendix F: Summaries of follow up interviews with selected Delphi Participants

Appendix A

Delphi Participants

last name	first name	email	position	affiliation	State
Adams	Jennifer	jadams@brooklyn.cuny.edu	Assistant Professor	Brooklyn College	NY
Apley	Alice	aapley@rmcres.com	Senior Research Associate	RMC Research Corporation	NH
Applegate	Darlene	darlene.applegate@wku.edu	Associate Professor of Anthropology	Western Kentucky University	KY
Baek	John	john.baek@cience.oregonstate.ed	Assistant Professor	Oregon State University	OR
Bartoy	Kevin	kbartoy@hotmail.com	Cultural Resource Specialist	Washington State Department of Transportation	WA
Breetzke	David	d.breetzke@gaiconsultants.com	Project Manager, Archaeology	GAI Consultants, Inc.	IA
Brown	Jana	brown.jana@gmail.com	Curator of Education	Museum of the Great Plains	OK
Clark	Joelle	Joelle.Clark@nau.edu	Professional Development Coordinator	Northern Arizona University	AZ
Cox	Annemarie	acox@sandiegoarchaeology.org	Program Coordinator	San Diego Archaeological Center	CA
Derry	Linda	cahawba@bellsouth.net	Director	Old Cahawba Archaeological Park	AL
Dixon	Nikki	ndixon@montana.edu	Sec & Adult Educ Spec	Museum of the Rockies	MT
Duncan	Faith	fduncan@fs.fed.us	Tongass National Forest Interpretation & Cons	USDA Forest Service	AK
Fagan	Brian	brian@brianfagan.com	Emeritus Prof of Anthro/Independent Scholar	UC Santa Barbara	CA
Fifield	Terence	tfifield@fs.fed.us	Heritage Program Leader	White Mountain National Forest	NH
Fleming	Ed	efleming@smm.org	Curator of Archaeology	Science Museum of MN	MN
Garr	Robin	Rgarr@brucemuseum.org	Director of Education	Bruce Museum	CT
Giesler	Ron	rgiesler	Director of Travel Programs	St. Louis Science Center	MO
Glass	Margaret	mglass@astc.org	Communications Coordinator for the NISE Net	Association of Science-Technology Centers	DC
Gonzalez Scoll	Edith	Egonzalez@brooklyn.cuny.edu	Adjunct Assistant Professor	Brooklyn College	NY
Handron	Kerry	HandronK@CarnegieMNH.Org	Earth Theater Director	Carnegie Museum of Natural History	PA
Harper	Caprice 'Kip'	kharper@swca.com	Project Manager, Cultural Resources	SWCA Environmental Consultants	CA
Haury-Arts	Cherie	cherie-hauryartz@uiowa.edu	Archaeological Technician/Faunal Analyst	U of IA, Office of the State Archaeologist	IA
Henderson	Gwynn	aghend2@uky.edu	Staff Archaeologist & Education Coordinator	Kentucky Archaeological Survey	KY
Hunter	Charlotte	Charlotte_Hunter@blm.gov	Deputy Preservation Officer (State Arch)	CA State Office, Dept of Interior, BLM	CA
Ishihara	Reiko	ishiharar@doaks.org	Post-doctoral Assoc in Maya Studies	Dumbarton Oaks Research Library and Collection	DC
Jefferies	Richard	rwjeff1@uky.edu	Associate Professor	U of KY Department of Anthropology	KY
Jones	James	rjones@dnr.IN.gov	State Archaeologist	Indiana Department of Natural Resources	IN
Kelly	Robert	RLKELLY@uwyo.edu	Professor	University of Wyoming	WY
Kirendall	Melissa	kirkenda@hawaii.edu	Archaeologist; part-time Professor	Pacific Legacy Inc., U of HI Manoa	HI

last name	first name	email	position	affiliation	State
Knotts	David	dknotts@lindenwood.edu	Dean & Prof, School of American Studies	Daniel Coone Campus and Historic Site	MO
Korn	Randi	korn@randikorn.com	Founding Director	Randi Korn & Assoc - mus prog & exhib evaluator	VA
Kress	Tanya	Tanya.kress@dcr.nh.gov	Historical Archaeologist, NH Proj Arch Coor	State of NH Div of Hist Res	NH
Ledwell	Sandy	sledwell@alsde.edu	Science Administrator	AL Department of Education	AL
Logan	Lloyd	Lloyd.logan@ceu.edu	Director of Education	College of Eastern Utah Prehistoric Museum	UT
Mallin	Alison	amillin@northmuseum.org	Collections Manager	North Museum of N H and Science	PA
Marino	Margie	mmarino@northmuseum.org	Executive Director	North Museum of N H & Science	PA
Martell	Sandra	smartell@uwm.edu	Assist Prof of Learning & Development	U of WI Milwaukee	WI
Maxwell	Peggy	pamaxwel@access.k12.wv.us	Educator	University High School	WV
McBride	Kim	kim.mcbride@uky.edu	Co-Director	Kentucky Archaeology Survey, U of KY	KY
McReynolds	Theresa	temcre@email.unc.edu	K-12 Public Outreach Assistant	Research Lab of Archaeology, U of NC Chapel Hill	NC
Melber	Leah M.	lmelber@lpzoo.org	Dir of Student & Teacher Programs	Lincoln Park Zoo	IL
Miller	Donald	Fortancientpoints@yahoo.com	Laboratory Director/Artifact Analyst	Gray & Pape, Inc.	OH/KY
Miller	Sarah	semiller@flagler.edu	Public Archaeologist/Regional Director	Florida Public Archaeology Network	FL
Munson	Cheryl	munsonc@indiana.edu	Research Scientist	Indiana University - Bloomington	IN
Nugent	Jill	jnugent@unt.edu	Faculty, Natural Science	Western Governors University; PhD student U of N TX	TX
Perdikaris	Sophia	SophiaP@brooklyn.cuny.edu	Associate Professor	Brooklyn College	NY
Pickhardt	Irene	Irene.Pickhardt@tea.state.tx.us	Assistant Director for Science	Texas Education Agency	TX
Pollack	David	david.pollack@uky.edu	Director	Kentucky Archaeological Survey	KY
Poole	Meredith	mpoole@cwf.org	Staff Archaeologist	Colonial Williamsburg Foundation	VA
Renoe	Susan	sdrenoe@yahoo.com	past Project Archaeology coordinator MO	N/A; public archaeology area of expertise	MO
Rood	Ronald	rrood@utah.gov	Assistant State Archaeologist for Utah	Utah Division of State History - Antiquities Section	UT
Runburg	Madlyn	mrunburg@umnh.utah.edu	Director of School Programs	Utah Museum of Natural History	UT
Schrader	Valeska	vschrader@access.k12.wv.us	Educator	Collins Middle School	WV
Schwendler	Rebecca	rebecca_schwendler@nthp.org	Public Lands Advocate	National Trust for Historic Preservation	
Sharp	Bill	bill.sharp@ky.usda.gov	Cultural Resources Specialist/Archaeologist	USDA Natural Resources Conservation Service	KY
Shibata	Hi'ilani	hshibata@bishopmuseum.org	Education Operations Manager	Bishop Museum	HI
Smith	George	gsmith4790@comcast.net	Archaeologist -Adjunct Professor	1/10 Florida State University	FL
Stahlgren	Lori	lori.stahlgren@ky.gov	Archaeology Review Coordinator	Kentucky Heritage Council	KY
Stimmer	Maryann	mstimmer@aed.org	Coor STEM Programs	Educational Equity Center @ AED	NY

last name	first name	email	position	affiliation	State
Wakely	Gillian	gwwakely@sas.upenn.edu	Director of Education	U of PA Museum of Arch and Anthro	PA
Walter	Charlie	cwalter@fwmsh.org	VP of Programs	Fort Worth Museum of Science and History	TX
Wesler	Kit	kit.wesler@murraystate.edu	Professor Archaeology	Murray State University	KY
Whitworth	Christi	cwhitworth@pari.edu	Education Director	Pisgah Astronomical Research Institute	NC
Wulfkuhle	Virginia	vwulfkuhle@kshs.org	Public Archaeologist	Kansas State Historical Society	KS
Young	Denise	dlyoung@email.unc.edu	Director of Education and Planning	Morehead Planetarium and Science Center	KY
Zimmerman	Heather	heather@psu.edu	Assist Prof Education	Penn Stat U	PA

Appendix B

Example of Round 1
Participants' Discussion Postings

Appendix B: A Sample of Participants' Responses from Round One of the Delphi Survey

Round One: Skills		
Discussion Thread	**Participant No.**	**Response**
Archaeology and Scientific Literacy	Participant 033	I think that for middle school-age learners and younger, the specific methods professional archaeologists use are not as important as the basic ideas of science, namely, the scientific method, classification, measurement, basic statistical concepts, observation vs. inference, the connection between questions and methods, and so forth. These basics underlie all the specific methods professionals use, and are essential for general scientific literacy, regardless of whether a student goes into archaeology, or even a scientific career.
	Participant 029	These ideas apply to all science of course, not just to archaeology, and rather than teach methods perhaps we should just teach what "systematic research" really means -- which can be applied to any endeavor.
	Participant 089	I second the importance of teaching students (middle school and younger) how to apply the scientific method, problem solving, critical thinking, etc. to non-traditional science subjects such as archaeology (or anthropology, history, social sciences). Observation, inference, research, analyzing, surveying, mapping, all of these skills allow students to develop invaluable skills at critical thinking, something they will need as they continue their education.
	Participant 050	I agree with all these comments on scientific literacy. Different ages will be able to understand different parts of the scientific process, however, we can teach the basics of scientific inquiry, hypothesis, discovery, measurements, etc at any stage. Some of the basic questions I get in informal settings include: How do you know where to dig? How does survey allow you to find things? I always talk about the basic methods of discovery and processing that discovery in the context of survey or excavation and the majority of students understand these concepts.
	Participant 085	I think that archaeology is a natural fit to explain scientific literacy, as long it we focus on the scientific process rather than just doing things to do things as in demonstrations. We should look at the process of how archaeology can answer questions.

Appendix C

Delphi Round 2 Results

In the following tables,
the numbers under the column
"Response Distribution"
are defined as:

1 = Very Unimportant
2 = Unimportant
3 = Neutral
4 = Important
5 = Very Important

Round Two: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K6	Archaeology is more than just digging	1	0	0	6	77	84	4.88	0.50072
K7	Archaeology involves considering the context of artifacts.	0	0	2	11	71	84	4.82	0.44345
K1	Archaeology is multi-disciplinary.	0	1	4	9	70	84	4.76	0.59352
K4	Through a systematic, scientific process, archaeologists study the past through physical remains.	0	1	6	19	58	84	4.60	0.67875
K19	Archaeological interpretations are subject to change due to new data, theories, methods, and perspectives.	0	0	6	22	56	84	4.60	0.62323
K23	When sites are destroyed and artifact contexts are lost our ability to study and comprehend the past is lost.	0	0	3	23	57	83	4.60	0.55069
K3	Archaeology is both a scientific and humanistic approach to understanding past cultures.	0	0	7	30	47	84	4.48	0.64893
K14	Material culture is a tool for understanding people of the past.	1	0	5	32	46	84	4.45	0.71818
K25	Archaeologists must consider state and federal laws that protect archaeological resources.	0	2	9	25	48	84	4.42	0.77938
K11	Archaeology is global, and encompasses the deep past to recent history.	0	0	11	28	45	84	4.40	0.71337
K12	Archaeology encompasses both our own and others' cultures.	0	0	12	27	45	84	4.39	0.72839

Round Two: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K17	Archaeology provides a temporal perspective on the relationship between humans and the environment.	1	0	8	37	38	84	4.32	0.74705
K5	Archaeology is democratic; it is not only about the "lifestyles of rich, famous, white males.	1	4	12	20	47	84	4.29	0.96407
K8	Archaeology can be destructive.	0	0	15	32	37	84	4.26	0.74638
K10	Archaeology is one way of understanding the past.	0	1	11	38	34	84	4.25	0.72602
K15	The archaeological record is both disappearing and being created.	1	0	10	42	31	84	4.21	0.74561
K18	There are a lot of gaps and missing pieces in the archaeological record.	0	0	13	40	31	84	4.21	0.69545
K16	Archaeology studies change through time and across space.	1	1	18	34	30	84	4.08	0.85318
K9	Archaeologists reconstruct the past based on available data.	2	2	13	34	32	83	4.06	0.92410
K2	Archaeology is a subfield of anthropology.	1	5	19	27	32	84	4.00	0.98176
K20	Archaeologists can come to equally acceptable but different conclusions with the same data.	2	1	20	36	25	84	3.96	0.89774
K13	Archaeology reveals social inequality, and provides a way to think through the implications for how people treat each other.	0	4	25	33	21	83	3.81	0.85729

Round Two: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K21	Archaeological interpretations are ethnocentric.	3	6	41	23	11	84	3.39	0.93161
K24	The majority of archaeology conducted in the United States is done for mitigation purposes.	3	9	38	23	11	84	3.36	0.96496
K22	Archaeologists use special methods to learn important information about past peoples that they could not have known through historical documents, oral traditions, or artifacts out of context.	2	0	5	32	45	84	4.40	0.80838

Round Two: Skills									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
S1	Scientific methods and inquiry skills are essential.	0	0	4	14	63	81	4.7300	0.5480
S8	Archaeologists use systematic methods for excavating a site.	0	0	5	16	60	81	4.6800	0.5895
S14	Archaeologists conduct laboratory analyses and write reports.	0	0	3	21	57	81	4.6700	0.5477
S15	Data gathering, recording, and data analysis are important steps in archaeology.	0	0	4	21	56	81	4.6400	0.5768
S7	Archaeologists use a variety of field techniques, including mapping, dating methods, and applying non-invasive technologies.	0	1	3	24	53	81	4.5900	0.6281
S6	Archaeology encourages critical thinking.	0	0	5	25	51	81	4.5700	0.6111
S9	Observational skills are important.	0	1	3	26	51	81	4.5700	0.6312
S5	Archaeology requires teamwork.	0	1	8	23	49	81	4.4800	0.7265
S12	Archaeologists use stratigraphy and superposition to interpret data.	0	1	7	27	46	81	4.4600	0.7080
S18	While focusing on detailed data, it is important for archaeologists to think about the larger context.	0	1	11	21	48	81	4.4300	0.7736
S10	Dating methods are important in archaeology.	0	0	8	35	38	81	4.3700	0.6604
S3	Archaeologists consider the validity and reliability of the data.	0	0	12	28	41	81	4.3600	0.7299
S13	Archaeologists use ethnographic information in their interpretations.	0	0	5	46	30	81	4.3100	0.5834
S17	Classification is an important skill in archaeology.	0	2	11	36	32	81	4.2100	0.7700

Round Two: Skills									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
S4	Archaeologists do not excavate an entire site, but leave some of it for new technologies and future generations to study.	0	2	18	29	32	81	4.1200	0.8424
S11	Archaeologists use mathematics and statistics.	0	0	17	37	27	81	4.1200	0.7311
S16	Archaeologists make comparisons within and between data sets.	1	0	15	38	27	81	4.1100	0.7906
S2	Through scientific processes and imagination we can understand past ways of life.	2	1	15	32	31	81	4.1000	0.9734

Round Two: Dispositions									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
D11	The public has a role in preserving archaeological sites.	0	0	1	18	59	78	4.7400	0.4681
D8	Preserving archaeological sites is important.	0	0	2	20	56	78	4.6900	0.5174
D9	Archaeological sites are non-renewable.	0	0	5	15	58	78	4.6800	0.5920
D23	Archaeological knowledge should be accessible to the public.	0	0	3	20	55	78	4.6700	0.5505
D15	It is important to preserve archaeological sites and refrain from illegal artifact collecting.	0	0	4	13	60	77	4.6700	0.5534
D10	Stewardship is important.	0	1	2	20	54	77	4.5900	0.6019
D17	Archaeologists must be ethical when dealing with the public.	0	1	12	7	58	78	4.5600	0.7992
D14	Archaeological ethics are essential for participating in archaeological experiences.	1	1	7	16	53	78	4.5300	0.8174
D18	Open-mindedness to cultural beliefs and values is important.	1	1	4	18	53	77	4.5100	0.7683
D5	Archaeological sites can connect people to the historical development of a community.	0	0	3	35	40	78	4.4700	0.5749
D7	Archaeology is everywhere, not only in the "preserved places."	0	1	6	26	45	78	4.4700	0.6974
D1	Archaeology is relevant to peoples' own history.	0	0	9	29	40	78	4.4000	0.6902
D4	Preservation of artifacts through curation is important.	0	0	7	31	40	78	4.4200	0.6550
D24	Artifacts have different values for different peoples.	1	0	11	30	36	78	4.2800	0.8042

Round Two: Dispositions									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
D2	Archaeology is socially relevant.	0	1	12	32	33	78	4.2400	0.7591
D6	Archaeology is relevant for all cultural groups.	0	2	17	24	35	78	4.1800	0.8641
D21	Archaeologists believe that knowledge about the past is valuable.	1	2	15	22	37	77	4.1400	0.9324
D3	The commonality of the human condition is important in archaeology.	0	2	19	24	33	78	4.1300	0.8733
D16	If someone discovers an archaeological find, he/she needs to report it to a local professional (e.g., museum, college faculty member, or government agency).	1	2	16	29	30	78	4.0900	0.9000
D19	Archaeologists have a curiosity and desire to learn about the past.	2	5	13	27	31	78	4.0300	1.0316
D22	Having an objective attitude about the past is important.	1	6	19	24	28	78	3.9200	1.0164
D13	Cultural heritage conservation is related to environmental conservation.	0	4	23	28	23	78	3.9000	0.8914
D12	The preservation of cultural heritage ensures that a community's character is protected.	2	2	25	25	24	78	3.8600	0.9767
D20	Archaeologists have a personal desire to connect with the past.	6	10	34	16	12	78	3.2300	1.1040

Round Two: Culture									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
C5	When working with indigenous communities, archeologists must acknowledge and respect their views.	0	0	3	10	64	77	4.7900	0.4957
C4	Many ancient cultures have present-day living descendants.	1	0	5	25	46	77	4.4900	0.7367
C1	Cultures are fluid and ever-changing over time.	0	0	9	26	42	77	4.4300	0.6964
C6	Archaeologists value diverse cultural perspectives, including indigenous beliefs.	1	0	4	32	40	77	4.4300	0.7150
C3	People within the same "cultural group" do not necessarily have the same beliefs and opinions.	0	1	8	26	42	77	4.4200	0.7318
C11	People from different cultural backgrounds may have different interpretations of the archaeological record.	0	0	8	35	34	77	4.3400	0.6612
C2	It is important to stress our common humanity.	0	1	12	25	39	77	4.3200	0.7854
C14	Different cultural backgrounds and experiences bring with them new ways of looking at the past and a new set of questions within which data can be examined or reexamined.	0	2	6	36	33	77	4.3000	0.7267
C16	People have a variety of interests and stakes in the past; and sometimes these may conflict with each other.	0	0	9	39	29	77	4.2600	0.6570
C7	Cultural relativism requires understanding each culture on its own terms.	1	0	10	33	33	77	4.2600	0.7845
C13	Archaeology has a role in giving a voice to otherwise voiceless segments of the population.	1	2	11	26	37	77	4.2500	0.8908

Round Two: Culture									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
C10	Archaeological interpretations have political and social consequences.	1	0	16	28	32	77	4.1700	0.8492
C8	Various groups have different interests in archaeological resources.	0	2	10	39	26	77	4.1600	0.7445
C15	Archaeologists do not have exclusive rights to the interpretation of archaeological resources.	1	4	8	34	30	77	4.1400	0.8990
C12	Multi-vocality leads to more dialogue between different groups of people involved in or affected by archaeology.	2	1	17	30	27	77	4.0300	0.9315
C9	Archaeology impacts contemporary society.	2	2	21	26	26	77	3.9400	0.9779

Round Two: Ecology									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
E3	Humans interact with the environment and these activities affect both human and environmental conditions.	0	0	3	25	47	75	4.5900	0.5717
E10	There has been a dynamic interplay between humans and their environment for a very long time.	0	0	2	28	45	75	4.5700	0.5495
E16	Archaeobotanical and faunal analyses contribute to understanding how the environment changes.	0	0	8	22	45	75	4.4900	0.6852
E6	Cultural factors influence how people use an available resource.	0	1	6	33	35	75	4.3600	0.6905
E5	Different cultures view landscape and environment in different ways.	0	1	6	35	33	75	4.3300	0.6845
E12	Information about how humans used plants and animals is important.	0	1	9	29	36	75	4.3300	0.7413
E13	The environment is dynamic and may influence culture.	0	0	8	35	32	75	4.3200	0.6609
E9	Humans are flexible, resilient, and adaptable and therefore can live in a variety of environments.	0	1	10	29	35	75	4.3100	0.7529
E11	Humans need to know their environment in order to obtain resources and survive.	0	2	11	29	33	75	4.2400	0.8027
E21	How past groups used their environments helps make connections to present-day environmental issues.	0	1	13	33	28	75	4.1700	0.7600
E15	Comparison of past and present ecosystems of the same region is important.	0	1	14	32	28	75	4.1600	0.7718
E19	Archaeological research on past human responses to ecological changes helps us understand climate change and present-day responses to it.	0	2	19	23	31	75	4.1100	0.8788

Round Two: Ecology									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
E2	Archaeological information about how past societies dealt with human and ecological issues (e.g., poverty, health care, climate change, war) can provide constructive solutions for today's problems.	0	3	15	31	26	75	4.0700	0.8436
E17	Examining contemporary ecological issues in terms of archaeology can inform policy-makers.	0	2	19	26	28	75	4.0700	0.8595
E14	Consideration of seasonality is important in archaeology.	0	2	20	25	28	75	4.0500	0.8683
E4	Cultural systems are contained within the broader context of the ecosystem.	0	3	16	28	27	74	4.0100	0.8653
E18	Ecological interrelationships that supported human survival in the past inform us about critical contemporary interrelationships.	0	4	21	22	28	75	3.9900	0.9371
E20	Archaeology shows potential responses and solutions to contemporary ecological issues.	0	4	22	22	27	75	3.9600	0.9364
E7	Analyzing trade-related artifacts is one way to show ecological connections in the archaeological record.	0	4	25	29	17	75	3.7900	0.8589
E8	Human advancement in technology and culture were shaped by the environment.	2	4	24	25	20	75	3.7600	0.9978
E1	No "natural" environments exist today, because of past human activities.	3	5	33	19	15	75	3.5100	1.0184

Appendix D

Delphi Round 3 Results

**In the following tables,
the numbers under the column
"Response Distribution"
are defined as:**

1 = Very Unimportant
2 = Unimportant
3 = Neutral
4 = Important
5 = Very Important

Round Three: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K1	Archaeology is multi-disciplinary.	2	1	4	15	57	79	4.3205	0.6931
K7	Archaeology involves considering the context of artifacts.	1	0	1	15	62	79	4.2949	0.6265
K6	Archaeology is more than just digging.	2	0	0	18	59	79	4.2564	0.7105
K22	When sites are destroyed and artifact contexts are lost our ability to study and comprehend the past is diminished or lost.	1	0	1	21	56	79	4.2308	0.5907
K21	Archaeologists learn important information about past peoples that they could not have known through historical documents, oral history, or artifacts out of context.	1	0	3	19	56	79	4.2308	0.6014
K12	Archaeology encompasses both our own and others' cultures.	1	0	5	33	40	79	4.1923	0.5824
K14	The study of material culture is a tool for understanding people of the past.	1	0	3	35	40	79	4.1795	0.5523
K4	Through a systematic, scientific process, archaeologists study the past through physical remains.	1	2	1	26	49	79	4.1410	0.6184
K19	Archaeological interpretations are subject to change due to new data, theories, methods, and perspectives.	1	1	6	26	45	79	4.1410	0.6391

Round Three: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K11	Archaeology is global, and encompasses the deep past to recent history.	1	0	6	38	34	79	4.1282	0.5666
K23	Archaeologists must follow state and federal laws that protect archaeological resources.	2	0	6	26	45	79	4.1282	0.7091
K8	Archaeology can be destructive.	1	2	11	36	29	79	4.1154	0.5807
K17	Archaeology provides a temporal perspective on the relationship between humans and the environment.	1	1	5	37	35	79	4.0897	0.6280
K3	Archaeology is both a scientific and humanistic approach to understanding past cultures.	1	0	12	36	30	79	4.0769	0.6184
K2	Archaeology is a subfield of anthropology.	1	6	21	22	29	79	4.0769	0.6400
K15	The archaeological record is both disappearing and being created.	2	1	11	37	28	79	4.0513	0.5788
K9	Archaeologists reconstruct the past based on available data.	1	2	12	37	27	79	4.0385	0.5685
K10	Archaeology is one way of understanding the past.	2	4	9	36	28	79	4.0256	0.6441
K16	Archaeology studies change through time and across space.	1	3	16	32	27	79	4.0128	0.6344
K18	There are a lot of gaps and missing pieces in the archaeological record.	1	1	13	37	27	79	4.0000	0.6447
K5	Archaeology is democratic; it is not only about the “lifestyles of rich, famous, white males.”	3	2	12	32	30	79	3.9487	0.7542

Round Three: Knowledge									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
K13	Archaeology can reveal social inequality and provide a way to think through the implications for how people treat each other.	2	6	11	35	25	79	3.9231	0.6982
K20	Archaeologists can come to equally acceptable but different conclusions with the same data.	4	2	14	39	20	79	3.9231	0.8021

Round Three: Skills									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
S5	Observational skills and critical thinking are important for archaeological studies.	1	1	0	23	51	76	4.4400	0.4997
S1	Scientific methods and inquiry skills are essential.	1	0	3	23	49	75	4.4324	0.5510
S7	Archaeologists use systematic methods for excavating a site.	1	0	2	26	47	76	4.3200	0.5492
S12	Archaeologists conduct laboratory analyses and write reports.	1	0	6	26	43	76	4.3200	0.6401
S4	As a multidisciplinary field, archaeology requires teamwork.	1	2	8	25	40	76	4.3067	0.5689
S6	Archaeologists use a variety of field techniques, including mapping, dating methods, and applying non-invasive technologies.	1	1	5	27	42	76	4.2800	0.6054
S13	Data gathering, recording, and analysis are important steps in archaeology.	1	0	5	24	46	76	4.2800	0.6690
S2	Through scientific processes we can begin to understand past ways of life.	2	0	8	33	33	76	4.2400	0.5891
S15	While focusing on detailed data, it is important for archaeologists to think about the larger context.	2	0	6	25	43	76	4.2400	0.6944

Round Three: Skills									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
S3	Archaeologists consider the validity and reliability of the data.	1	1	8	34	32	76	4.2267	0.5346
S10	Archaeologists use stratigraphy and superposition to interpret data.	2	0	5	36	33	76	4.2267	0.6488
S14	As a process of scientific inquiry, classification is an important skill in archaeology.	3	3	16	30	24	76	4.1200	0.6359
S11	Archaeologists use ethnographic information in their interpretations.	1	1	12	37	25	76	4.0800	0.6316
S8	Applying a variety of dating methods is important in archaeology.	1	3	17	33	22	76	4.0533	0.6554
S9	As part of the scientific process archaeologists use mathematical and statistical methods in data analysis.	2	3	24	31	16	76	3.9467	0.7333

Round Three: Dispositions									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
D14	It is important to refrain from illegal artifact collecting from archaeological sites.	1	0	1	10	58	70	4.7681	0.6218
D17	The public has a role in preserving archaeological sites.	1	0	0	19	50	70	4.6812	0.6300
D9	Archaeological sites are non-renewable.	1	0	4	13	52	70	4.6522	0.7241
D7	Archaeological sites are in many locations other than national parks and protected places.	1	0	5	16	48	70	4.5942	0.7340
D8	Preserving archaeological sites is important.	1	0	1	25	43	70	4.5652	0.6747
D10	Community and individual stewardship of archaeological sites are important.	1	0	2	24	43	70	4.5507	0.6974
D21	Archaeological knowledge should be accessible to the public.	1	0	3	24	42	70	4.5217	0.7197
D18	Open-mindedness to cultural beliefs and values is important.	1	2	3	19	45	70	4.4928	0.8335
D16	Archaeologists must use professional ethics when dealing with the public.	1	1	6	17	45	70	4.4783	0.8333

Round Three: Dispositions									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
D13	Professional ethics are essential for participating in archaeological experiences.	1	2	6	17	44	70	4.4348	0.8825
D6	Archaeology can be relevant for all cultural groups.	1	2	5	21	41	70	4.4203	0.8644
D1	Archaeology is relevant to peoples' history.	1	0	6	27	36	70	4.3913	0.7711
D5	Archaeological sites can connect people to the historical development of a community.	1	1	4	29	35	70	4.3768	0.7878
D2	Archaeology can be socially relevant in today's world.	1	0	7	26	36	70	4.3623	0.7854
D3	Archaeology informs us about the past human conditions and how those relate to our present conditions within society, culture, and the world.	1	1	4	29	35	70	4.3623	0.7854
D22	Artifacts have different values for different peoples.	1	1	7	28	33	70	4.3043	0.8279
D4	Preservation of artifacts through curation is important.	1	0	5	37	27	70	4.2754	0.7253
D19	Archaeologists value knowledge about the past.	1	1	12	23	33	70	4.2174	0.8890

Round Three: Dispositions									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Statement Number**
		1	**2**	**3**	**4**	**5**			
D11	The preservation of cultural heritage helps ensure that a community's identity is protected.	2	0	12	26	30	70	4.1594	0.9175
D12	Cultural heritage conservation is related to environmental conservation and historic preservation.	1	2	11	31	25	70	4.0870	0.8701
D15	All archaeological finds should be reported to the appropriate governing agencies.	2	2	11	35	20	70	3.9710	0.9070
D20	In archaeology objectivity about the past is essential.	2	3	16	23	26	70	3.9565	1.0209

Round Three: Culture									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
C5	When working with indigenous communities, archeologists must acknowledge and respect their views.	1	1	4	21	49	76	4.5333	0.7769
C6	Archaeologists should value diverse cultural perspectives, including indigenous beliefs.	1	1	5	19	50	76	4.5200	0.7946
C4	Many ancient cultures have present-day living descendants.	1	0	5	30	40	76	4.4267	0.7384
C12	Archaeology can provide information on under-represented populations in the archaeological record.	1	1	3	32	39	76	4.4133	0.7550
C1	Cultures are fluid and ever-changing over time.	1	2	6	26	41	76	4.3600	0.8485
C2	It is important to stress our common humanity.	1	2	6	28	39	76	4.3333	0.8436
C11	People from different cultural backgrounds may have different interpretations of the archaeological record.	1	2	8	30	35	76	4.2667	0.8595
C3	People within the same culture do not necessarily have the same beliefs and opinions.	1	3	6	33	32	75	4.2297	0.8687

Round Three: Culture									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
C7	Archaeology requires understanding each culture on its own terms.	1	3	7	32	33	76	4.2133	0.8745
C13	Different cultural and social backgrounds provide diverse ways of looking at the past, and inform new sets of questions.	2	2	6	35	31	76	4.2000	0.9005
C10	Archaeological interpretations can have political and social consequences.	1	4	11	29	31	76	4.1200	0.9438
C16	Different cultural views and experiences give us a more holistic view of the society or culture being examined.	3	1	12	27	33	76	4.1200	0.9995
C14	Archaeologists provide an informed perspective that significantly contributes to the interpretation of archaeological resources.	2	4	9	30	31	76	4.1067	0.9942
C9	Results of archaeological studies can influence contemporary society.	2	1	10	39	24	76	4.0800	0.8662
C15	People have a variety of interests and stakes in the past; and sometimes these may conflict with each other.	2	2	11	34	27	76	4.0800	0.9265
C8	Diverse groups have a variety of interests in archaeological resources.	2	2	12	33	27	76	4.0667	0.9348

Round Three: Ecology									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
E9	There has been a dynamic interplay between humans and their environment for a very long time.	1	1	2	21	48	73	4.5694	0.7473
E2	Humans interact with the environment and these activities affect both human and environmental conditions.	2	0	4	23	44	73	4.4583	0.8381
E11	Information about how humans used plants and animals is important.	1	1	2	34	35	73	4.3889	0.7422
E15	Archaeobotanical and faunal analyses contribute to understanding how the environment changes.	1	0	5	32	35	73	4.3750	0.7400
E4	Different cultures view landscape and environment in different ways.	1	1	7	32	32	73	4.2778	0.8088
E5	Cultural factors influence how people use an available resource.	2	1	5	32	33	73	4.2778	0.8757
E10	Humans need to know their environment in order to obtain resources and survive.	1	0	8	33	31	73	4.2778	0.7732
E12	The environment is dynamic and influences culture.	1	1	6	37	28	73	4.2500	0.7645

Round Three: Ecology									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
E8	Humans are flexible, resilient, and adaptable and therefore can live in a variety of environments.	2	0	7	33	31	73	4.2500	0.8517
E14	Comparison of past and present ecosystems of the same region is important.	1	0	8	39	25	73	4.1944	0.7438
E19	How past groups used their environments helps make connections to present-day environmental issues.	2	1	10	30	29	72	4.1690	0.9100
E1	Archaeological information about how past societies dealt with human and ecological issues can provide constructive perspectives for today's problems.	3	1	10	29	29	73	4.1268	0.9846
E3	Cultural systems are contained within the broader context of the ecosystem.	4	1	13	29	26	73	4.0139	1.0413
E7	Human adaptation in technology and culture are shaped by the environment.	3	1	7	44	18	73	4.0000	0.8881
E18	Archaeology can inform potential responses and solutions to contemporary ecological issues.	2	3	14	29	25	73	4.0000	0.9786

Round Three: Ecology									
Statement Number	**Statement**	**Response Distribution***					**Participant Numbers**	**Mean Score**	**Standard Deviation**
		1	**2**	**3**	**4**	**5**			
E16	Examining contemporary ecological issues in terms of archaeology could inform policy-makers.	4	1	14	30	24	73	3.9444	1.0466
E6	Analyzing trade-related artifacts is one way to show ecological and cultural connections in the archaeological record.	1	3	17	32	20	73	3.9167	0.8999
E13	Consideration of seasonality is important in archaeology.	1	2	18	34	18	73	3.9167	0.8517
E17	Ecological interrelationships that supported human survival in the past inform contemporary interrelationships.	2	4	11	39	17	73	3.9028	0.9217

Appendix E

Final Delphi Survey Results

Archaeological Research and Education Framework

Knowledge

Multi-Disciplinary Nature of Archaeology
Archaeology is a multi-disciplinary approach to understanding the human past.
Archaeology is global, and encompasses the deep past to the recent history of different cultures, including our own.
Archaeology, as a subfield of anthropology, incorporates both scientific and humanistic approaches to understand past cultures.
General Knowledge Statements
The archaeological record is both disappearing and being created; therefore, there are a lot of gaps and missing pieces in the archaeological record.
Archaeology is governed by state and federal laws that protect archaeological resources.
Archaeology studies change through time and across space.
Archaeology is democratic; it can reveal social inequality and provide a way to think through the implications for how people treat each other.
Systematic Study of Evidence
Archaeology involves considering the context of artifacts.
Archaeology studies the past through physical remains using a systematic, scientific process.
When sites are destroyed and artifact contexts are lost, our ability to study and comprehend the past is diminished or lost.
Archaeology can be destructive.
Interpretation of the Archaeological Record
Archaeologists learn important information about past peoples that they could not have known through historical documents, oral history, or artifacts out of context.
Archaeological interpretations are subject to change due to new or available data, theories, methods, and perspectives from a variety of sources.
Archaeology provides a temporal perspective on the relationship between humans and the environment.

Archaeology can lead to equally acceptable but different conclusions with the same data.

Skills

Science Processes
Scientific methods, critical thinking, and inquiry skills including observation, inference, and classification, are essential in archaeology.
Data gathering, recording, and analysis are important steps in archaeology.
Mathematical and statistical methods in data analysis are important scientific processes in archaeological research.
Validity and reliability of archaeological data are important considerations for analyses.
Archaeological excavation of a site requires systematic methods.
Laboratory analyses and reports are important steps in archaeology.
Archaeological practice uses a variety of field techniques, including non-invasive technologies.
Stratigraphy and superposition are important for interpreting archaeological data.
Multi-Disciplinary Nature of Archaeology
As a multidisciplinary discipline, archaeology requires teamwork.
Through scientific processes, archaeological research can begin to understand past ways of life in a larger context.
Using ethnographic information can be important in archaeological interpretations.

Dispositions

Ethics
Archaeological ethics, both professional and personal, are essential for participating in archaeological experiences.
In archaeological practice, objectivity about the past should be essential.
Cultural Connections/Relevance
Being open-minded to different cultural beliefs and values should be an important part of archaeological practice.
Archaeology should be relevant for all cultural groups and their histories.
Archaeological sites can connect living people to the historical development of a community.
Archaeology informs us about the past human conditions and how those relate to our present conditions within society, culture, and the world.
Artifacts have different values for different peoples.
The preservation of cultural heritage helps ensure that a community's identity is protected.
Archaeological knowledge should be accessible to the public.
Protection and Preservation
Archaeological sites are non-renewable and should be protected.
Archaeological sites are in many locations other than national parks and protected places.
Preservation of artifacts through curation is important.
Cultural heritage conservation is related to environmental conservation and historic preservation.
Communities and individuals have an important role in the stewardship and preservation of archaeological sites.

Culture

Knowledge Statements Culture
Cultures are fluid and ever-changing over time.
People from different cultural backgrounds or even from the same cultural backgrounds may interpret the archaeological record differently.
Many ancient cultures have present-day living descendants.
Knowledge Statements Archaeology
The archaeological record can provide information about past populations who have typically been underrepresented in historical accounts.
Archaeological practice requires understanding each culture on its own terms.
Value Statements
Archaeological practice should value diverse cultural perspectives, including indigenous beliefs.
It is important to stress our common humanity in archaeological research.
People have a variety of interests and stakes in the past; and sometimes these may conflict with each other.
Inter-Disciplinary Statements
Different cultural and social backgrounds provide diverse ways of looking at the past holistically, and inform new sets of questions.
Archaeology provides an informed perspective that contributes significantly to our understanding of the past.
Archaeological interpretations can have political and social consequences in today's world.

Ecology

Cultural/Ecological Connections
Information about how humans used plants and animals is important in archaeological analyses.
Different cultures view landscape and environment in different ways, including how to use available resources.
Cultural systems are contained within the broader context of the ecosystem.
The environment is dynamic, and shapes human adaptations in technology and culture.
Analyzing trade-related artifacts is one way to show ecological and cultural connections in the archaeological record.
Human Adaptation/Ecological Responses
Humans interact within a variety of environments, and their activities affect both human and environmental conditions.
Humans need to know their environment in order to obtain resources and survive.
Archaeology can inform potential responses and solutions to current ecological issues based on how past groups dealt with similar environmental situations.
There has been a dynamic interplay between humans and their environment for a very long time.
Archaeobotanical and faunal analyses contribute to understanding how the environment changes.
Comparison of past and present ecosystems in the same region is important.
Consideration of seasonality is important in archaeology.

Appendix F

Summaries of Follow-Up Interviews

11/4/10
Participant #4

Ethnography explicitly stated only once; alluded to in other statements. Ethnography not present enough; not acceptable.
Statements can be used as a framework for ISE. Collaborative inquiry model is the way archaeology should progress.
CIMA is important with working with underserved audiences because:

- Empowers underserved audience
- Data from collaborative work provides another piece of the story
- Students within ISE venue – as well as all other individuals – are empowered
- Science education is improved
- Bolsters communities
- Renews interest in archaeology

11/5/10
Participant #6

Interviewee was happier with last set of statements than with the previous rounds.
Biggest contribution is collaborative inquiry – cited TJ Ferguson and Chip Colwell-Chanthaphonh's work.
The process of endorsing different backgrounds, the recognition and validation, is most important.
Value what is brought to the table.
Statements are secondary.
CIMA powerful; doesn't require sacrificing archaeological integrity.
Statements are a good framework for ISE; emphasize engagement.
Advice: Bill suggested focusing on pedagogical process in ASFA Phase 2

11/8/10
Participant #9

Statements represent a mainstream/traditional view of archaeology.
Skill section statements oriented toward science process skills, science skills that have dominated in the past. Interesting that there weren't any social skills within statements (social skills needed for working with the public). E.g., the disposition statement focused on stewardship and preservation, a mainstream view; void of role of individual as collaborator. Maureen also noted the lack of public benefits of archaeology within the statements.
She was surprised by the Knowledge statement of 'archaeology is democratic . . . how people treat each other' – this notion of how people are treating each other was pleasantly startling within the context of the overall results.
The profession has not given much thought to underserved audiences. A shift in perspective is needed.
If we want our science to serve underserved audiences we need to work closely with the communities.

We need to bring people in as equals, collaborators – not a lot of people in the profession are collaborating right now.
Implications – archaeology is in a unique position to bridge science and culture (importance of cultural relevance within Disposition culture statements). Statements could be used as guiding principals in ISE. One could substitute science for archaeology in statements.

Collaborative inquiry was a new term; it could be an incredibly powerful tool. Speaks to the shifting perspective needed; underserved more involved, voices heard. A truly collaborative effort would ensure cultural relevancy, usefulness, engagement – result in better materials.

11/8/10
Participant #10

Dispositions: cultural connections – make archaeology accessible to the public; should be understandable, relevant. Consider other world views, not just dominant view. Regarding ' different values to different people' incorporate beliefs in care/curation of artifacts.
Underserved audience: Statements are a basic guide. Listening to other voices/perspectives/world views is part of cause and effect. There is a social responsibility to provide relevance; have both views available for the public – their world view in overall assessment, their unique cultural identity incorporated into scientific methodology.
ISE use: show in museum process the importance of their community, history. More interest in scientific research will surface due to their history being relevant.
CIMA – incorporates all of value. Archaeological constructs and methodology used in every day life. Example of scientific methods learned in field experience more meaningful to learners; practical use more relevant, less threatening.

Additional commentary:
1) simulated excavations in museums are not beneficial; a distance between individuals and sites has been the standard; connections to the site will convey the importance of protecting the site
2) keep information relevant and simple; have connections to archaeological data in their own community, not just the 'glamorous' nature of Egypt
By including this archaeological data it brings out the groups that are underrepresented – those not becoming scientists; by including the community's history, the community is involved, has a vested interest; they'll come back
3) it's important to have community work together, e.g., museum and schools; it cements learning and provides an opportunity to build incrementally
4) if the audience is involved in the process; they'll come back

11/9/10
Participant #14

Saw a balance in Delphi survey responses between environmental determinism ad post processual.
He spoke of his experience in SE Alaska – excavation produced 10,000 year-old artifacts; found that scientifically generated data confirmed/reinforced beliefs of Tlingit elders' stories. Stories validated by scientific data; some individuals within the team felt this was a distortion.
Omissions:
1) model building in archaeology; viability of model, based on best possible information, honestly addressed
2) protection preservation – where people do things today they likely have been done in the past; inevitability of human behavior

Underserved audiences: a challenge is that teachers drawn to predominately Native American education positions are fundamentalist in their orientation; they're not inclined to incorporate the scientific method, not grounded in science. Lessons are typically approached through a cultural history standpoint. Incorporate scientific method within lesson(s); tweaking of orientation needed.
Implications: message to students – science doesn't alienate them from their culture.

CIMA – unfamiliar with the label; the model is the way he's been doing business for quite a while. As a conceptual model, it facilitates an individual thinking about things outside their own current understandings.
Archaeology is a great vehicle for an appreciation of the value of nonmaterial things the world: relationships, information, knowledge. . . . He's struck by the number of times he has heard from individuals after lengthy periods of time about how their experience with archaeology changed their world view.

Suggestion: use recognize instead of the 'oft overused and divisive term stress' within the value statement (Culture) 'It is important to recognize our common humanity in archaeological research.'

11/9/10
Participant #15

All statements were 'right on' within the categories – no surprises or inconsistencies.
It's important to include other worldviews, not just dominant view – making underserved audiences perspective relevant.
Underserved audiences: Good archaeology, good outreach programs will be effective no matter what the population. Archaeology is unique to other disciplines; we all have our past as a relevant connection.
Good outreach elicits prior conceptions 2) multiple learning strategies and 3) draws from many disciplines (archaeological evidence, history, architecture). It helps underserved populations learn about their family/people. It provides a tangible experience. This is true for any group; archaeology speaks to all people.
You can talk to any group about artifacts – the sky is the limit. Use local resources.

Susan would like information about the six exemplary sites.

11/9/10
Participant #16

It was Interviewee first Delphi survey – no specific expectation, so surprises.
Joelle suggested refinement of general knowledge, i.e., the archaeological record. When working with the public, the archaeological record comes with a set of assumptions that implies the existence of a defined body of information.
Omissions: dating, qualitative data science processes
The results are acceptable, adequate.
Underserved audiences: Ethnographic pieces need to be enhanced. Assumptions need to be challenged. An example given was protection and preservation, an assumption from a non indigenous perspective. A Hopi perspective would be to leave it alone.
The statements are too disconnected; suggested standing back from these great ideas, important statements. Categories are okay, they are part of the process. Now, it needs a set of unifying ideas.
Refinement needed: how will the statements be used? It's critical to create a schema. Enduring understandings of archaeology?
Make the subject matter interesting; free choice inherently has interest, it's essential. Multivocality – an opportunity to engage in their own history; archaeology is still very white/western European. Archaeology provides an opportunity to connect with their past; enhances our understanding of the past.

Are there one or two unifying statements within each category? Idea is not to overwhelm and not to oversimplify. Divergent/convergent thinking – what is the big picture? Archaeology is . . . . Archaeology is not . . . .

11/10/10
Participant #17

Interviewee was not surprised with outcomes; happy that scientific process ranked highly.
Within cultural dispositions, she was impressed that so many statements 'made it through.'
Underserved audiences: she finds it surprising that there is so little archaeology content in school. She views this as a puzzle.
There is a disjoint between archaeology and the commitment to the public – disposition statement 'archaeology accessible to the public'. Mechanisms needed for an amateur level archaeology necessary to displace sense of elitism within the field.
Implications: there is an acknowledgement among participants of the need for better outreach, underserved audiences included. Pragmatically, archaeology would benefits from more visibility.

Not being represented in the formal standard of learning is a window of opportunity for informal education. It's beneficial not being bound by standards/assessments. Efforts should be directed to the opposite end of the spectrum – not linking to assessment or standards. Create a broad palette – the challenge is to address all public. Archaeology is unique – the access to material 'stuff' offers opportunities for engagement, gaining interest of general public. Focus should be on interpretation.
CIMA – If the goal is to reach Native American and African American audiences, have a very specific idea. People are already engaged in science. How do you reach individuals who aren't?
There are some very specific things that archaeology can offer that other sciences cannot: capitalize on the interest in the past.

An advantage with informal science education: energy expended on aligning materials to standards/assessment not necessary.

11/12/10
Participant #19

Interviewee found Round Two difficult; she felt all the information was important.
Expected more points within dispositions under ethics – although more statements related to ethics within other categories.
She was surprised that no one identified that everyone practices science. Alicia wondered about asking the same types of questions of audiences being served (Delphi survey questions); she is curious about the responses. Would responses be vastly different? Would they overlap?
She's been thinking about the overall mission – is it archaeological education for education sake? For developing stewards of the past? For social justice? For developing new ideas for stewardship?
Underserved audiences: the six archaeological research and educational sites key to contributing to ISE.
Collaboration and participant observations will elicit information.
CIMA – the use of this model is an ethical imperative. In order to understand, to reach compromise, you have to be collaborative. Collaboration takes time. Voiced concern about preaching to the choir; wondered about the impact on the overall practice of archaeology. Changes would be a huge contribution to ISE.
Additional idea(s):
Alicia revisited the idea of giving the Delphi survey to audience being served. One could find out about prior knowledge, interests, agendas . . . .
Perhaps stereotypes are not being perpetuated, but are not being challenged.

11/12/10
Participant #20

Interviewee disagrees with statement about objectivity.
Being systematic is more important than being objective; objectivity is something we should aspire to; it's a false god.
Underserved audiences: an umbrella term used to describe everybody else but us.
An ontological shift is needed. There is 'a respectful, yet they are wrong' approach to non dominant views. Until science embraces other world views, sincerely embraces that underserved audiences' beliefs are of value, worthy of respect, it will be viewed as just posturing. Underserved audiences are very sophisticated at pegging hypocrisy. Share intellectual power.
CIMA – voiced concern about CIMA possibly not being the model for every context. The Participatory Action Research model (PAR) has a variety of strategies within – collaboration, consultation – doing the work at the behest of the client, initiator, response to the community. She offered the idea of having a constellation of models to afford being responsive to each context.

11/12/10
Participant #21

Interviewee was reminded him of how big the field of archaeology is by the wide range of statements within the results. The statements represent a good summary and provide a wide range for outreach. It gets complicated when working with underserved audiences – with time restrictions and the sheer largess of the field of archaeology. Rather than viewing archaeology as static, Chuck referred to the possibility of using the statements in a more fluid approach within ISE. With New Mexico being the best culturally preserved state in the US there are within groups (indigenous, descendants, new immigrants) and many points of entry for outreach programs.
Spoke to the importance/power of material artifacts to draw interest; finding the level of initial fascination – that's the challenge of archaeology. Once initial fascination is hooked, then the opportunity of bringing in other disciplines surfaces.
Concerns: This past year has been the most difficult for him in scheduling outreach with schools due to the focus on 'passing tests.' Also – butting heads with the Christian right challenging him with dating of artifacts.

11/15/10
Participant #22

Results are comprehensive. Items of interest to her were the multidisciplinary aspects and cultural ethics. Eleanor admired your ability to collapse all the pieces within the survey.
Underserved audiences – the cultural connections/relevance section of dispositions confirms that different cultures place different value on artifacts.
Engage public by meeting them where they are; this opens the door for programming.

There is a tendency in archaeology where archaeologists are seen as the holders, purveyors of knowledge. Dialogue started through CIMA would be hugely beneficial because the discourse would not be coming from the same thought process; it would be taking into account their views. An example was given of the Wars Project in the SW United States. **Interviewee** and an individual from the San Juan Pueblo were talking about cultural stories, with Eleanor talking about how details get left out of stories and how archaeology and stories are complementary led to
Figure out what is important to the population. Example: (1) African Americans – somebody needs to be writing the story of the diaspora and someone will write the story. They are in charge of telling the stories; stories are filled out by archaeology; (2) Hopi Footprints – engaging, multifaceted, Hopi given control. Not your typical model; serves as a model for ISE. (3) gives a message to pay attention – examples of displays at Mammoth and Big Horn Battlefield – one case dedicated to Native Americans – and Buffalo Soldiers having one photo within display.
CIMA – is the only way to get them to the table. Value their opinion. We can't presume to know what other audiences find of interest.

The ASFA project is critically important; revamp science. There is too much top down 'scientists shedding light'. Start from the collaborative venue; it's a fascinating, engaging process . . . not the typical linear approach.