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The Public Communication of Science and Non-Formal Education Within the Framework of Public Argentine Archaeology: The Case of Archaeology Workshops

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This article presents and analyses a method of public communication in archaeology carried out by a group of researchers within a non-formal educational framework, as a contribution to public archaeology in Argentina. This project included diverse activities, such as archaeology workshops for children and teenagers, which took place in museums in four cities located in three regions: Paraná (North-east), Tres Arroyos and Lobería (Pampas), and Lamarque (Patagonia). A conceptual evaluation is presented based on the application of a non-participational observation methodology, that includes the analysis of posters made by those attending the workshop and surveys conducted by the archaeologists at the culmination of the activity.

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This study suggests that workshops can be one of the most effective strategies employed by researchers to publicly communicate archaeology, and therefore can be of use to other research teams that have as their objective the democratization of knowledge generated in scientific-academic spheres.

KEYWORDS outreach, public archaeology, alternative pedagogical tools, archaeological heritage

Introduction

One of the main aims of archaeology is the study of human groups in the past from the analysis of their material remains. Over the past several decades, archaeologists in Argentina have analysed cultural material and interpreted the way of life of the indigenous populations that inhabit or inhabited the region till relatively recent times (Curtoni, 1997). As with other disciplines, archaeology faces diverse challenges connected with the social valuation of archaeologists' professional activity and the objects of their study. Among these is the inclusion of contemporary archaeological interests (e.g. industrial archaeology) and the valuation, conservation, and protection of the tangible and intangible archaeological heritage by society as a whole.

Science represents one of the fundamental elements of modern Western culture. Yet the scientific sphere is distant from everyday experiences, in good measure due to the lack of suitable media for engaging with the non-specialized public, that is, most of society (García Guerrero, 2009). This situation is not foreign to archaeology. Non-formal educational spaces for archaeology and the archaeological heritage provide a forum to help build this awareness, and in doing so complement formal education and the different programmes implemented for its dissemination (Sarramona, 1992).

At the Museo de La Plata, Argentina, there is a group dedicated to archaeological research of the south-east of the Pampas region (province of Buenos Aires), the Upper Delta of the Paraná River (province of Entre Ríos), and northern Patagonias (province of Río Negro). During 2008 and 2009 this team institutionalized outreach and transference activities that it had been engaged in unsystematically and voluntarily in a university outreach project called 'Archaeology, Education, and Museums. Encounters between Researchers and Local Communities' ('Arqueología, educación y museos. Encuentros entre investigadores y comunidades locales'). This allowed the team to create a stable group of volunteers (teacher-researchers, graduates, and advanced students), funded by the Universidad Nacional de La Plata. This project, which received the active collaboration and participation of regional museums, swiftly turned into a prolongation of research projects. This paper analyses in-depth a proposal contained in the outreach project in question: the use of archaeology workshops for children and adolescents.

Workshop methodology and principles

By definition, the word 'workshop' (in Spanish, 'taller') comes from the French *atelier*, and means 'studio' or 'work-place' (Maya, 1996). The workshop is a teaching-learning system and represents an alternative paedagogical tool to the commonly used

methodologies in formal and non-formal educational processes. In the words of Ander Egg (1991: 9–10) it consists of a group experience based on the following principles:

1) it is learning by doing
2) it is a participational methodology
3) it is a pedagogy through questions
4) it is a training tending to interdisciplinary work and a systematic approach
5) it is a coordinator-pupil relationship established by means of the carrying out of a common task
6) its pedagogical practice has a globalizing and integrating character
7) it involves and requires group work
8) it allows the integration of teaching, research, and practical work. The essential element of the workshop is to carry out a work project based on practice and an interactive dynamic, for which theory and research are necessary.

The workshop leads to work starting out from a task or a problematic situation, which is used as a trigger. The coordinator has an active role as s/he poses questions, encourages participation, and makes situations complex. Consequently, those attending acquire a leading role; they give their opinions, produce work with others, and think critically. The aim of the workshop is the central positioning of the learner, with the part of the others acquiring relevance in a process focussed on doing and inscribed in the constructional perspective of the learning. Thus, as it is a task of continual interaction, the coordinators or promoters of the workshop also find themselves constantly transformed or influenced, as well as the programmed activities, which can be reformulated or readapted.

Workshops as an option for communicating sciences to the public

As noted by García Guerrero (2009), in recent decades workshops have established a role as tools to enable public recreation of science through the dynamics of play and experimentation. Such workshops seek to build new communicational spaces and create processes of bidirectional information interchange. Their essence is founded on dialogue and taking advantage of the knowledge and experiences of those attending in order to give meaning and relevance to the scientific subjects under study. In this way it is possible to recreate science in non-specialized spaces, generating pertinent re-contextualizational processes and facilitating direct contact with participants to adjust the dynamic of the learning experience to their needs and interests. The workshop assigns the attendant an active role on an experimental, intellectual, and emotional level.

Scientific communication and educational processes directed at the general public enable access to science to a partial extent. Most efforts to popularize science concentrate on cognitive aspects, where knowledge is presented as a finished product and the participants are unaware of either their own dynamic contribution or the processes by which the result was achieved. Therefore, in order that people may experience and become familiarized with the way in which scientific knowledge is generated, a learning experience is required that exceeds the mere transmission of

information and encourages the participants to build experiences associated with the scientific method. Therefore, as participants are actors in the process of knowledge-building, the active involvement of the public is crucial in order to bring them closer to science. It is for this reason that this analysis is associated with new views of public communication of science considered as the sum of activities possessing scientific contents directed to non-specialist public in a non-captive situation. This definition excludes communication among specialists and school teaching (Fayard, 2004). These views recognize that communication has a non-linear character, is more complex than what is assumed by the traditional approach, and pays attention to reconfiguring experience at the classical borderlines between communicational contexts (Bucchi, 1996; 1998; Castelfranchi and Pitrelli, 2007; Dierkes and von Grote, 2000; Gregory and Miller, 1998).[1]

In this sense, the workshop makes it possible to acquire more structured and complex knowledge in an accessible manner, yet it is not simplistic because it is introduced by means of an interactive approach in which the public is not regarded as a passive and uninformed subject (García and Meza, 2008). It could be said that in these new communicational paradigms the 'other' has a central role in the communication dynamic, as they are considered able to process the information they receive, reinterpret its meanings, and integrate it into the context of their beliefs, values, and interests (Hilgartner, 1990).

Just as the constructivist perspective of science considers that researchers generate models to explain natural and social phenomena, the pedagogical approach encourages participants to build knowledge associated with the elements under study in the educational process. Both cases involve important processes of cognitive and social action: ideas are generated, communicated, enriched, and discarded. The constructivist perspective on which some pedagogical theories are based seeks to generate a balanced process between the influence of the social environment and the individual's inner disposition. Therefore, knowledge is the result of the constructions each person makes out of the epistemological models they already possess — their previous knowledge, that is, the constructions they had already developed with their surrounding environment (Knorr-Cetina, 1994).

The workshop dynamic is favourable to the establishment of this kind of dialogue because it does not seek to achieve a pre-established absolute truth. Instead, what is sought is to guide the participants in the construction of models of value by explaining the material under study. The concepts that are used undergo cognitive recreation by the participants, but also feedback resulting from their ideas. The aim is to generate, validate, and contrast models by means of practical activities and their relation to available scientific information on a subject. As for their pedagogical foundation, the workshop is an educational tool with objectives that impart a direction to its actions and strategies. Workshops strive to be flexible educational dynamics, capable of adjusting to the characteristics of the participants. Each group is unique and its members have distinctive expectations, previous knowledge, viewpoints, and abilities.

There are four elements that define workshop methodology: teamwork, use of speculation, playful learning, and the development of skills. Instead of establishing generic elements in the action of all the people involved, the workshops attempt to diversify the tasks to be carried out. In this way the group involved in the activities

becomes a team that requires each person's contribution in resolving the set problem.

Scientific communication workshops adopt the style of educational workshops through a series of elements that aim to facilitate and enrich the non-specialized public's approaches to science. Workshops operating through playful experimentation are entertaining activities while at the same time leading the students to new contextual meanings of the scientific concepts they are dealing with. The experiences help create stimulating dynamics and offer a practical illustration of scientific concepts. In the terms of Pozo and Gómez (1998), the best way for pupils to learn science is playing at doing scientific work, and therefore such teaching must be based on experiences that allow pupils to investigate and reconstruct the main processes of knowledge building. Piaget (1981) similarly notes that the best way to learn is to discover or create oneself, instead of someone else becoming an intermediary of knowledge. In other words, the presentation of scientific knowledge as a product rather than a process, or as a pre-established set of ideas rather than a way of accessing certain facts, consolidates undesirable attitudes towards both it and its social implications (Pozo and Gómez, 1998).

To practice and learn science requires certain procedures that, far from being intuitive, must be taught. Still, the traditional style of teaching these procedures have tended to reduce them to mere routines removed from the real cognitive complexity of scientific thought (Pozo and Gómez, 1998). Hence, without confusing the teaching of these procedures with formal scientific research, the ideal is to try and make pupils, in restricted conditions and under the guidance of the coordinator, be able to approach the way in which scientists construct their models and put them to the test, for only in doing so will they be able to understand the true nature of scientific knowledge (Pozo, 1996).

The archaeology workshops: case study

In this section the workshop project 'Archaeologists for a day' is analysed and considered as a strategy of public communication related to archaeology, where science, education, and communication are intertwined. The analysis, carried out on the basis of non-participant observations, is then presented, alongside the products of the workshop in the form of posters that the participants drew, and the polls that researchers took among those present at the end of the activity.[2] Prior to the description of the workshop, it is useful to place it within the project framework that it is part of, namely 'Archaeology, education, and museums. Encounters of researchers and local communities'. The leaders of this project (Patricia Madrid, Mariano Bonomo, and Luciano Prates) are archaeologists who incorporated a specialist in museum education (Constanza Pedersoli) into the team. The project has the following research remit:

> Archaeological research requires, in carrying out fieldwork, contact with different social actors in the communities in which it takes place. These actors often contribute key information, collaborate with the researchers in access to the sites, contribute in making possible many logistical aspects related to field trips, and the interpretation of the archaeological record.

> In our experience as teacher-researchers and pre- and post-graduate students, we have detected interest in those communities to learn about what we do, and find out more about the past and present of the localities they inhabit. In addition, the research work becomes more fruitful when the communities realize the importance of heritage preservation and take steps to protect it.
>
> The purpose of this project is to promote more and better dialog between the archaeological knowledge we produce and the different actors in those communities in which we carry out our research.
>
> Thanks to the link with regional museums and local schools we will put in motion workshops for children and talks for the general public, in which diverse topics will be gone into related to the local and regional past and present, and the preservation and protection of the cultural-natural heritage from a co-participative and integrated perspective of knowledge. (Madrid et al., 2008)

According to the plan carried out for the project framework, the workshop analysed has the following objectives for its participants:

1. Take cognizance of the differences and similarities among the following areas of knowledge that study the past: archaeology, palaeontology, and history. With regard to archaeology, to understand the specificity of its object of study and work methodology.
2. Place the human species within its proper spatial and temporal context, alongside other animal species (only for 13- to 17-year-old participants).
3. Receive an introduction to the general principles of the process of building scientific knowledge in general, and archaeology in particular, through the management of archaeological materials and replicas (archaeological contexts).
4. Identify the importance of protecting the archaeological heritage through the recognition of certain methodologies of archaeological practice.

It should be pointed out that besides the workshops alluded to, this project incorporated other activities such as holding conferences and talks in each area, the preparation of museographic exhibitions, the publication of informative articles and books (e.g. Bonomo, 2012; Bonomo et al., 2010; Politis et al., 2009), and the production of a series of posters to be incorporated in regional museums and other public spaces (e.g. schools, local government institutions, national parks). The content of such material is related to:

1) the presentation of archaeology as a discipline.
2) the methods employed by archaeologists in building knowledge from lithic, bone, and ceramic materials; the archaeological and natural heritage (possessing knowledge in order to preserve objects and landscapes- tangible and intangible heritage).
3) the way of life of the indigenous peoples of each of the areas studied: the Pampas plains; the Paraná Delta islands (between 2000 and 500 years ago) and Río Negro (from 3000 to 500 years ago).

It could be stated that, following Maya (1996), this outreach project is framed in a teaching-learning situation having a threefold function: teaching, research, and

service, attempting an integration of theory, research, and practice by means of group work and an interdisciplinary and globalizing focus. This workshop has been carried out in Paraná, Diamante, Victoria, Gualeguay, and Gualeguaychú (Entre Ríos), Tres Arroyos, Claromecó, San Cayetano, Lobería, San Manuel and La Plata (Buenos Aires), and Lamarque and Valcheta (Río Negro), among other towns. Each iteration of the workshop consisted of a single meeting lasting two hours. The participants were children aged 9 to 12 years (age group 1) and 13- to 17-year-olds (age group 2). These workshops were categorized as activities existing within non-formal education since they were held outside schools, at the museums in each locality, and were coordinated exclusively by archaeologists. The total number of workshops was 180 and the number of participants around 3600 with at least two accompanying teachers (also participants) per workshop.

Observations at the 'Archaeologists for a Day' workshop

For this analysis non-participant observations were made at fifteen workshops held at different locations in the Department of Tres Arroyos. It is necessary to point out that all the observed workshops present the structure detailed below and follow almost to the letter the formal (written) plan devised for their implementation.

Phase 1: Introduction

The workshop starts off with a general introduction of the group and its participants, and a basic outline of the project. Then a discussion is started with the children in which they are asked if they know what they have come to do in the workshop. They are then told about the aims of the activity and how they are going to work. The archaeologists always stress the importance of the active participation of the whole group, inform the students that they are not going to be evaluated, and make it clear that they wish to be listened to. This lasts around ten minutes.

Phase 2: Archaeology and the sciences 'of the past'

Afterwards, and in constant dialogue with those attending, the aims of the study and the domains of archaeology are discussed. Confusions always arises and the distinction of archaeology from palaeontology and history is made. The workshop leaders attempt to get the children to recognize similarities and differences in these areas of knowledge by means of the objects of study and the methodologies they employ. This moment is of crucial importance since basic concepts are mentioned that, in most cases, create confusion and must be cleared up in order to achieve the objectives of the workshop. In the workshops observed the approach to this matter is solved in one of two different ways:

a) It is carried out orally and the archaeologists gather the participants' opinions and write them up on a blackboard, on which a conceptual diagram is created, separating the disciplines. This takes around ten to fifteen minutes.
b) The participants are divided into groups of around six children, who are handed envelopes with texts (magazines, books, newspaper notes) and/or visual materials (photographs and drawings) to reflect on. The assignment consists of selecting at least two texts or images they consider associated to

each of the three disciplines (history, palaeontology, and archaeology), and explaining why they have linked the images to each discipline. After a brief period of work, each group presents a common viewpoint. This takes about twenty minutes.

In both cases, the archaeologists generate a group debate, moderating and intervening in the discussion. The coordinators lay stress on the children's opinions, and mainly on the mistakes that have been made during the relations they have established. Most of the discussions have to do with the objects of study in archaeology, palaeontology, and history, as well as the main methodological tools of each discipline. The most important differences between the three disciplines are also highlighted, especially regarding the objects of study, methodologies, and their extension in time, so as to arrive at an 'operative' definition of the disciplines. The difficulty of fragmenting the complex objects of study within the restricted limits of the areas of knowledge, as well as the need for interdisciplinary work, are always emphasized. It is worth mentioning that in the majority of workshops observed, this discussion is conducted orally (the first option described), as this is quicker and easier.

Phase 3: Projection of images

After definitions are dealt with, a presentation of images are shown that are directly related to the practice of archaeology. This strategy goes hand in hand with oral explanations by the workshop leaders on how fieldwork is carried out (from preparatory tasks and the use of aerial photography and geophysical techniques, to excavation with the establishment of grid-squares, site recording of the materials unearthed, the sifting of the sediments extracted from the grid-square, as well as the preparation and processing of the materials in the lab). The use of chemical techniques are also explained, as well as radiocarbon dating, and archaeological subdisciplines, such as experimental archaeology and ethnoarchaeology. In this exposition matters that are not explicit in the supporting visual materials are also noted, such as the emphasis archaeologists place on the care of materials, the protection and conservation of the sites, and the social and patrimonial worth of archaeological remains. This takes about ten minutes.

Phase 4: Reconstruction of a day of life in the past

The ultimate purpose of this stage of the workshop is to encourage the participants to work on the basis of the ideas they have acquired about archaeology, trying to get the children to represent the archaeologist's activity and the analytical work performed on the materials obtained. For this activity the participants are divided into groups and each is given a box with archaeological materials from different archaeological contexts. Each box contains archaeological materials (some genuine, some not) corresponding to the following contexts: the house of a contemporary family; pre-Hispanic human burial with funerary goods; hunter-gatherer campsite; farmer village; post-Hispanic urban occupation (see Figure 1).

On the basis of each assemblage of materials they are assigned the task of reconstructing, the way archaeologists do, the series of processes that gave rise to it. From their inferences they will imagine a day in the life of the men, women, and children involved in the production of the archaeological remains

FIGURE 1 Workshop participants with the boxes of archaeological contexts.

Materials were added into the boxes that did not belong to the same depositional event (contaminants) for the students to identify processes altering the original record (for instance, from finding glass or iron in a pre-Hispanic settlement). Besides the central assignment, they were given several secondary ones to make the work simpler and easier. These included:

1) to enumerate and briefly describe the material
2) determine whether the materials are modern or ancient
3) imagine the place at which they may have been collected to determine the kind and quantity of the people that may have participated in their accumulation (adults of both sexes, children, and old people)
4) recognize the type of daily activities involved in and represented by the remains.

The results of this assignment are summarized in a group production, and to this end the archaeologists hand out poster sheets and marker pens to the groups that arrive at conclusions. The time allocated for this assignment is around twenty minutes. After the posters are made, the groups present the conclusions of their work to the

group. In this phase the workshop leaders take an active part, intervening and encouraging reflection on the participants' production. This activity takes some thirty to thirty-five minutes. In this phase great fluidity was generally observed on the part of the students in explaining their productions, giving the close of the activity a more participational, complex, and dynamic sense.

Phase 5: Conclusion

On ending the workshop, the archaeologists summarize the main themes that were explored, thank the participants (and the teachers that accompanied them), and hand out a questionnaire for the children to complete and hand in before leaving.

Presentation and analysis of posters at 'Archaeologists for a Day' workshops

In this section, a set of 126 posters created as a workshop activity by diverse groups of participants of the project are analysed. These posters correspond to age group 1 (children in the upper level of basic primary education — between 9 and 12 years old). Each poster was made by a group of three to five participants, which represents a total of around 500 participants. Posters in this case can be considered an aid to communication with which the participants express their representations of archaeology and the study of the past. Their ideas are communicated through drawing, writing, or both, and therefore these variables are taken into account when analysing the representations of the past in their posters. Afterwards, on the basis of the observations carried out, the oral explanation of their productions is also analysed.

Classification and description of the posters

Considering the language used for their expression, it has been observed that out of a total of 126 posters, three contain drawings alone; 21 contain writing alone and 102 contain both drawing and writing. A total of 105 posters have drawings (including the ones that also have writing), of which 84 have isolated drawings, 15 have drawings of scenes, and six have isolated scenes and objects. Out of 15 drawings of scenes, eight are considered dynamic as they show the combination of materials and people carrying out an activity (see Figure 2). For instance, four include scenes of camp sites, and four depict archaeological excavations. Seven drawings are of individuals, such as the drawing of a hunter (see Figure 3).

From a communicational viewpoint, if one analyses what the participants attempted to represent in their posters, it can be noted that some children made reference to the archaeologists' work and others opted for explaining ways of life in the past. These are two distinct representations, though equally important in relation to the objectives of the workshop, as the children were expected to understand the main principles of the process of constructing scientific knowledge in general and that of archaeology in particular. Among the six drawings including both options, that is, isolated objects and scenes, only one is dynamic (including materials and people carrying out some activity) and five are individual (hunting). In general, the drawings of scenes that are found show hunting activities, dwellings, cooking and fire, campsites, men planting seeds, different animals living together, and archaeologists excavating.

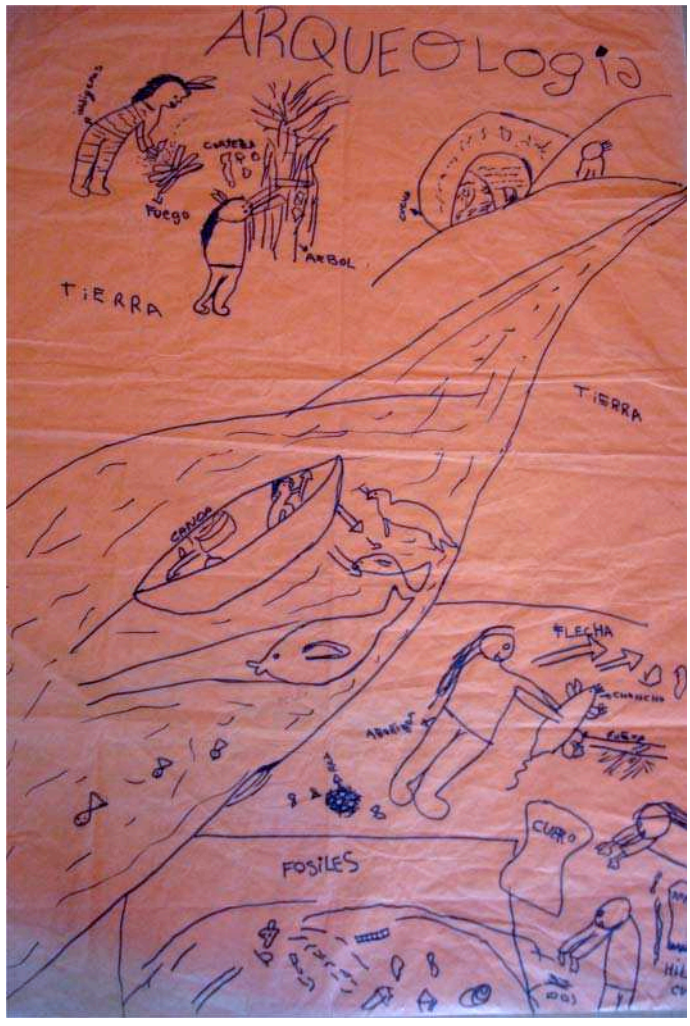

FIGURE 2 Combination of drawing materials and people carrying out an activity.

A total of 121 posters have written text. In 56 of them the archaeological object contained in the box is described, in 35, the object and its function, in 21 the object is described and, the contexts of use for those objects in the lives of the groups that employed them are suggested, in seven the object and the context of its discovery is described, and in four the object and the material it is made of. In most cases the objects, as well as their description and contexts of use in the past, are represented with different levels of complexity, while others are centred on the archaeological task itself, without regarding the way of life of the groups in the past. With this point it is clear that attention is brought to bear on the research work and/or the discovery itself. This situation would show a lower degree of distance between the object studied and archaeology and, though they would attain objectives 1, 3, and 4 of the planning of the activity, it could be claimed the second objective was being neglected, which refers to the human groups that lived there in the past. The hypotheses the participants put forward refer to the way of life of the populations that used the

FIGURE 3 Posters with drawings of a hunter.

described objects, for instance, 'they lived by hunting', 'they lived in huts', 'they were sedentary'.

In referring to human groups in the posters the terms 'Indian', 'aboriginal', 'hunter-gatherer' are used in the singular. When referring to them collectively they are called 'population', and 'original peoples'. It should be stressed that in the majority of the posters the subject is not mentioned directly, but is used tacitly (e.g. 'they used it for . . .'; 'they had the tools . . .'). This way of referring to the indigenous populations can be explained by the mechanism of naturalization of the stigma of historical depersonalization that has obtained with regard to the original peoples, not only in the Argentine educational system, but in the rest of Argentinian society at large (Falabella et al., 2010).

Analysis of the questionnaires handed out at the 'Archaeologists for a Day' workshops

A total of 430 questionnaires were considered, which were given to 260 students in the localities of Paraná (Entre Ríos), 32 in Tres Arroyos (Buenos Aires) and 138 in

Lamarque (Río Negro). It should be mentioned that the questionnaires were filled out by the participants of the workshops who produced the posters analysed above. The following discussion considers the survey responses and what conclusions can be drawn from them. It should be noted that as these questions were open-ended the answers varied considerably, so categories grouping related answers have been created for their analysis:

1) What aspects of the workshop did you enjoy?

The most frequent response referred to all aspects of the workshop, without specific details. The second most common response states encountering and working with different types of materials, such as human and faunal bones, stones, pottery, and others. Next in importance was a portion of replies which it has not been possible to classify as they refer to very varied things, such as imagining the past, playing at being archaeologists, the discovery of humans; the pictures, videos, and posters shown; when archaeologists said they knew the Indians (referring to the work of ethnoarchaeology). The rest of the replies refer to aspects of the methodology used and the work dynamic.

Of the 18% of varied responses answers included: imagining the past, playing at being archaeologists, the discovery of humans; the pictures, videos, and illustrated sheets shown. This highlights aspects that are presented directly in the workshop or arise out of the leaders' commentaries. Among the different unrelated answers, the mention of human bone remains is also a constant. This might be because among the materials worked with there are full-size replicas of human bones, the skull being what most captures the participants' interest.

2) What things would you change about the workshop?

It is notable that 80% of the participants would change nothing. The 14% of other answers mention general aspects such as: that they would change the whole of the workshop, change some video and materials, or make it shorter. There is a great variety in the answers, and the repeated ones are infrequent. The remaining 6% would change the duration of the workshop (so that it lasted longer) and that it might include field-trips to practice excavations and/or visits to archaeological sites in the area.

3) What other topics would you have liked to know?

Most respondents agreed they would not have wanted anything else, followed by responses by participants who would have liked to know about dinosaurs, indigenous people/aboriginees, local fauna in the region, human remains, experience an excavation, and learn more about the work of archaeologists, among others. The 'other' answers concern such diverse topics as visiting a museum, further information on the antiquity of the materials, information on Egypt, Rome, and Greece, more photos, treatment of volcanic ashes, and so on. The thirty-eight respondents (9%) replying 'No answer / Do not know' might show a lack of interest of the participants for the workshop.[3]

4) What did you know about the archaeologist's job prior to the workshop?

Thirty per cent of respondents said they knew 'nothing' about it, while 14% talk about the search and study of 'things' of the past and say 'a bit or very little'. The answers that could not be grouped refer to the materials and processes of archaeological work; the tools they use and mention of materials (e.g. bones, stones, and pottery) among others. This shows an imprecise knowledge of the discipline with up to 66% of the answers showing that the participants possess scant knowledge of the archaeologist's activity prior to the workshop, as only 1.3% said they knew 'everything' (see Table 1).

5) What would you do if you found archaeological remains?

A clear majority claim they would inform a professional or competent authority. Out of the total responses, nearly 70% would not touch the find, whereas a smaller number would pick it up and carry it somewhere. A minority would do nothing, did not know, or gave no answer, and there were a number of responses that suggest they would keep it and sell it Among the disparate answers were 'investigate it', 'carry on searching', and 'publish it in the media' (see Table 2).

The analysis of the survey positively highlights that the students seem to be more committed to the workshop as it relates to their experience, when they are familiar with the materials and work of the archaeologist, resulting greater and prolonged engagement with the themes of the workshop. What is clearly distinguished is that the workshop encourages a positive preservationist attitude: in the face of a chance discovery, the majority of those polled would demonstrate a protective, careful attitude to the find. It is very important that this kind of response should be given at the end of the workshop as it is a clear sign that one of the objectives has been fulfilled related to the protection and recognition of the value of the archaeological heritage.

Yet the fact that all the participants do not give a positive response as regards the heritage could be an issue, particularly bearing in mind that 15.5% of those polled

TABLE 1

WHAT DID YOU KNOW ABOUT THE ARCHAEOLOGIST'S JOB PRIOR TO THE WORKSHOP?

Students' prior knowledge of the work of archaeologists	Number of responses (430)
Nothing	30%
Other answers	22%
Something / Very little	14%
The finding and studying things of the past	14%
On human and animal bones	8%
Excavating the soil	8%
Investigating fossils	3%
Everything	1%
Total	100%

TABLE 2

WHAT WOULD YOU DO IF YOU FOUND ARCHAEOLOGICAL REMAINS?

What would you do if you found archaeological remains?	Number of responses (430)
Tell a competent authority without touching them (museum, archaeologists, municipality)	49%
Remove the materials and then notify a competent authority (museum, archaeologist, municipality)	20%
Other answers	9%
Would keep it or sell it	9%
Tell a teacher or parent	6.5%
Do not know / No answer	3%
nothing	3.5%
Total	100%

show no interest in its preservation (those that answered 'Nothing', 'No answer / Do not know', or 'I would keep it and sell it'). This is a matter that obviously needs reinforcing in the planning of upcoming workshops, and which could do with more emphatic rejection to discourage these potentially 'anti-patrimonial' attitudes.

A broader issue that arises from the workshop is the poor knowledge of the children's understanding of archaeology, which supports the assumption that contemporary Argentinian society has little knowledge about its pre-Hispanic past, a situation that goes back to the times of the cultural construction of the nation state of Argentina. Since the late nineteenth century, the indigenous issue was addressed only as a backdrop of the conquest processes: the official historical narrative reduced them to a minimal expresion. This process began with the necessity of building a racially and culturally homogenous nation with European roots, and consequently Argentinian history marginalized indigenous peoples for more than three centuries (Balazote and Radovich, 1992; Mandrini, 1992; Slavsky, 1992). On the one hand, this homogeneity concealed both ethnic and social differences and promoted the construction of an univocal national heritage. On the other hand, it spread (through school education) the notion of a glorious and irreversible past with no connection with their modern descendants (Endere, 2007). In this regard, the 'post-colonial era' demands new strategies for rethinking a more plural, heterogeneous and multicultural discourse of such a history. In this context, non-formal education projects, such as archaeology workshops, provide key tools to address socially relevant issues (Martin Barbero, 2003).

Discussion

After analysing the workshop, it is clear that such a forum is a valid strategic option for the public communication of archaeology. The integration of all the activities allows participants to construct a representation of archaeology as a discipline and of the archaeological heritage as a cultural possession worth preserving. If the

workshop is seen as an agent of popularization, it can be deemed a suitable methodology for interacting with the public, assessing their opinions, divulging knowledge about archaeology, and sharing interests and aspirations.

On the basis of interpretations carried out by those that attended the final sessions of the workshop, for instance, in the closing remarks the children placed emphasis on the ways of life of human groups in the past and how the archaeologist approaches this knowledge. The responses to the questionnaires demonstrate the contributions of the workshop as the majority of the participants declare that they would change little or nothing, but also show they have understood what archaeology is and that they feel motivated to carry on learning about the topic. The positive impact of the workshop on conservationist and value-assigning attitudes of the participants towards the archaeological heritage is something that should be explored in greater depth so that, at the end of the workshop, all participants have a clearer notion of how to go about protecting it better. In general these analyses reveal the benefits of involving children in such initiatives like excavating, and experiencing what it is like 'to be an archaeologist'.

In this sense it could be claimed the workshop achieves its stated aims. Criticism or negative points are very few, despite the anonymity of the survey, which encouraged freedom of answers. However, a central issue comes up, which is the initial high percentage of ignorance about the archaeologist's job and archaeology as a discipline. This reinforces the supposition that Argentinian society at large knows little about the pre-hispanic past, which gives greater impetus to stimulate such interest though the varied, original, and attractive undertakings of workshops.

Similarly, for the purpose of reflecting on the workshop strategy as public communication of archaeology, it is necessary to discuss the programme in relation to its multiple facets, such as the planning of these activities, their systematization while they are in progress, and their evaluation; the setting up of interdisciplinary teams and the associative strategies for the purpose of broadening and diversifying their scope, as well the success of the programmes. The reference to questions of cultural and archaeological heritage should also be borne in mind when archaeological topics are addressed publicly.

It can be said that scientific recreation helps the participants to construct knowledge about archaeology or develop ideas they already possess on an ephemeral and imprecise level (García, 2008). The programme is adjusted to the type of public it is serving, setting up a dialogue with the participants that surpasses the often one-way nature of knowledge communication. It is important to stress the planning and systematic approach to the activities, the advice from specialists in education, and the continuous formation of the team in consolidating the workshop with relevant experience. In this programme, the activities allow students to approach the subject on the basis of their previous knowledge, initiating them from the 'other's' knowledge, generating an experience of playful learning (playing at being archaeologists), working with archaeological materials, and even sketching an interpretation of archaeology.

The evaluation strategies that archaeology workshops implement allow them, besides suiting the programme to the requirements of the public, to utilize instruments that can function as systematic documentation and evaluation of the workshops. As

García (2008) maintains, for many scientists involved in public communication of science, workshop dynamics lack the evaluation stage, and as such few studies are published in an academic context and those that are present such projects in a descriptive and non-critical way. Without an evaluation there can be no specific quantifiable results, nor is there opportunity to identify areas of improvement so as to increase the efficiency of the workshops. The outcomes of such projects must go beyond the mere description so as to include the analysis and the conceptual and critical reflection.

Another equally important aspect of running successful workshops is specific training in the area of communication. As Calvo (2002) maintains, if we really believe in the need for public communication (of archaeology), as an instrument of cultural egalitarianism and access to knowledge, we must devote greater resources to the training of scientific communicators. Training is the motor behind any professional activity in a period of increasing demands for quality and specialization. In the case of archaeology, the majority of workshop leaders carry out their task with great conviction, but without other groundwork than a specialized knowledge of the scientific/archaeological material they wish to deal with. In this sense, the importance of the work in interdisciplinary teams must be stressed, as in the case study above, in which the collaboration of professionals in various disciplines proved beneficial in covering pertinent aspects that were lacking in the team (e.g. educational-pedagogical, design, writing, drawing, and crafts). Mainly in aspects related to specific matters of the public and their learning characteristics, as suggested by García and Meza (2008), it is abundantly clear that it is not enough to have the professional training in the scientific contents to be communicated or the personal motivation to participate in activities of this sort. It is necessary to possess pedagogical or psychological-pedagogical knowledge on the characteristics of the public to be dealt with, as well as the didactic communication strategies that will assure the efficacy of the effort and generate a favourable atmosphere for collaborative work.

Workshops are a useful tool for public communication of archaeology as the close and interpersonal relationship established with the participants guarantees personal communication, in which the interchange is more intense. As Herrera Lima (2007) maintains, it is necessary to address the workshop participants' life worlds, their way of building meanings, their shared representations and references; all of this articulated with their placement as a social subject. Thus the knowledge of potential publics, audiences, recipients, or mediators is the initial condition from which communication and education projects can be planned with a high probability of success. However, a limitation of this methodology is the small number of people that can attend (normally these groups do not exceed 25 or 30 participants), which requires numerous activities to be carried out in order to be able to reach large publics. In this sense it becomes necessary to interest and stimulate the formation of new groups, in order to considerably widen the coverage, without sacrificing the impact of the activities. Actions are needed to attract and train new communicators and workshop leaders for this purpose. It becomes crucial to diversify the origin of the workshop-leaders, promoting the participation of other sectors in the task of communication by this medium, such as teachers, researchers and advanced students. As Diana Cazaux (2008: 63) maintains:

> though spreading knowledge does not make people wise (any more than watching football does not make us soccer players) it manages to make people sensitive to the importance of science, generating interest in the results, creating a favourable climate for certain experimentation, and nurturing scientific vocations.

The effort of a well-managed workshop can generate very high impacts on the people involved. It is not just a matter of spreading archaeological knowledge as though the public were a mere recipient that absorbs it uncritically. Direct interaction, constant feedback, and timely adjustments have a significant impact on the participants and by involving them in the process of knowledge building, substantial contributions are made to scientific culture by the individuals involved.

An equally important matter to remember in these activities and strategies is the importance archaeologists assign to the archaeological heritage. In this work it is assumed that each and every one of the actions of public communication of archaeology, within the framework of non-formal education, have an effect on the attachment of value by society to the archaeological heritage, not only from the way the public appropriates it, but mainly from its presentation. Here it is crucial to acknowledge that in the venture analysed above this question cuts across the whole activity of the workshop and is even explicit in each of the propositions established in the general framework of the project.

Public communication of science fulfils a central role in the process of social construction of knowledge of archaeology but it has not yet been possible to emphasize its role, which leads to a rupture of communication, even within the archaeological community. In Argentina, the establishment of archaeology workshops in the framework of non-formal education continues to be an unsystematized, non-conceptualized activity, and its impact is usually unassessed, although its stated benefits are numerous. It is necessary to begin training potential workshop leaders by generating systematic models of activities that involve epistemological, pedagogical, and methodological elements, and documenting projects carried out, the experiences they produce and, above all, the mistakes made in them. Most archaeologists maintain that these activities are little-known, and lack prestige in the academic milieu (Conforti, 2010a). Still, in order to earn recognition it is very important to do them in a systematic, planned, and controlled way. Additionally, it is necessary to network with different social institutions (not only schools and museums, but neighbourhood organizations or NGOs) and with specialists in education and communication that are able to make contributions to central aspects of the educational or communicational process lying beyond the area of archaeology (Conforti, 2010b).

To conclude, it is important to reflect on the mediation of archaeologists as communicators. As Martín Barbero (1990: 13–14) maintains:

> the communicator discovers that the dissemination of a work or the comprehension of the sense of a practice does not have as its only limits the density or complexity of the text, but the reading situation, and the interweaving in it of not purely cultural social factors. To accept this perspective in no way goes against the specificity of the information or the cultural work, but is rather the acceptance that this specificity is not made only of formal differences but also out of references to worlds of life and modes of use.

This way of conceiving public communication of archaeology establishes a starting point, so that the professional that utilizes it will have an integrated view of the

socio-cultural context in which the recipient public is placed; a view that will allow that person to place themselves according to the receiver's outlook and develop the representational forms that may be found significant in that context (Herrera Lima, 2007). In the case study which has been presented and analysed here, this is the road that has begun to be travelled.

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Notes

[1] The classical conception holds that 'knowledge must be shared, distributed, education given'. Science produces 'scientific facts' and these are transformed (are adapted) and spread to a wider public by means of popularly accessible books, Internet pages, articles in magazines specializing in scientific dissemination, newspaper articles, and television documentaries. This classical model is part of the learnt cultural inheritance, memorized and repeated by generations of scientists and also, for instance, by disseminators and journalists that accept that their 'function' consists in being the 'bearers of truth' in science, the driving belt of two unconnected worlds (Polino and Castelfranchi, 2008: 10).

[2] All these data correspond to activities carried out during the workshops held in 2009.

[3] The possible causes of the answers 'No answer (N/A)' and 'Don't know' (D/K) are not gone into in this analysis.

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