Integrating Primary Sources into the Elementary School Classroom: A Case Study of Teachers' Perspectives

Anne J. Gilliland-Swetland, Assistant Professor (to receive correspondence)

Department of Information Studies, University of California at Los Angeles

212 GSE&IS Building

Los Angeles, CA 90095-1521

E-mail: swetland@ucla.edu

Yasmin B. Kafai, Assistant Professor

Department of Education, University of California at Los Angeles

2331 Moore Hall

Los Angeles, CA 90095

E-mail: kafai@gseis.ucla.edu

William E. Landis, Manuscripts Librarian

The University of California, Irvine Libraries

Department of Special Collections

P.O. Box 19557

Irvine, CA 92623-9557

E-mail: blandis@uci.edu

Integrating Primary Sources into the Elementary School Classroom: A Case Study of Teachers' Perspectives[i]

Abstract:

There have been increasing calls in recent years for archivists to become more engaged with the K-12 community and for primary sources to be more integrated into K-12 curricula. This paper discusses effective ways to incorporate primary sources in the classroom, and examines teacher attitudes about the use of those sources. The paper begins with an overview of efforts by both the archival community and developers of digital resources to develop primary source-based programs for use by K-12 communities in both formal and informal education settings. It then describes the methodology used to conduct this case study and the case study findings. It concludes with a discussion of the implications of this research for developing a systematic archival and educational infrastructure and a coherent theory base for K-12 educational use of primary sources.

Introduction

Most archival efforts with children and young adults to date have focused either on informal education through the development of exhibits, educational packets, or tours; or on formal K-12 education by bringing classes of students to the archives and conducting a program for them there. What these activities lack, however, is the ability to develop the centrality of primary sources in formal classroom activities. A critical issue facing archivists is how to effect such classroom implementation. How does one encourage such uses? How does one identify likely teachers? Who will work with teachers to help them articulate their needs, select appropriate content, facilitate the integration processes, capture and document the lesson so that it can be used again, and evaluate the pedagogical and learning outcomes in order to refine the processes further?

A research team at UCLA embarked upon a classroom intervention that addressed several of these issues. The research team included faculty members and graduate students in Archival Science and Educational Psychology working with elementary school teachers and the archivist for the UCLA History of Medicine Collection. This case study was conducted as part of the UCLA Digital Portfolio Archives (DPA) Project, which explored issues associated with the integration of scientific primary sources into the formal elementary school learning process, and the associated implications for the development of digital systems that support classroom learning using archival materials.[ii] The goals of the DPA Project were:

1. To engage archival and education researchers directly with elementary school teachers and students in order to assess issues of intellectual accessibility of primary sources by this community.
2. To examine evidence of archival literacy in 4th and 5th grade students.
3. To evaluate the possible benefits of using primary sources to enrich elementary science education.
4. To explore the implications for the design of DPA environments that might be used for elementary learning, information retrieval, and collection management.
5. To explore effective ways of incorporating primary sources into classroom activities.
6. To examine teacher attitudes about the use of primary sources in the classroom.

This paper focuses primarily on the fifth and sixth of these goals, that is, effective ways to incorporate primary sources into the classroom, and teacher attitudes about the use of primary sources in the classroom. The approach used by the DPA researchers included identifying teachers who had some prior knowledge of working with primary sources; pre-selecting and then re-describing archival materials of strong local significance to be used by the teachers and children; using field trips to a site similar to those where the archival materials were created and to the archival repository where they are currently housed; and digitizing original materials and incorporating the digitized versons together with enhanced descriptions into a Website designed for classroom use. In this project, archivists, teachers, and researchers all worked together to develop, teach and evaluate a classroom implementation that corresponded to state curricular framework requirements; and to provide auxiliary contextual materials for classroom use such as biographical information, contemporary magazine articles, and early film footage.

This paper begins with an overview of efforts by both the archival community and developers of digital resources to develop primary source-based programs for use by K-12 communities in formal and informal education settings. It then describes the methodology used to conduct this case study and the case study findings. It concludes with a discussion of the implications of the DPA research for developing a systematic archival and educational infrastructure and a coherent theory base for K-12 educational use of primary sources.

Background

In 1972, Hugh Taylor traced the use of primary sources in English schools from 1906 until the early 1970s. These schools applied what was known as "source method" by using printed extracts of documents, rather than the actual archival documents themselves. This approach was used despite the richness of historical resources, such as ecclesiastical manuscripts and local historical sites, available and accessible to schoolchildren in and around their villages. Taylor noted that there were pedagogical limitations to not working with the actual document as *artifact* and that the learning experience could have been significantly enhanced by drawing upon local historical resources that were readily accessible to school children:

> How different are the circumstances if the school uses its own environment--the village and the farms, the streets and the lanes, the church and the inn--as its

> special field of study--a ready-made and inexpensive historical laboratory on its own doorstep! and how easy it is when the teacher is really interested, for local study carried out in this way to serve three or four distinct and all educationally important purposes. Valuable as it is, the least important result of such historical study is the factual knowledge gained. More precious is the emotional insight which the child acquires for the rest of his life. This gives him an added keenness of perception, a historic "awareness" of and an enlightened interest in his environment, a sense of local pride and a consciousness of local achievement.[iii]

Taylor's thoughts echo the approaches advocated by educational theorist John Dewey in the early 1900s, who maintained that experience is what helps lead to education and gives meaning to abstract concepts.[iv] Dewey's ideas continue to be influential in contemporary theory about knowledge construction, and together with the work of Jean Piaget, who developed the concept of stages of development in children, have strongly influenced contemporary museum K-12 education activities.[v]

Formal learning generally takes place under the aegis of classroom instruction, with defined curriculum and stated pedagogical objectives frequently tied into educational standards or frameworks. Informal learning, also known as "free-choice learning" refers to the kinds of learning experiences that take place outside of the classroom, such as those often facilitated by museums. Promoting both formal and informal learning using primary sources has become a key function of museums, many of which have staff dedicated to educational programming. Indeed in 1992, the American Association of

Museum's Task Force on Museum Education explicitly recognized the important service role that museums play in learning for populations of all ages:

> Museums provide their most fruitful public service by providing an educational experience in the broadest sense; by fostering the ability to live productively in a pluralistic society and to contribute to the resolution of the challenges we face as global citizens.[vi]

There are, of course, qualitative differences in the missions of archives and museums[vii], and in the nature of the primary sources they hold in terms of how they lend themselves to artifact-centered or evidence-based education. The benefits for young students, however, of working with primary source materials, whether they be from museums or from archives, are manifold. Such benefits extend beyond the acquisition of historical subject knowledge, and can be referred to under the rubrics of *information literacy* and *archival literacy*. Information literacy relates to information users' abilities to recognize when information is needed and to locate, evaluate, and effectively use information[viii]. Archival literacy relates to users' consciousness of their documentary heritage and the role that records play in establishing and protecting their rights and in recording and communicating their heritage. Archival literacy also relates to users' abilities to apply evidence-seeking as well as information-seeking skills. These skills include the ability to consider individual documents in the context of their record aggregations, making sense out of unsynthesized or unredacted material, considering the circumstances of creation of the document (i.e., asking *who, what, when, why, where*, and *how*), considering the

nature, form, version, and originality of the document, and considering the chain of custody of the document.[ix]

Archivists traditionally have been interested in developing the use of primary sources by K-12 communities out of a desire to broaden and diversify the archival user base. Today there is additional motivation for archivists to work more closely with the K-12 community. In the United States, archivists are increasingly responding to political mandates (and by implication, funding opportunities) that aim to provide increased access to a wider range of information resources by all citizens through the implementation of digital technologies. Recent federal and state curricular standards seeking to improve the quality of education and learning across the curriculum in part by recommending the incorporation of more primary sources into learning activities[x], and in part by emphasizing the development of children's information literacy skills, also encourage the development of archival classroom-partnerships.[xi] What archivists lack in their efforts, however, is a robust archival and educational infrastructure and a coherent theory base supporting such use in the context of both formal and informal K-12 education. This is in part because archivists' practices, constrained by concerns about the preservation of original materials and the often specialized nature of those materials, have still not achieved optimal levels of physical and intellectual accessibility for K-12 users. It is also, however, because archivists have had difficulty in identifying where, when, and how they might most effectively and usefully become engaged in classroom activities, and in understanding which types of activities might best address curricular and developmental needs.

In the archival literature, a few promising strategies have been identified whereby archivists can become engaged in K-12 education and address associated intellectual and logistical issues. For example, Ron Chepesiuk, reporting in 1983 on educational programs in Great Britain and Ireland, outlined some of the practical problems teachers experienced in working with archival sources in the classroom. These problems included teachers' lack of knowledge about how best to incorporate such materials, lack of time because of administrative duties, unwillingness to try new things in the classroom, and distance from an archival repository.[xii] Chepesiuk made two main recommendations, firstly, that there be an archives staff member available to work directly with teachers and students; and secondly, that there be a staff member in the archives with some teaching background who is able to "nurture" teachers and encourage them to incorporate archival materials into their classroom. The eventual aim of nurturing teachers was to "train" them in sufficient numbers that they would begin to influence curricular decisions and recommendations by school boards and standards-setting bodies in favor of incorporating these primary source-based pedagogical approaches. More recently, Ian Wilson, has argued in favor of less staff-intensive approaches, such as developing a range of tailored exhibits and publications, as well as providing guides to how to use different source materials and classroom teaching kits for teachers.[xiii]

In 1998, Sharon Anne Cook, a self-described Teacher-Archivist, looked at both archives and museums in Canada in terms of the role they might play as "educators" through public programming in education, especially in light of coping with increasingly sophisticated curricular requirements and mainstreamed classrooms. In reviewing progress in this area in Canada, however, she lamented the lack of coherency in

educational programming strategies. Cook addressed the issue of how to bridge the professional domains and expertise of teachers and archivists by recommending a strategy of professional partnerships. Such partnerships, she argued, might take the form of incorporating student teachers into public programming activities, especially teachers who have a research component to their program, such as the production of specialized educational kits.[xiv]

Providing Archival Materials Online for K-12 Activities

Today digitization and networked online access technologies provide new tools for archivists who wish to increase use of their holdings by the K-12. Several sets of guidelines have been developed for digitization projects that set out content selection criteria that can be applied to make digitized archival content more relevant for K-12 use.[xv] The issue of whether or not to pre-select materials for classroom use is a debateable one. On the one hand, pragmatics on the part of both the archives and teachers argue that it will be much easier to encourage use if materials are pre-selected, and certainly when digitizing materials, some selection is almost always going to have to occur. Pre-selection by archivists, optimally in consultation with teachers, helps teachers to quickly find and incorporate developmentally and topically appropriate archival materials into their curricula terms. On the other hand, however, there are certain ends that pre-selected and indeed digitized materials cannot achieve. Hugh Taylor alludes to two of these: firstly, the pedagogical benefits of introducing students to a:

> genuine experience by simply placing an unsorted group of papers or series with unspecified contents in front of him and saying, in effect, 'enter into a dialogue with these records, this tiny fragment of thousands of tons that have been written, and ask your own questions and draw your own conclusions; expose your personality to them and see what happens; there is no right or wrong answer.'[xvi]

Secondly, digitization and online dissemination of archival materials can preclude students' ability to experience the original. Such experience, in many cases and certainly at particular stages in students' cognitive development, is part of the important learning that can take place from working with primary sources.

The Library of Congress (LC) has perhaps done the most to date to identify and meet the needs of K-12 in terms of online access to digitized copies of archival materials. LC's American Memory Project has selected material of particular interest to middle and high school teachers and students.[xvii] Between 1991 and 1993, the Library of Congress conducted a formative K-12 user evaluation of the American Memory Project. That evaluation found that successful use of American Memory by K-12 communities appeared to depend upon:

> teachers' perceptions of students' need for and ability to use primary source materials; the degree to which American Memory collections support preferred teaching methods, including outcome-based education; the amount of teacher and librarian involvement in introducing American Memory primary resource

collections to colleagues and students; the degree to which American Memory collections support the curriculum. [xviii]

LC is developing Internet teaching tools to help teachers exploit these materials and alternative search pages for middle and high school students.[xix] LC has also worked to establish an American Memory Fellows Program to bring in teachers to work with the collections and build curricular implementations using primary sources. This new program will help to teach users how to use the collections in teaching critical thinking and writing skills in the classroom, as well as the relevant subject curriculum.[xx]

One of the associated outcomes of digitization and online dissemination technologies is that archivists are beginning to examine more closely the intellectual accessibility of archival description for non-scholarly communities, including the K-12 community, and ways in which description could potentially be made more effective for less traditional users who might encounter it online.[xxi] An outstanding issue, however, is that archivists and others engaged in building digital environments for information discovery and retrieval, focused as these are on ease of use, are unlikely to be building environments that are concomitantly optimized for the reflective processes of learning. The Online Archive of California (OAC), a union database of finding aids and digitized archival collections from archives and museums across California, is one project that has recognized this issue and has begun to address it. The OAC is planning to develop interfaces to encoded finding aids and digitized archival content tailored to specific user communities, including K-12. In doing so, OAC developers will draw upon the results of

a user evaluation project that is currently underway, examining both scholarly and K-12 user needs.[xxii]

What becomes apparent from the review of the existing projects and studies is that there has been little systematization and evaluation of ways to build robust archives-K-12 partnerships, to integrate primary sources into K-12 activities in developmentally appropriate and pedagogically effective ways, to understand and address teacher needs and expectations, and to assess the relative merits of using original, printed facsimile, or digital copies of archival materials in the classroom. The case study described in this paper incorporated recommendations made by these projects and studies, explored further associated issues, and raised additional areas for consideration by focusing on the teachers' perspectives.

Classroom Implementation for the DPA Project

The classroom implementation for this case study took place in two integrated 4th and 5th grade classrooms in a laboratory elementary school associated with UCLA. The researchers approached the school approximately six months in advance of the planned classroom implementation to ask about the school's willingness to participate in the research and to identify teachers who might be interested. The researchers had also prepared a written research protocol and human subjects clearance (the school also required that the research protocol go through their own human subjects research approval process because of the participation of children in the research). Two teachers were identified by the school who would likely be interested in participating in the

research. One of these teachers had already had considerable experience in working with primary sources, and the other teacher worked closely with the first and with the same grade levels. Both teachers agreed and together with their classes, one in science and the other in social science and each consisting of 29 students, participated in the research activities. The teachers from each class had different educational backgrounds and teaching interests, one in history and the social sciences, and the other in the natural sciences. As a baseline activity for the case study, we asked the teachers several questions in advance of the classroom intervention about their knowledge and attitudes toward history and philosophy of science or social science (as appropriate to each teacher's area of expertise). The questions about teachers' understanding of their respective subject domains were taken from an interview guideline developed by King to examine teachers' knowledge and attitudes towards history and philosophy of science.[xxiii] The responses to these questions are summarized in Table 1.

[insert Table 1]

Because teachers in the school identify classroom curricular content within each area at least six months in advance, the research project started in the academic year prior to the planned implementation with a series of planning meetings in which the two teachers and researchers met to discuss potential classroom activities, the selection of appropriate archival materials, and the logistics of organizing field trips. The researchers paid for substitute teachers in order to allow the participating teachers the time to take part in the planning activities.

Phase I: Working with teachers and the archivist to select archival materials

In addition to the teachers and the researchers, the archivist for the UCLA History of Medicine Collection also participated in the DPA research, thus creating a unique partnership to facilitate the classroom implementation. The researchers worked with the archivist to identify candidate archival materials for the classroom implementation. The group then met together to consider which aspects of these materials might work best in the elementary education setting, as well as local curricular objectives and the time necessitated for the preparation of the digital description and copies of selected materials. The group decided that the project would be designed primarily around one set of materials drawn from the Donald Ryder Dickey Collection, which is housed in the History of Medicine Collection in the UCLA Biomedical Library.

During his extensive field work in Canada, Hawaii, Laysan Island, California, and Baja California between 1908 and 1923, naturalist Donald Ryder Dickey created a black and white photographic collection containing over 7,000 images in various formats, collected over 50,000 specimens of birds and mammals, and kept detailed field notes of his research trips. While chiefly documenting individual species, especially birds, the Dickey photographs also include habitat and general landscape photographs. The collection is of particular significance not only because Dickey's work was extensively published in journals such as the *National Geographic*, but also because his work documents Southern California before the post-World War II population explosion forever altered the landscape, flora, and fauna.[xxiv]

The researchers chose this collection because it had several of the characteristics of primary sources previously identified as important for K-12 use,[xxv] and it also provided a challenging test case for metadata development, another research aspect of the DPA Project. The collection's wealth of visual materials was augmented by a variety of materials in other formats, including textual materials and physical specimens, that had been retained and described in a finding aid according to Dickey's original classification scheme. The research team felt that this arrangement and description provided considerable insight into Dickey's documentation practices and would thus help students to think about how the work of naturalists has changed over time. Since the collection largely documents Southern California areas with which students might be familiar and to which they might take field trips, the collection seemed to be especially relevant for comparative use in classroom units on ecology and environmental awareness.

At a preliminary meeting between the researchers and the teachers to discuss the nature of the curricular implementation, it was decided that the participating classes should make a field trip to a wetlands site in Los Angeles similar to sites documented by Dickey. In order to support the field trip activity, the researchers examined photographs and field notes from field trips that Dickey made in Southern California and selected for digitization 50 photographic prints and 23 pages of notes from 7 different field trips that were contained in Dickey's field notebooks. The photographs selected for digitization had been mounted on reference cards and included Dickey's own holograph and typewritten classification and descriptive notes regarding the images. Using Biomedical Library facilities, the researchers created 72 dots per inch (d.p.i.) black and white GIF images and

a smaller thumbnail image for each selected item. The researchers also created Dublin Core metadata for individual images to facilitate their identification, retrieval, and comparison on the Web by students. During the subsequent classroom activities, the students were asked to create similar metadata for materials they had created during field trips which were also incorporated into the Website.[xxvi] Although Dublin Core metadata represent a very simple metadata schema designed in part to be able to be used by non-experts to describe materials that they have created, the descriptors used for some of the Dublin Core metadata elements were modifed at the suggestion of the teachers in order to make the purpose of the element more apparent to the students.[xxvii]

Phase II: Classroom activities

In November 1997, class A participated in the research activities over the course of two weeks. After a vacation break, class B participated in the same sequence of research activities. At least one researcher was present during all the classroom activities and worked together in class with each teacher. Over the two-week period of research activities, each classroom met every day for about 45-60 minutes to participate in the classroom and research activities, resulting in approximately 7-8 research meetings per class. A variety of methods were used to document classroom activities and collect information from teachers and students, including videotaping activities and analysing student work. The student work included fieldnotes made and photographs taken during fieldtrips; selection and rationale for which of the photographs they wished to retain and digitize for documentary purposes and which they wished to discard; assignment of

Dublin Core metadata to the selected photographs; comparisons between each fieldtrip; comparisons between Dickey's materials and their own; comparisons between original and digital materials; transcriptions of Dickey's fieldnotes; historical photograph analyses; and role-playing exercises. Most of the documentation on the teachers was collected through pre-and post- classroom intervention interviews. Each interview, lasting about thirty minutes, was conducted by researchers, taped, and subsequently transcribed for further analysis.

Each class first participated in a short field trip to History of Medicine Collection at the UCLA Biomedical Library, where the students visited the facilities that housed part of the Dickey Collection. The class was split into two groups, and while one group visited the closed stacks, the other listened to an introduction to the Dickey Collection given by the archivist. The archivist showed the students a number of different items such as the original glass plate negatives, index cards accompanying the photos, field notebooks, and two taxidermied birds (the specimen collection is not housed in the same building as the archival collection). Students were able to examine and physically touch items, read passages from the fieldnotes, and ask questions. The other group, meanwhile, examined the filing cabinets and shelves in which the all the photographic negatives, notebooks, and index cards were stored, thus gaining an appreciation of the physical extensiveness of the collection. After that, the groups switched places and participated in the other activity. A team picture was taken at the end of the field trip.

The major field trip involved a full-day visit to the Ballona Wetlands, one of the few remaining nature reserves within the Los Angeles metropolitan area. The wetlands are

located within a forty-minute bus ride from the school. They are connected to the Pacific Ocean and surrounded by housing, roads, and the Marina del Rey yacht harbor. Before the class left the school, researchers introduced the class to description and field note sheets that they would use to document their research activities. Each team was also given a disposable camera, a clipboard for note taking, and a logsheet on which they were instructed to list brief descriptive information about the photographs they took. As a way of introducing the wetlands, the resident biologist at the Ballona Wetlands showed the students his diary containing his own field notes. He then invited a student to read his observations of bird appearances and behaviors that he had written earlier that day. Many student team members not only took photographs and wrote log records for those photographs, but also, emulating the biologist, used their field note sheets to record their own observations.

As background to the field trips, students were given a homework reading assignment of a short biographical essay about the American naturalist John Muir taken from *Cobblestone Magazine*. This reading was later discussed in class together with historical footage taken from two films about early Los Angeles.[xxviii]

Phase III. Assessing teachers' perspectives on working with primary source materials

As most educational research has shown, teachers are instrumental in the ways in which curricular activities are implemented in their classrooms. Their views on the subject matter, as well as their beliefs about what students should learn and how they should

learn it, guide their choice of pedagogical materials and activities as well as their interactions with them. Any research intervention that proposes an alternative approach or introduces different materials needs to take these factors into account. For these reasons, and because this project represents a unique case study for archival researchers in terms of working directly with teachers, the DPA Project researchers conducted two structured interviews with each teacher, one before the start of the classroom intervention and one after the end of the classroom intervention. The science teacher had very little previous exposure to working with primary sources. When asked whether she had previously attempted to use primary sources in teaching, she stated that "I have [searched for materials and not found them], but I wasn't looking primarily for primary sources. I was looking for anything that would have pertained to [early California]. I never consciously looked for something and didn't find it because I didn't know to look for it." In contrast, the social science teacher had considerable prior experience with working with primary sources in the classroom, indicating that doing so had become common practice in K-12 social science education, that published facsimiles were widely available for use, and that this approach was heavily discussed at professional conferences and in professional journals, including a regular column in *Social Studies Professional*.

The interviews were designed to elicit the following types of information from the teachers:

1. The teachers' knowledge of and attitudes about using primary sources in the classroom, both before and after the intervention.
2. Feedback from the teachers on the classroom intervention and the project in general.

Teachers were asked questions both before and after the intervention relating to their knowledge of and attitudes about the use of primary sources in the classroom. Table 2 shows the teachers' definitions of primary sources before and after the classroom intervention. Table 3 indicates their previous experiences with primary sources and expectations for using them further.

[insert tables 2 and 3]

Tables 4 and 5 contain the teachers' reflections about the value of primary sources for students' learning and for teachers in teaching.

[insert tables 4 and 5]

Whereas tables 4 and 5 look at the teachers' perceptions of benefits of using primary sources in the classroom, table 6 contains their responses to questions designed to elicit their thoughts about possible limitations or obstacles to using primary sources in this way.

[insert table 6]

In the post-intervention interview, a final group of questions solicited feedback from the teachers about the classroom intervention, the field trips, the usability of the primary

source materials, and the project in general. The responses of the teachers are detailed in Tables 7-11.

[insert Tables 7-11]

Discussion

From working with the two teachers, the researchers learned that integrating primary sources into the elementary school curriculum can be a fruitful but also challenging enterprise. Teachers' input was central in all phases of the project to help the researchers to understand their concerns, students' interactions and the larger classroom context. The researchers identified issues that not only pertained to teachers' conceptualizations of primary sources but also to the integration of primary sources with other learning media and activities.

i. Teachers' conceptualizations of primary sources

Although both teachers had different disciplinary backgrounds and levels of experience in working with primary sources, there did not appear overall to be very significant differences between them in any of the areas investigated through the interview questions. Both teachers stressed the importance of teaching in a way that was experience-based, using materials with which students could make real connections. They stressed the need for students to be able to observe for themselves, ask good questions,

and evaluate materials critically. It was as important to the teachers that students understand the scientific process and method as it was that they fully grasp the content of the curricular unit. In terms of working with primary sources, both teachers identified primary sources as something *original* that *connected one to the past* and *made the past real*, and provided *another way to learn*. They also indicated that primary sources could come in *any form*-- textual, visual, and artifactual and that they could be very *powerful* in the classroom because they inspire *empathy* [emphases added].

Interestingly, neither teacher identified primary sources as something they or their own students might actually create themselves, although this was in effect what the students had done in the intervention. The teachers' fairly limited views of primary sources—as primarily historical and pre-existing—are important factors for archivists to take into consideration when working with teachers. The case study indicated that it was not only the use of historical, but also the inclusion of self-created primary sources that contributed greatly to the success of the project. The children, and indeed the teachers, came to think of themselves, through the classroom intervention, as creators of their own records upon which they needed to impose an order and which one day might also be considered archival.

ii. Teachers' attitudes toward integrating primary sources in the classroom

The one noticeable difference between the two teachers was the general framework in which they situated classroom work with primary sources. For the social studies teacher,

the historical context provided through the primary sources was key, while the focus on understanding scientific process and methods was central to the science teacher when elaborating the benefits of primary sources. While both aspects are important in either field, it is often the case that social studies focus on providing historical context whereas science sees the introduction to the scientific method as one of its main goals. With the use of historical and contemporary primary sources in the classroom activities, the researchers hoped to achieve an integration of these two viewpoints and yet it appeared difficult to break the disciplinary boundaries.

Within these two frameworks of context and method, both teachers saw the classroom integration of primary sources as an important aspect of students' learning. After the intervention, the teachers indicated that it had been a very valuable learning experience for the students and were very enthusiastic about finding ways to integrate primary sources into their curricula in the future. Some of the valuable aspects of working with primary sources that they noted included:

- Demonstrating to the students the *volume or extensiveness* of the materials created during the scientific process, particularly by means of the field trip to view the actual collection and through working with Dickey's field notes.
- Requiring the students, when emulating scientists in working with the materials they generated in the field, to do very *detailed work*..
- Helping students to do scientific work in a *more realistic manner*.
- Demonstrating the *interdependence* that exists between different phenomena and activities.

- Illustrating to students how they are living today in a *very different California* due to the process of environmental change.

When asked about possible problems with locating and integrating primary sources into the classroom, both teachers predicted that *language*, especially as it was used historically, would likely pose a problem for their students. Although the teachers did not follow up on this aspect in their post-intervention interview, the researchers observed that the technical language used by Dickey, as well as the language used by the archivists in describing the Dickey Collection, did pose problems for students.[xxix]

iii. Need for multiple media and juxtaposition of activities

The researchers found that use of primary sources in the classroom required direct integration with curricular activities and a range of other kinds of materials to be most effective in learning for students at the 4th and 5th grade level. They also found that composite and comparative activities (for example, both a visit to the historical repository and a wetlands field trip), a variety of ways to access and experience the primary sources (for example, viewing the originals in their repository as well as using digitized copies and transcriptions in the classroom), and use of supporting materials in a variety of media to re-create historical context or historical vignettes to illustrate personal biographies (for example, the historical film clips of early twentieth-century Los Angeles and article about John Muir) when taken together where what provided the richest learning experience for the students and the most stimulating teaching environment for the teachers.

Both teachers indicated in the post-intervention interview that the visual materials were particularly important with students of this age and that they would have liked to have had additional visual and artifactual materials available for the students, such as some of Dickey's actual notebooks and taxidermied specimens, as well as more photographs of Dickey himself. The teachers also indicated that both the field trips taken by the students contributed strongly to the power of the intervention in terms of expanding the boundaries of the classroom. Both of these latter observations on the part of the teachers appear to indicate that the use of primary sources in the classroom is likely to be most powerful when it is possible to combine original materials with facsimiles (digital or otherwise) and guided learning with an experiential component. In other words, it appears that for young students to come to terms with the contexts in which archival materials are created and the role of archival repositories in retaining them, they need not only descriptions about the provenance and context of the materials but they also need to experience the environment in which the materials were originally created and are now housed. Adult users of archival materials usually have some understanding of the role of archives in collecting and preserving materials, and have often been trained intellectually to recreate the historical and functional context of archival materials with the assistance of archival finding aids and a reference archivist. Children, on the other hand, may need to have those contexts recreated in a much more tangible way through activities such as field trips, role playing, or emulating activities and creating their own records (thus, as Taylor recommended, maximising one's own environment).[xxx]

In contrast to the multiplicity of classroom activities, this project also demonstrated that a comparatively small amount of primary source material, *if appropriately selected, described and contextualized*, can provide more than enough content for elementary-level classroom activities like those described in this case study. In this case study, having the archivist first identify a range of materials that had high visual appeal and that appeared to be relevant to the curriculum being taught, then having teachers look over sample materials and make a final selection, and finally working with the advice of the teachers to enhance and simplify the description of those materials worked very well. The teachers knew best what kinds of material would translate well into classroom activities (both in terms of curriculum and also the students' developmental capabilities) and what they would need to do themselves in order to contextualize and otherwise help the students to come to terms with them. While this may seem to be an inordinate amount of work for a single curricular unit for two classrooms, it is worth noting that the implementation, once put together, could be documented and repeated each year for new classes, or made available to other schools with very little additional effort.

One other point that should be made here is that even teachers cannot always predict when a fertile teaching or learning opportunity can arise serendipitously due to a student observation, an artifact brought from home by a student, or an action of a guest speaker. Such was the case in this study when the biologist at the Ballona Wetlands volunteered his own fieldnotes for the students to examine, thus giving students the opportunity to view Dickey's historical notes and those of a contemporary expert, and then to create and compare their own. The more flexible and multi-faceted the curricular intervention using primary sources is, the more likely that such serendipitous opportunities may arise.

Concluding Remarks and Areas for Further Research

The experiences of the DPA Project researchers with this case study illustrated that archivist-teacher partnerships can be extremely effective and rewarding for all participants, even with elementary school students and curricula outside the social sciences. This case study raises several considerations that are important for any archival repository or school wishing to become engaged in archives-classroom programs for elementary education. These considerations include how teachers can be involved in the selection of primary sources for use in the classroom; how teachers can achieve a rich mix of primary source-based activities without encountering confounding resource issues (including technological and knowledge resources); how teachers can develop evaluative criteria for what did and did not work in terms of the age-appropriateness of the primary sources and the curricular activities; and what archivists and others can do to encourage and enhance primary source-based activities in the elementary classroom.

This case study, however, marks only a beginning of such investigations, and thus it concludes with several questions that deserve further research:

- How might the nature of the primary sources used vary by content area and by developmental level of the students?
- What do students learn from accessing materials digitally that is different from accessing materials physically? How important is it for classroom enrichment that students are able to experience both?

- Is there a role for archival instruction (i.e., inculcating archival literacy) in K-12 education similar to the bibliographic instruction that many students receive. If so, who might be responsible for delivering it? Should instruction in working with primary sources be included in the education and training of school media specialists?
- What are the long-term implications for students' scientific knowledge development and the teaching of science when these take place within a socio-historical context?
- If children are successfully exposed to primary sources during their elementary education, will they voluntarily seek them out or incorporate them into other learning activities as they continue with their education?

Table 1. Teachers' Knowledge and Attitudes towards History and Philosophy of Science or Social Science as Indicated in Their Responses to Pre-Classroom Implementation Interview Questions

	Teacher Class A (Social Sciences)	Teacher Class B (Sciences)
Q1: What is social science/science?	To me it is teaching of everything. It's geography … citizenship, community involvement, economics. Social studies really encompasses what life is.	It's a way to explain the natural world and question what's going on in that world, and to systematically answer the questions you have about how the world works.
Q2: How is scientific knowledge produced?	You always have to start with what children understand so that they do build on something And that's relatively easy in the social studies.	By asking questions, coming up with, observing phenomenon asking questions about that phenomena ... trying to prove the answers, ... and then coming up with proofs for that hypothesis or disproofs.
Q3: How do you think social science/science should be taught?	I think you can use a whole variety of strategies such as role play ... to look at what life was really like by looking at the person's life. ... For me the main thing is to know that people were real.	It needs to be very hands on, very experienced based ... getting them to begin doing some of their own hypothesizing and then creating ways to go about proving it.
Q4: Why is understanding of social science/science important?	I think we need to constantly be looking at why … who we are as a nation and what this nation represents and the documents that were created. You can't do that without understanding the past.	People need to be scientifically literate, otherwise they are prey to all kinds of scams and ridiculous theories.
Q5: What are your goals as a social science/ science teacher?	To teach a student how to... become a learner, to learn how to do research, to understand, to sift through material and understand what is important and what may be of less importance. To understand how to verify facts, how to be able to write well, to communicate.	To help children to love science, to help children come up with good questions to ask, learn the processes of science, and apply them to their lives, see how it applies to their lives and, and learn some content too, also to look at big concepts and to start being able to overlay them... it's transferring.
Q6: What is most important to teach about scientific discipline?	N/A	The scientific method I think is important for them to see that there are steps that need to be followed... I think what's most important [is] to teach method.
Q7: What is most important to teach to elementary students?	It's a foundation. ... for what comes in high school ... and I think a love for this stuff. You want kids to want to know why and I think social studies is a really good place for wanting to know why things are the way they are.	Big concepts, and how to go about questioning those things that they are looking at in the world, observing, the process skills, the processes are very important to me, more than the content.

Table 2. Teachers' Definition of Primary Sources Before and After the Project

How would you define "primary source materials"?	PRE	POST
Teacher Class A (Social Sciences)	Something that connects you directly to the past ... It can be anything ... it can be a thimble, it can be a newspaper, it can be a picture.	[A] primary source is a direct link to the past. It can be either written or oral material. Anything that was actually done in the past that allows … in this case, students or children to be able to understand better about what happened, to bring history alive.
Teacher Class B (Sciences)	They are the original, or materials similar to … if … you can't get the original, to the original material that people used in the past.	Photographs, journals, drawings, anything that was originated from the person that or people that we are studying about. Something that was done historically it seems by the people ... in any shape or form.

Table 3. Teachers' Prior Experience with Primary Sources (Pre-Classroom implementation) and Expectations for Further Use (Post-Classroom Intervention)

	What are your previous experiences with primary sources?	**Would you consider using primary sources again in your curricular activities?**
Teacher Class A (Social Sciences)	In everything. We use them to enhance some sort of dramatic play or ... people will bring things ... and we'll look at them and or I'll bring things in and ask them to try and decide ... what's the material made of. How is it used? To what purpose. What important role did it play in society, so it's like guessing games.	I use them in everything, so we're using them now for the study of the Gold Rush. It should be in everyone's teaching.
Teacher Class B (Sciences)	In teaching social studies over the years, California history and things like that, we pulled up diaries of .. the pioneers and the miners ... or pictures that we got, ... but primarily in history.	Definitely, yes. ... Next year when I'm doing oceanography I would love to be able to find some ... people historically who have done a lot of work with oceanography and (use materials) in a similar way ... I would be interested in pursuing some of the medical areas.

Table 4. Teachers' Assessment of the Value of Primary Sources for Students' Learning

	PRE **Where do you see the value of primary sources for your students' learning?**	POST **Where do you see the value of the Dickey/Ballona activities for your students' learning?**
Teacher Class A (Social Sciences)	It's a very powerful tool because everybody has empathy and you become very empathetic because you're seeing real things. It's a very powerful tool because it … sucks you in because it's real.	Very powerful because [it helps students] to understand to really be a scientist means you don't collect three samples but the thousands and thousands of samples that he collected in order to be able to make generalizations or to be able to put forth theories. So in terms of that, those kinds of real experiences … it really brought to the fore that these were real flesh and blood people, living in a very different California, and I think [the students] got that … it's a very different world that they live in.
Teacher Class B (Sciences)	I'm not sure, I'm looking forward to seeing it ... But as I've been hearing everyone talking about it, it's a skill, a resource, another way for them, I mean, to learn about the world.	I think it was really valuable for them getting to see how a scientist works, getting to see the amount of work and materials and the kind of observations scientists make. I think those were really valuable experiences for the kids ... It reinforced and was another way for me to see to help children work as scientists and to really get to do scientific work in a more realistic kind of manner.

Table 5. Teachers' Assessment of the Value for Teachers of Using of Primary Sources

	PRE **What do you see as the value of using primary sources for you as a teacher?**	POST **Where do you see the value of the Dickey/Ballona activities for you as a teacher?**
Teacher Class A (Social Sciences)	All of [a] sudden a picture becomes a real person to them and it's empathy, it's an understanding of something that to them looks very foreign and strange, and that .. all of a sudden you can feel the connection to this. It's very powerful.	You can't be a scientist, you can't be a historian until you, unless you really go out, unless you go out and do the work. So what it does is it opens … it expands the classroom walls. It gives a chance to see that what they are learning in class is relevant ... they had an opportunity to see many range of different occupations, and then of course they were looking at Dickey who was a scientist, so, that was really nice.
Teacher Class B (Sciences)	I'll be learning how to do it too, so I see it as a really good learning activity for me ... Once I understand it more then it will easier for me to see how I can make it fit in other places.	Because I think it gives history a reality, where, otherwise it's just words and you're telling them about something that happened way before they were born in a time when they have no concept of what was going on.

Table 6. Problems with Using Primary Sources for Teachers and Students

	PRE **Students' problems with using primary sources**	POST **Were there kinds of primary sources that you would like to have had beyond those we provided? Can you give us examples?**
Teacher Class A (Social Sciences)	Language, always, because, depending on how far you go back it becomes … sometimes … a challenge for them the way old English was written … up till the 17th century.	I would have tried to find more pictures of [Dickey]. That I think would have been really important and more sites … I think that kids, especially at this age … to find sites that they know today, ... that would take a bit more doing, but that actually would have more power, ... I would have liked to pull out more of his samples ....some of his stuff, and also more of his fieldnotes, and not necessary digitized, but the actual books.
Teacher Class B (Sciences)	The language is difficult for this age group and ... the historical perspective if you're talking about somebody that lived (long) ago. I now need to go back and put that time [in context] which I think at this age can be a hurdle.	I would have loved to have gotten some of the stuffed animals and been able to get some of those, I mean, more of those available to the children.

Table 7. Students' Learning Experiences

	How would you define the learning experiences of the students?
Teacher Class A (Social Sciences)	It forced them to do detailed work ... to have to be really focused … you know you're taking pictures of a specific site, and you had to detail a certain site, then you had to write it down so they were doing it in different modalities and I think that was really good. [The students] started pre-site, then there was a work at the site, then they came back and then they had to come back and put it together so there was a lot of shifting through, of weeding out and of organization, which I think is really good.
Teacher Class B (Sciences)	It's the hands on and learning about the environment and the interdependence and all of the things that we were doing, I think they got a first hand view of it and a chance to experience it and do it that way.

Table 8. Value of Field trips

In particular, what did you think about each of the field trips?	**Biomedical Library**	**Ballona Wetlands**
Teacher Class A (Social Sciences)	... recognizing that collections … material is saved, that there's value in saving works from people, and [the students] got that immensely ... that there's something to be valued in the saving of collections and that collections are cataloged and are maintained in a certain order and that not only are they maintained in a certain order but in order to preserve them certain things have to happen.	They got to go where [Dickey] went, really went, so, ... it was very … powerful … It's stepping away from the classroom ... that's really important too … that they realize that the site has been different ... we talked a lot about that afterwards.
Teacher Class B (Sciences)	Being able to go into the vault, being able to see all the old materials, getting to hear from the librarians, you know, what it entails to have this material, I think it was a very rich experience, and getting to see some of the things, you know, it was wonderful.	That was a fantastic field trip ... That was right in there, hands on, they were listening to someone who does that for a living, they were watching what he did, they watched for themselves, they got to observe, they got to photograph, they got to be naturalists and nothing can be better for kids then getting to be a scientist, work like a scientist.

Table 9. Value of Historical Photographs

What did you think about the historical photographs notes in terms of:	**Usability by 4th and 5th grade students**	**What they might contribute to the learning experiences of the students?**
Teacher Class A (Social Sciences)	I think they are absolutely crucial because obviously I use them when I teach history. We're looking at … photographs now of 49'ers, of real people in California. Given my druthers, there's a couple that I would have select, to have more time to be able really to select, a whole variety of [photographs] more with [Dickey] in them, would be nice.	This is what kids look at and [what] makes it real for them You can't talk about somebody without showing, without visuals, and … especially at this age, you have so many kids that are so much more visual than they are auditory. So if you don't have pictures at this age its deadly, and I think that's actually what made the project go… it was the primary sources, it was the material that we used. It was very powerful.
Teacher Class B (Sciences)	They could have been a little better, but, better to have the quality that we had... than none at all. It was hard to sometimes see them, especially on the copies.	To me a picture is worth a thousand words and being able to see what it looked like then [was] extremely powerful, [and] made it much richer to them, more real.

Table 10. Value of Historical Field Notes

What did you think about the historical field notes in terms of:	**Usability by 4th and 5th grade students**	**What they might contribute to the learning experiences of the students?**
Teacher Class A (Social Sciences)	I think the format we could have worked on a little bit more, but … I think it's definitely do-able at this age, I mean I think we need to go through and, I'd love to do this again at some point.	It was the comparison of what [Dickey] did and what the children were doing … It was just understanding the process of taking notes and of being detailed and of being correct in your observation, of not being sloppy, that these had to be very precise.
Teacher Class B (Sciences)	Usability, for some who were trying to read his handwriting, I think it was a challenge and so they liked that. I think for some of the younger children it might have been a bit challenging, but still usable because they were hearing other people reading it and they were seeing it so I think it was really important because it was a model.	Directly, because as they were taking notes they were using those same criteria that they pulled out from his fieldnotes or that we helped them pull out to include in their fieldnotes.

Table 11. Integration of Dickey/Ballona Activities Within Curriculum

	How do you see the classroom work with the Donald R. Dickey collection and Ballona Wetlands activities as part of social science/science learning?
Teacher Class A (Social Sciences)	This is the way that we need to go ... when you look at history you want to focus on certain people, people that made a difference, and here's someone who really made a difference …and then [to] be able to present him or her with as much information as [possible] using the source materials [so] that they can really get a sense of who the person was … the problem always is time … this stuff really takes time.
Teacher Class B (Sciences)	It's the hands on and learning about the environment and the interdependence and all of the things that we were doing, I think [the students] got a first hand view of it and a chance to experience it, and [to] do it that way.

[i] The Digital Portfolio Archives (DPA) in Learning Project was funded by the National Science Foundation Collaborative Research in Learning Technologies, NSF CRLT #96-16396.

[ii] For a detailed description of the entire research project see Gilliland-Swetland, Anne J., Yasmin Kafai., and Anthony Maddox. *Digital Portfolio Archives in Learning: Modeling Primary Content Transformation for Elementary Science Education*. Final Report to the National Science Foundation Collaborative Research on Learning Technologies Program (Los Angeles, CA: UCLA, August 1998). Available at: http://scow.gseis.ucla.edu/faculty/swetland/HTML/DPA.html (September 10, 1999). For discussion of the student outcomes of this project, see Anne J. Gilliland-Swetland, Yasmin Kafai, and William Landis. "Metadata Applications in the Creation and Description of Digital Primary Sources for Elementary School Classrooms" (forthcoming in the *Journal of the American Society for Information Science*).

[iii] Taylor, High. "Clio in the Raw: Archival Materials and the Teaching of History,"

American Archivist 35 nos. 3&4 (1972): 317-330.

[iv] Dewey, John, *The School and Society* Reprint (Chicago, IL: University of Chicago Press, 1956), and *Experience and Education* (New York: Macmillan, 1938).

[v] See, for example, R. Vukelich, "Time Language for Interpreting History Collections to Children," *Museum Studies Journal* 1 no.4 (1984): 43-50; and E. Duckworth, "Museum Visitors and the Development of Understanding," *Journal of Museum Education* 15 no.1 (1990): 4-6.

[vi] American Association of Museums. *Excellence and Equity: Education and the Public Dimension of Museums*, Washington, D.C.: American Association of Museums, 1992: 6.

[vii] While both archives and museums are repositories of primary sources, there are distinct differences in societal function, institutional mission, and holdings that need to be acknowledged. The difference in societal function and, therefore, in institutional missions in many cases, is likely to mean that educational programming in archives will never be treated as a primary role as it is in so many museums today.

[viii] American Library Association Presidential Committee on Information Literacy, *Final Report* (Chicago, IL: American Library Association, 1989).

[ix] Gilliland-Swetland, Anne J. "An Exploration of K-12 User Needs," ibid., p.137.

[x] See, for example, California State Department of Education, *History-Social Science Framework* (Sacramento, CA: California State Department of Education, 1988); and the National Center for History in the Schools, *National Standards for United States History: Exploring the American Experience* (Los Angeles, CA: University of California, 1994).

[xi] Statewide curriculum standards for teaching information skills exist for several states in the United States, including California and Colorado.

[xii] Chepesiuk, Ron. "Archives and the Child: Educational Services in Great Britain and

Ireland," *Provenance* 1 no.2 (Fall 1983): 45-58.

[xiii] Wilson, Ian. "Towards a Vision of Archival Services," *Archivaria* 31 (Winter 1990-1991): 91-100. One recent example of the development of such materials for teachers is *Primary Sources at the Archives--A Guide for Teachers* which is available through the Amazing British Columbia Archives' Time Machine, URL: http://www.barchives.gov.bc.ca/exhibits/timemach.

[xiv] Cook, Sharon Anne. "Connecting the Archives and the Classroom," *Archivaria* 44 (1998): 102-117.

[xv] For example, the criteria for selection for inclusion in American Memory have included the following: items that tell the story of America in an interesting way; items unique to the Library which users would previously have had to travel to Washington, D.C. to view; items with minimal copyright concerns; the most significant items in the Library's collections; and items that are best suited to go through the digitization process. Veccia, S.; Springer, M.; et al. "American Memory User Evaluation 1991-1993." Prepared by The American Memory User Evaluation Team, The Library of Congress. Available at: ftp://rs7.loc.gov/pub/american.memory/user.eval/chap2.txt (September 10, 1999). See also Dan Hazen, Jeffrey Horrell, and Jan Merrill-Oldham, *Selecting Research Collections for Digitization* (Washington, D.C.: Council on Library and Information Resources, August 1998); Stephen E. Ostrow, *Digitizing Historical Pictorial Collections for the Internet* (Washington, D.C.: Council on Library and Information Resources, February 1998); and Anne J. Gilliland-Swetland, "An Exploration of K-12 User Needs for Digital Primary Source Materials," *American Archivist* 61, 1 (Winter/Spring 1998): 136-157.

[xvi] Taylor, Hugh, "Clio in the Raw," ibid..

[xvii] Veccia, S.; Springer, M.; et al. "American Memory User Evaluation 1991-1993," ibid..

[xviii] Veccia, S.; Springer, M.; et al. "American Memory User Evaluation 1991-1993," ibid..

[xix] To assess user needs in order to create interface prototypes and retrieval tools for different user groups, researchers conducted a survey of the nine reading rooms at LC, with an emphasis on the content and use of Special Collections. They also conducted a limited survey of 24 teachers and 27 school library media specialists who wished to incorporate primary sources into educational settings; and parents and workers in a daycare center in Flint, MI. See G. Marchionini, C. Plaisant, and A. Komlodi, "User Needs Assessment for the Library of Congress National Digital Library Program," Human-Computer Interaction Laboratory, University of Maryland at College Park, February 1996. Available at: ftp://ftp.cs.umd.edu/pub/hcil/Reports-Abstracts-Bibliography/3640.html (10 September, 1999).

[xx] Zich, Bob, "How to Provide Access to Your Information System: Managing Outreach," Presentation, *The Information Ecosystem: Managing the Life Cycle of Information for Preservation and Access*, National Archives and Records Administration, College Park, MD, March 13, 1998.

[xxi] See, for example, G. Marchionini, C. Plaisant, and A. Komlodi, "User Needs Assessment for the Library of Congress National Digital Library Program," Human-Computer Interaction Laboratory, University of Maryland at College Park, February 1996. Available at: ftp://ftp.cs.umd.edu/pub/hcil/Reports-Abstracts-Bibliography/3640.html; (September 10, 1999). See also Anne J. Gilliland-Swetland, "Popularizing the Finding Aid: Exploiting EAD to Enhance Online Browsing and Retrieval in Archival Information Systems by Diverse User Groups" (paper in review); and Anne J. Gilliland-Swetland et al. "Metadata Applications in the Creation and

Description of Digital Primary Sources for Elementary School Classrooms," ibid.

[xxii] The Online Archive of California Evaluation Project (available at: http://scow.gseis.ucla.edu/faculty/swetland/HTML/oacep/oachome.htm) is being conducted by researchers at the Department of Library and Information Science at UCLA and is a multi-faceted formative and summative evaluation of the development, implementation, and use of the OAC. See Gilliland-Swetland, Anne J. "Evaluation Design for Large-Scale, Collaborative Online Archives: Interim Report of the Online Archive of California Evaluation Project" (forthcoming in *Archives & Museum Informatics*).

[xxiii] King, B.B. "Beginning Teachers' Knowledge of and Attitudes Toward History and Philosophy of Science," *Science Education* 75 no.1 (1991): 135-141.

[xxiv] Dawson, William Leon. T*he Birds of California; a Complete, Scientific and Popular account of the 580 Species and Subspecies of Birds Found in the State*, Donald R. Dickey, Wright M. Pierce, William. L. Finley and William L. Dawson, (San Diego, South Moulton Co., 1923); Wachs, Martin, Margaret Crawford et al. Eds. *The Car and the City: the Automobile, the Built Environment, and Daily Urban Life* (Ann Arbor : University of Michigan Press, 1992); Los Angeles Department of Water and Power. *Water, Power, and the Growth of Los Angeles: a 100-year Perspective* (Los Angeles, CA: Los Angeles Department of Water and Power, 1986).

[xxv] Gilliland-Swetland, Anne J. "An Exploration of K-12 User Needs," ibid. "Metadata Applications," ibid.

[xxvi] A detailed description of how finding aid and Dublin Core metadata were used in the DPA Project can be found in Gilliland-Swetland et al. "Metadata Applications," ibid.

[xxvii] In fact the Dublin Core metadata became essential for student access since the complex narrative descriptions contained in the collection's finding aid proved to be too unwieldy for students at this developmental stage to use with any facility.

[xxviii] The film clips were taken were *Trolley Through the Valley* (University of California, Los Angeles, 1972) and Margaret Lesser Bach's *Landscape with Angels* (1975). For a more detailed discussion of the classroom intervention and research analysis of the students' activities, see Gilliland-Swetland et al. "Metadata Applications in the Creation and Description of Digital Primary Sources for Elementary School Classrooms," ibid.

[xxix] "Gilliland-Swetland et al. "Metadata Applications," ibid.

[xxx] Although in some school settings in might be difficult, if not impossible because of logistical and financial reasons, for students to visit the actual archival repository, perhaps a photographic or video tour through the premises in which the primary sources are held might augment the students' learning experiences.