

# Integrating Primary Sources into the Elementary School Classroom: A Case Study of Teachers' Perspectives<sup>1</sup>

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**RÉSUMÉ** Dans les dernières années, on a lancé des appels nombreux pour que les archivistes s'impliquent davantage auprès des enseignements de l'élémentaire et du secondaire [en anglais, K-12 désigne l'enseignement au primaire et au secondaire, « from kindergarten to grade 12 », NdT] pour favoriser l'utilisation des sources d'archives dans les programmes scolaires. Cet article discute différentes façons d'intégrer efficacement les documents d'archives dans les classes et examine l'attitude des enseignants quant à leur utilisation. On traite d'abord des efforts déployés par la communauté archivistique et par les fournisseurs des ressources numérisées en vue de développer des programmes basés sur des sources d'archives pour les salles de classes élémentaires et secondaires, qu'il s'agisse d'apprentissage formel ou informel. On passe ensuite en revue la méthodologie qui a été utilisée dans l'étude de cas et les résultats obtenus. L'article se termine sur une discussion des implications de cette recherche pour le développement systématique d'une infrastructure archivistique et éducative et l'établissement d'une base théorique cohérente pour l'utilisation de documents d'archives à des fins éducatives dans les programmes scolaires de l'élémentaire et du secondaire.

**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, that is, primary and secondary education. 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 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 establishing a coherent theoretical base for educational use of primary sources in K-12 education.

## 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 the provision of formal primary and secondary (K-12) education by bringing classes of students to archives and conducting more structured classroom programs there. What these activities lack, however, are methodologies for employing primary sources as a central focus in formal classroom activities effectively. A critical issue facing archivists is how to effect such classroom implementation, a question little studied to date in the archival literature. How does one encourage such uses? How does one identify likely teachers? Who should 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 at a future date, and evaluate the pedagogical and learning outcomes in order to refine processes further?

In 1997, a research team at the University of California, Los Angeles 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 has explored issues associated with the integration of primary scientific sources into the formal elementary school learning process, and then the implications for the development of digital systems that use archival materials to support classroom learning.<sup>2</sup> The goals of the DPA Project were to:

- engage archival and education researchers directly with elementary school teachers and students in order to assess issues associated with the intellectual accessibility of primary sources faced by teachers and students;
- examine evidence of the ability of fourth and fifth grade students to achieve archival literacy;
- evaluate the possible benefits of using primary sources to enrich elementary science education;
- explore the implications for the design of DPA environments that might be used for elementary learning, information retrieval, and collection management;
- explore effective ways of incorporating primary sources into classroom activities; and
- examine teacher attitudes about the use of primary sources in the classroom.

This paper focuses primarily on the last two goals, that is, effective ways to bring primary sources into the classroom, and teacher outlooks on the use of primary sources in the classroom. The approach used by the DPA researchers included:

- identifying teachers with some prior knowledge of working with primary sources;
- pre-selecting and then re-describing archival materials of strong local significance for use by teachers and children;
- conducting field trips to a site similar to where these materials were created and to the archival repository where they are currently housed; and
- digitizing original materials and incorporating the digitized versions, together with the enhanced descriptions, into a web site 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 obtain 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 elsewhere 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 the current case study and obtain 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 to serve as a basis for use of primary sources in K-12 education.

## **Background**

In an article in 1972 the Canadian archivist 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,” using printed extracts of documents rather than the actual archival documents themselves. This approach was applied despite the richness of original historical resources, such as ecclesiastical manuscripts and local historical sites, accessible and available to schoolchildren in and around their villages. Taylor noted that there were pedagogical limitations in not working with the actual document as *artifact* and that the learning experience could have been enhanced significantly by drawing upon these local historical resources:

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.<sup>3</sup>

Taylor's thoughts echo the approaches advocated in the early 1900s by educational theorist John Dewey, who maintained that experience is what helps lead to education and gives meaning to abstract concepts.<sup>4</sup> Dewey's ideas continue to be influential in contemporary theory about knowledge construction. Together with the work of Jean Piaget, who developed the concept of stages of development in children, they have strongly influenced contemporary K-12 museum education activities.<sup>5</sup>

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. The promotion of 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 recognized the important role that museums play with populations of all ages in learning, stating that:

museums provide their most fruitful public service by providing an educational experience in the broadest sense[,...] fostering the ability to live productively in a pluralistic society and to contribute to the resolution of the challenges we face as global citizens.<sup>6</sup>

There are, of course, qualitative differences between archives' and museums' missions,<sup>7</sup> and in how the nature of primary sources lend themselves to artifact-centered or evidence-based education. However, the value to young students of working with primary source materials, whether from museums or archives, is manifold. Such benefits extend beyond knowledge of historical subjects, and fall 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 use information effectively.<sup>8</sup> 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 record aggregates, make sense out of unsynthesized or unredacted material, consider the circumstances of the document's creation

(i.e., asking *who*, *what*, *when*, *why*, *where*, and *how*), analyze the document's form and nature, determine whether it is an original and which version, and understand its chain of custody.<sup>9</sup>

Archivists traditionally have been interested in promoting the use of primary sources by K-12 communities out of a desire to broaden and diversify the base of archival users. 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 initiatives, and by implication, funding opportunities that aim to promote increased access by all citizens to a wider range of information resources through the implementation of digital technologies. Recent federal and state curricular standards seek to improve the quality of education and learning across the curriculum in part by recommending the incorporation of more primary sources into learning activities,<sup>10</sup> and as well by emphasizing development of children's information literacy skills. They also encourage the development of archives-classroom partnerships.<sup>11</sup> What archivists lack in their efforts, however, is a robust archival and educational infrastructure and a coherent theoretical base supporting such use in the context of both formal and informal K-12 education. This has transpired 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 as well a result, however, of archivists' 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 better involved in the schools and address associated intellectual and logistical issues. In 1983, American archivist and librarian, Ron Chepesiuk, reporting on educational programs in Great Britain and Ireland, outlined practical problems teachers experienced using archival sources in the classroom. These included teachers' lack of knowledge about how best to incorporate such materials, time constraints resulting from administrative duties, unwillingness to try new approaches in the classroom, and distance from an archival repository.<sup>12</sup> Chepesiuk made two main recommendations: first, that archives have a staff member available to work directly with teachers and students; and secondly, that there be an employee on staff with some background in teaching who is able to "nurture" teachers and encourage them to incorporate archival materials into their classrooms. The eventual aim was to "train" teachers in sufficient numbers that they might begin to influence school boards and standards-setting bodies in favor of incorporating primary-source-based pedagogical approaches into curricular recommendations and decisions. More recently, Ian Wilson, now National Archivist of Canada, has argued in favor of less staff-intensive approaches. Wilson suggests devel-

oping a range of specially tailored exhibits and publications, as well as classroom kits for teachers, and guides to different source material.<sup>13</sup>

In 1998, Sharon Anne Cook, a self-described teacher-archivist, looked at archives and museums in Canada, analyzing the role they might play as “educators” through public programming, especially in light of increasingly sophisticated curricular requirements and “mainstreamed” classrooms (i.e., where students of a range of abilities are brought together into the same classes). Despite this promise, she ended up lamenting the lack of coherency in Canada in educational programming strategies. Cook addressed the issue of bridging the teachers’ and archivists’ professional domains and expertise by recommending a strategy of professional partnerships. Such partnerships, she argued, might take the form of including student teachers (especially student teachers having a research component to their training program) in public programming activities. One example was the production of specialized educational kits.<sup>14</sup>

### **Providing Archival Materials Online for K-12 Activities**

Today digitization and networked online access technologies are providing new tools for archivists who wish to increase use of their holdings by the K-12 community. Several sets of guidelines have been developed for digitization projects that set out content selection criteria for making digitized archival content more relevant for K-12 application.<sup>15</sup> The question of whether or not to pre-select materials for classroom use is a debatable one. On the one hand, from a pragmatic standpoint both archivists and teachers argue that it will be much easier to encourage use if materials are pre-selected. And certainly some selection will almost always necessarily occur when digitizing materials. Pre-selection by archivists, optimally in consultation with teachers, helps teachers save considerable time in finding and incorporating developmentally and topically appropriate archival materials into their curricula. On the other hand, there are certain ends that pre-selected and indeed digitized materials cannot achieve. Hugh Taylor alludes to the pedagogical benefits of introducing a student 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.”<sup>16</sup>

Taylor notes that digitization and online dissemination of archival materials can preclude students from experiencing 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. Original materials can invoke a variety of distinct affective responses ranging from internalization of the sheer physical extent of accumulated materials, to a heightened awareness of the intrinsic characteristics of the materials (such as their fragility or the nature of their media), to a sense of awe at being in the presence of old, unique, beautiful, pivotal, or poignant materials. There is also likely to be an enhanced sense of personal connection with the content of the materials, something that educational research has shown to be key to learning in young children.

The Library of Congress (LC) has perhaps done the most to date to identify and meet the needs of K-12 through online access to digitized copies of archival materials. The LC's American Memory Project has selected material of particular interest to middle and high school teachers and students.<sup>17</sup> Between 1991 and 1993, the Library of Congress conducted a formative user evaluation of the American Memory Project. That evaluation indicated that successful application of American Memory resources by K-12 communities depended 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.<sup>18</sup>

The LC is developing Internet-based teaching tools to help teachers exploit these materials, as well as alternative search pages for middle and high school students.<sup>19</sup> The LC has also worked to establish an American Memory Fellows Program to bring teachers in to work with collections and build curricular implementations using primary sources. This new program will help teach users how to use the collections in teaching critical thinking and writing skills in the classroom, as well as in addressing curriculum subjects to which the contents of the collections relate.<sup>20</sup>

One of the outcomes of digitization and of technologies for online dissemination of information 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 might be made more effective for less traditional users who encounter it online.<sup>21</sup> 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, 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 underway, examining both scholarly and K-12 needs.<sup>22</sup>

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

### **Classroom Implementation for the DPA Project**

The classroom implementation for this case study took place in two integrated fourth and fifth grade classrooms in an elementary school which serves UCLA as a laboratory for educational, information technology, and other types of studies. The researchers approached the school approximately six months in advance to seek the school's participation in the research and to identify teachers who might be interested. The researchers also prepared a formal research protocol outlining the nature of the research activities and acquired clearance to use human subjects. (The school required that the research protocol be subject to the school's human subjects research approval process as well as that of UCLA because of the participation of children in the research.) Two teachers likely to be interested in participating in the research were identified by the school. One had considerable experience in working with primary sources, and the other worked closely with the first in the same grade levels. Their educational backgrounds and teaching interests differed, the one specializing in natural history and the other in history and the social sciences. These teachers, together with their classes (one in science and the other in social science and each consisting of twenty-nine students), participated in the subsequent research activities. To provide a baseline for the case study before beginning the classroom intervention, we asked the teachers several questions about their knowledge of and attitudes toward the social sciences and the history and philosophy of science (varying the questions as appropriate to each teacher's area of expertise). These questions were taken from an interview guideline developed by science education researcher B.B. King for examining teachers' knowledge of and attitudes towards history and philosophy of science.<sup>23</sup> The responses to these questions are summarized in **Table One**.



**Table One: 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)
<b>Q1: What is social science/science?</b>	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.
<b>Q2: How is scientific knowledge produced?</b>	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.
<b>Q3: How do you think social science/science should be taught?</b>	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.
<b>Q4: Why is understanding of social science/science important?</b>	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.
<b>Q5: What are your goals as a social science/ science teacher?</b>	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.

<b>Q6: What is most important to teach about scientific discipline?</b>	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.
<b>Q7: What is most important to teach to elementary students?</b>	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.

Because teachers in the school choose curricular content within each area at least six months in advance of the academic year, the research project started in the school year prior to that of the planned implementation with a series of meetings in which the researchers and two teachers met to discuss potential classroom activities, the selection of appropriate archival materials, and the logistics of organizing field trips.

*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 participated in the DPA research, thus creating a unique partnership in facilitating the classroom implementation. The researchers first worked with the archivist to identify potential archival materials for the classroom implementation. The entire group then met to consider which aspects of these materials might work best in the elementary school setting, as well as to assess local curricular objectives. The group's decision was that the project would be designed primarily around a set of materials drawn from the Donald Ryder Dickey Collection, 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 had created a black and white photographic collection containing over 7,000 images in various formats, and collected over 50,000 specimens of birds and mammals. He had also kept detailed field notes on his research trips. While the Dickey photographs chiefly document individual species, especially birds, they also include habitat and general landscape photographs. The collection is of particular significance not only because Dickey's work was published extensively 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 Southern California landscape, flora, and fauna.<sup>24</sup>

The researchers chose this particular collection because it had several of the characteristics identified by prior research as being important in primary sources for K-12 use,<sup>25</sup> and because it also provided a challenging test case in metadata development, another element in the larger 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, described in a finding aid which follows Dickey's original classification scheme. The research team felt that both the arrangement and description provided considerable insight into Dickey's documentation practices and would thus help students think about how the work of naturalists has changed over time. Since the collection largely documented Southern California areas with which students might be familiar and to which they could take field trips, the collection seemed to be especially appropriate for making ecological and environmental comparisons identifying changes between Dickey's period of work and today.

At a preliminary meeting of the researchers and teachers to discuss curricular implementation, it was decided that part of this would be that the participating classes would pay a visit to a wetlands site in Los Angeles similar to sites documented by Dickey. To support the activity, the researchers examined photographs and field notes from field trips by Dickey in Southern California and then selected for digitization fifty photographic prints and twenty-three pages of notes from seven different field trips taken from Dickey's field notebooks. The selected photographs had been mounted on reference cards and included Dickey's handwritten and typewritten classifications and his descriptive notes regarding the images. Using Biomedical Library facilities, the researchers created 72 d.p.i. (dots per inch) black and white Graphical Interface (GIF) images, as well as smaller thumbnail images for each selected item. The researchers also created Dublin Core metadata for individual images to facilitate identification, retrieval, and comparison by students once the images were mounted on the web. During the subsequent classroom activities, the students were asked to create similar metadata for materials they had created during their field trips. These materials and metadata were also incorporated into the web site.<sup>26</sup> Although Dublin Core metadata represent a very simple schema designed in part to be used by non-experts to describe self-created materials, the descriptors used for some of the Dublin Core metadata elements were modified at the suggestion of the teachers in order to make the purpose behind the element even more apparent to the students.<sup>27</sup>

### *Phase II: Classroom Activities*

Class A participated in the research activities over the course of two weeks in November 1997, followed, after a vacation break, by Class B's participation in the same sequence of activities. At least one researcher was present during all classroom sessions and worked together in class with the teachers. Over the

two-week period, each classroom met every day for about forty-five to sixty minutes to participate in the classroom and research activities, resulting in approximately seven to eight research meetings per class. A variety of methods were used to document classroom activities and collect information from teachers and students, including analyses of the work done by students and videotapes of the same. This work included:

- field notes made and photographs taken during the aforementioned field trips;
- the selection of photographs they wished to retain and digitize for documentary purposes and those which they wished to discard, including the rationale for the selections;
- assignment of Dublin Core metadata to the selected photographs;
- comparisons between fieldtrips, between Dickey's materials and their own, and between original and digital materials;
- transcriptions of Dickey's fieldnotes;
- analyses of historical photographs; and
- role-playing exercises.

Most of the research documentation relating to 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 the 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 different items such as Dickey's original glass plate negatives, index cards that accompanied the photos, field notebooks, and two taxidermied birds – the latter taken from the specimen collection, housed in a building separate from the archival collection. Students were able to touch items, examine them, read passages from the fieldnotes, and ask questions. Meanwhile, the other group examined the filing cabinets and shelves on which 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. A team picture was taken at the end of the field trip.

The more 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 the worksheets that they would use to document their research activities. Each team was also given a disposable camera,

a clipboard for taking field notes, and a log sheet 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 a diary containing his field notes. He then invited a student to read observations of bird sightings 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 observations.

As background to the field trips, students were given a homework assignment to read 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.<sup>28</sup>

### *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 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 – in terms of working directly with teachers – this project represents a unique study in the use of archival material, the DPA Project researchers conducted two structured interviews with each teacher, one before the start of the classroom intervention and one after it was concluded. The science teacher professed very little previous exposure to working with primary sources. When asked whether she had ever tried using primary sources in teaching, she responded 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 in working with primary sources, indicating that this 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 in a regular column in *Social Studies Professional*. The interviews were designed to:

- ascertain teachers’ knowledge of and attitudes about using primary sources in the classroom, both before and after the intervention;
- obtain feedback from the teachers on the classroom intervention and the project in general.

**Table Two** shows the teachers' definitions of primary sources before and after the classroom intervention. **Table Three** indicates their previous experiences with primary sources and expectations for using them further.

**Table Two. Teachers' Definitions 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 ... or people that we are studying about. Something that was done historically it seems by the people ... in any shape or form.

**Table Three. 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 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.
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**Tables Four and Five** contain the teachers' reflections about the value of primary sources for students' learning and for teachers in teaching.

**Table Four. 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 [that] 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 Five. 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 ranges 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.

Whereas Tables Four and Five look at the teachers' perceptions of benefits in using primary sources in the classroom, **Table Six** contains their responses to questions designed to elicit their thoughts about possible limitations or obstacles.



**Table Six. 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 become "sometimes" a challenge for them the way old English was written up till the seventeenth 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 field notes, 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.

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 Seven to Eleven**.

**Table Seven. Students' Learning Experiences**

	<b>How would you define the learning experiences of the students?</b>
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 Eight. Value of Field Trips**

<b>In particular, what did you think about each of the field trips?</b>	<b>Biomedical Library</b>	<b>Ballona Wetlands</b>
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 Nine. Value of Historical Photographs**

<b>What did you think about the historical photographs notes in terms of:</b>	<b>Usability by fourth and fifth grade students</b>	<b>What they might contribute to the learning experiences of the students</b>
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 it's 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 Ten. Value of Historical Field Notes**

<b>What did you think about the historical field notes in terms of:</b>	<b>Usability by fourth and fifth grade students</b>	<b>What they might contribute to the learning experiences of the students</b>
Teacher Class A (Social Sciences)	I think the format we could have worked on a little bit more, but I think it's definitely doable at this age, I mean I think we need to go through it 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 field notes or that we helped them pull out to include in their field notes.
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**Table Eleven. Integration of Dickey/Ballona Activities Within Curriculum**

	<b>How do you see the classroom work with the Donald R. Dickey collection and Ballona Wetlands activities as part of social science/science learning?</b>	
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 firsthand view of it and a chance to experience it, and [to] do it that way.	

### Discussion

From working with the teachers, the researchers learned that integrating primary sources into the elementary school curriculum can be a fruitful but challenging enterprise. Teachers' input was central in all phases of the project to help the researchers 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.

#### *1) Teachers' Conceptualizations of Primary Sources*

Although the teachers had different disciplinary backgrounds and levels of

experience in working with primary sources, they exhibited no very significant differences overall in any of the areas investigated through the interview questions. Both teachers stressed the importance of teaching in a way that relied on students having direct experiences, by using materials with which students could make real connections. They stressed students' need 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, for example, 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 inspired *empathy*.

Interestingly, in post-intervention interviews, 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. The teachers' limited views of primary sources – as primarily pre-existing and historical – are important factors for archivists to consider when working with teachers. The case study indicated that it was not only use of historical, but also 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 being their own creators of 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 within which they situated classroom work with primary sources. Unsurprisingly, 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. While the two intellectual perspectives are or can be important in both fields, social studies focus more on providing historical context whereas, in the United States, science education sees introduction to the scientific method as one of its main goals. Through use of both historical and contemporary primary sources in classroom activities, the researchers hoped to integrate these two viewpoints. Yet it appeared difficult to break the disciplinary boundaries.

Nevertheless, despite the two contextual and methodological frameworks, both teachers saw the integration of primary sources into classrooms 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 future ways to incorporate primary sources into their curricula. Some of the valuable aspects of working with primary sources which the teachers 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 working with the materials that scientists generate 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; and
- illustrating to students how, owing to the process of environmental change, they are living today in a *very different California*.

When asked about possible problems with locating and integrating primary sources into the classroom, both teachers predicted that *language*, especially as used historically, could well pose a problem for their students. Although the teachers did not come back to this issue 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.<sup>29</sup>

### *III) Need for Multiple Media and Juxtaposition of Activities*

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

Both teachers indicated in the post-intervention interview that 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 taxidermal speci-

mens, as well as more photographs of Dickey himself. The teachers also indicated that the two field trips taken by the students contributed strongly to the power of the intervention in terms of expanding the classroom's boundaries. Both of these latter comments appear to indicate that the use of primary sources in the classroom is likely to be most powerful when it is possible to combine facsimiles (digital or otherwise) with original materials and link guided learning with an experiential component. In other words, it seems 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 not only need to have descriptions about the provenance and context of the materials: they also need to experience both those environments in which the materials were originally created as well as those in which they 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 no more than the assistance of 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 by emulating activities and creating their own records – thereby, as Hugh Taylor recommended, maximizing one's environment.<sup>30</sup>

Even though a multiplicity of classroom activities may be needed, 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 study, having the archivist first identify a range of materials that had visual appeal and appeared relevant to the curriculum being taught, then having teachers look over sample materials and make a final selection, and finally using the advice of the teachers to enhance and simplify description of materials worked very well. The teachers knew best what kinds of material would translate well into classroom activities in terms both of curriculum and the students' developmental capabilities and what they needed to do in order to contextualize and otherwise help the students to come to terms with them. While seemingly 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 even teachers cannot always predict is when a fertile teaching or learning opportunity can arise serendipitously, for example, from an observation by a student, an artifact brought from home, or the action of a guest speaker. Such was the case in this study when the biologist at the Ballona Wetlands volunteered his field notes for the students to examine, thus giving students the opportunity to compare Dickey's historical notes and those

of a contemporary expert, and then create and compare their own. The more flexible and multi-faceted that the curricular intervention is, the more likely it is that such serendipitous opportunities may arise.

#### *IV) Students' Reactions to the Project*

Although this article is a study of teachers' perspectives on integrating primary sources into the classroom, it is perhaps also appropriate to mention briefly their students' reactions to the project. As a concluding activity, researchers asked one class to evaluate, in a Quickwrite activity, what they thought about and had learned from their work with the Dickey Collection and the Ballona Wetlands materials. ("Quickwrites" are often used in elementary classroom to get students used to writing, with the teacher often specifying in advance that students will respond to set questions and write for the next fifteen minutes only.)

In the first question, students were asked, "Describe what it was like to use old source materials." Many students responded with general, positive adjectives such as "fun," "nice," or "enjoyable." For example, one student wrote, "I think that using old science materials was a big experience and I would like to do it again." A number of students commented on Dickey's handwriting, referring to their experience of having read copies of field notes written by Dickey. For example, one student stated that "reading Donald R. Dickey's writing was a little difficult." Several students' responses related to the fact that the materials came from a different time, such as the student who stated, "I learned that in the 1920's ... science materials were a lot different."

For the second question, students were asked, "List at least three things you learned during these three weeks." Many responses related to Dickey himself, for example, that they had learned "who Donald Dickey was," "that Donald Dickey collects a lot of animals," and "a lot about Donald Dickey's life." Students remarked upon aspects of the collection, for example, upon the number of photographs and specimens Dickey collected. Some student responses related to the occupation of naturalists or what they had learned about plants or wildlife, for example, that "I learned what a naturalist is, does, and how was a naturalist [sic]," and "I learned the names of different plants."

In the third question, students were asked: "What did you enjoy the most?" The most popular activity indicated by the students was the wetlands field trip, but students also mentioned the field trip to the Biomedical Library, use of the computer, and the use of the cameras and binoculars. The last question asked was: "What would you like to study more about?" Most of the student responses to this question related either to wildlife or to Donald Dickey. Examples included "I would like to study more about egrets," and "I would like to learn more about his life out of photography [sic]." In fact, two frustrations that the students raised repeatedly during the classroom intervention



were that more biographical detail was not available on Donald Dickey and that he was no longer alive for them to ask him questions, such as why he had become a naturalist or why he had chosen to take certain photographs.

### **Concluding Remarks and Areas for Further Research**

The experiences of the DPA Project researchers indicate 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 issues that are important for any archives or school wishing to become engaged in archives-classroom programs for elementary education. These considerations include determining ways in which teachers can be involved in the selection of primary sources for classroom use; how teachers can achieve a rich mix of primary source-based activities without encountering resource issues (including those relating to knowledge and technology); how teachers can develop criteria for evaluating what did and did not work in terms of the age-appropriateness of primary sources and curricular activities; and what archivists and others can do to encourage and enhance primary-source-based activities in the elementary classroom.

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

- How might the nature of the primary sources used vary by content area and by students' developmental levels?
- 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' development of scientific knowledge 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 their education?

### **Notes**

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

- 2 For a detailed description of the entire research project see Anne J. Gilliland-Swetland, 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, 1998). Available at: <http://skipper.gseis.ucla.edu/faculty/swetland/HTML/DPA.html> (10 September 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" *Journal of the American Society for Information Science* 50, no. 4 (Fall 1999), pp. 89–116.
- 3 Hugh Taylor, "Clio in the Raw: Archival Materials and the Teaching of History," *American Archivist* 35, nos. 3 and 4 (1972), pp. 317–30.
- 4 John Dewey, *The School and Society* (Chicago, 1956), and John Dewey, *Experience and Education* (New York, 1938).
- 5 See, for example, R. Vukelich, "Time Language for Interpreting History Collections to Children," *Museum Studies Journal* 1, no. 4 (1984), pp. 43–50; and E. Duckworth, "Museum Visitors and the Development of Understanding," *Journal of Museum Education* 15, no. 1 (1990), pp. 4–6.
- 6 American Association of Museums, *Excellence and Equity: Education and the Public Dimension of Museums* (Washington, 1992), p. 6.
- 7 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.
- 8 American Library Association Presidential Committee on Information Literacy, *Final Report* (Chicago, 1989).
- 9 Gilliland-Swetland, "An Exploration of K-12 User Needs for Digital Primary Source Materials," *American Archivist* 61, no. 1 (Winter/Spring 1998), p. 137.
- 10 See, for example, California State Department of Education, *History-Social Science Framework* (Sacramento, 1988); and the National Center for History in the Schools, *National Standards for United States History: Exploring the American Experience* (Los Angeles, 1994).
- 11 Statewide curriculum standards for teaching information skills exist for several states in the United States, including California and Colorado.
- 12 Ron Chepesiuk, "Archives and the Child: Educational Services in Great Britain and Ireland," *Provenance* 1, no. 2 (Fall 1983), pp. 45–58.
- 13 Ian Wilson, "Towards a Vision of Archival Services," *Archivaria* 31 (Winter 1990–91), pp. 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> (10 September 1999).
- 14 Sharon Anne Cook, "Connecting the Archives and the Classroom," *Archivaria* 44 (1997), pp. 102–117.
- 15 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. See S. Vecchia, M. Springer 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> (10 September 1999). See also Dan Hazen, Jeffrey Horrell, and Jan Merrill-Oldham, *Selecting Research Collections for Digitization* (Washington, 1998);

- Stephen E. Ostrow, *Digitizing Historical Pictorial Collections for the Internet* (Washington, 1998); and Anne J. Gilliland-Swetland, "An Exploration of K-12 User Needs pp. 136–57.
- 16 Taylor, "Clio in the Raw," pp. 329–30.
- 17 Vecchia, Springer, et al., "American Memory User Evaluation 1991–1993."
- 18 Ibid.
- 19 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 the Library of Congress, with an emphasis on the content and use of Special Collections. They also conducted a limited survey of twenty-four teachers and twenty-seven school library media specialists who wished to incorporate primary sources into educational settings, and parents and workers in a day care center in Flint, Michigan. 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).
- 20 Bob Zich, "How to Provide Access to Your Information System: Managing Outreach," Presentation at *The Information Ecosystem: Managing the Life Cycle of Information for Preservation and Access* (National Archives and Records Administration, 13 March 1998).
- 21 See, for example, G. Marchionini, C. Plaisant, and A. Komlodi, "User Needs Assessment for the Library of Congress National Digital Library Program." 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."
- 22 The Online Archive of California Evaluation Project (available at: <http://skipper.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 Anne J. Gilliland-Swetland, "Evaluation Design for Large-Scale, Collaborative Online Archives: Interim Report of the Online Archive of California Evaluation Project," *Archives & Museum Informatics* 112, nos. 3–4 (1998), pp. 177–203.
- 23 B.B. King, "Beginning Teachers: Knowledge of and Attitudes Toward History and Philosophy of Science," *Science Education* 75, no. 1 (1991), pp. 135–41.
- 24 William Leon Dawson, *The Birds of California: A Complete, Scientific and Popular account of the 580 Species and Subspecies of Birds Found in the State* (San Diego, 1923); Donald R. Dickey, Wright M. Pierce, William L. Finley, and William L. Dawson (South Moulton Co., 1923); Martin Wachs, Margaret Crawford et al., eds., *The Car and the City: The Automobile, the Built Environment, and Daily Urban Life* (Ann Arbor, 1992); Los Angeles Department of Water and Power, *Water, Power, and the Growth of Los Angeles: A 100-Year Perspective* (Los Angeles, 1986).
- 25 Anne J. Gilliland-Swetland, "An Exploration of K-12 User Needs"; Gilliland-Swetland et al., "Metadata Applications."
- 26 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."
- 27 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.
- 28 The film clips were taken from *Trolley Through the Valley* (Los Angeles, 1972) and Margaret Lesser Bach's *Landscape with Angels* (n.p., 1975). For a more detailed discussion of the classroom intervention and research analysis of the students' activities, see Gilliland-Swetland et al., "Metadata Applications."

29 Gilliland-Swetland et al., "Metadata Applications."

30 Although in some school settings it 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.