AN EXPERIMENT IN THE EDLAB

An Evaluation of the National Postal Museum's EdLab+Clusters Program

2013

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Contents

EXECUTIVE SUMMARY

The EdLab+Clusters program sought to introduce EdLab's "mission-based learning" approach, a variant of project-based learning, to the three Capitol Hill Cluster Schools (CHCS)—Peabody Early Learning Center, Watkins Elementary, and Stuart-Hobson Middle School—in a sustained way. It involved intensive work with a core group of teachers for a whole academic year; these teachers were supported through regular face-to-face meetings with EdLab staff, practical assistance with scheduling field trips, and other channels.

Two issues of program design and implementation stood out as problematic: scalability and technology.

- Scalability requires moving away from models based on one-on-one interaction and support, but the Clusters program entailed a large investment of staff time per participant. Further, some participants relied heavily on EdLab for practical and logistical support for (1) scheduling, planning, and providing transportation for field trips and (2) providing technology tools (iPads, iPods) for student use.

- Technology issues sometimes made mission implementation problematic. Issues included the availability of digital devices (outside of those provided by EdLab); the reliability and availability of technology in the schools; and administrative blocking of websites.

Participating teachers were satisfied with the program and believed they and their students benefitted from it. However, the study team was not able to objectively document improvements in teacher skills, knowledge, and attitudes—in part for methodological reasons (a very small sample size), and in part because there appeared to be some degree of self-selection among participants for those who were already favorably inclined toward pedagogies such as mission-based learning.

Administrative support for the program was uneven, and this was an impediment to implementation for some participants. The requirements and policies of the District of Columbia Public Schools (DCPS) administration posed the largest organizational obstacles—particularly the focus on standardized testing. Some teachers also found it difficult to work missions into their schedules, given other administratively-imposed demands on their time.

The EdLab+Clusters experiment was valuable in exposing the formidable obstacles to integrating an approach like mission-based learning into the curriculum of public schools without major changes in the administrative and institutional environment. Successfully transferring mission-based learning into a formal educational environment such as CHCS requires much more than dedicated program staff and enthusiastic teacher-participants. It requires an administrative commitment and an institutional framework that actively support such experiments.

More generally the study team believes some foundational issues with EdLab should to be addressed if the program is to grow and thrive:

- Make better use of existing research, resources, and best practices relating to pedagogical approaches similar to mission-based learning (e.g., project-based learning), and reach out to collaborator organizations that promote similar practices and philosophies.
- Clarify the program's goals and criteria for success, which remain too vague to allow rigorous assessment.
- Systematize and "automate" aspects of the program to facilitate scalability and sustainability in the absence of direct infusions of EdLab staff time and effort.

INTRODUCTION

In spring 2012, staff from the National Postal Museum's (NPM's) EdLab approached the Office of Policy and Analysis (OP&A) about evaluating the EdLab+Clusters program, an effort to introduce EdLab's mission-based learning philosophy in a sustained way over the course of a whole academic year at the three schools of the Capitol Hill Cluster Schools (CHCS) group: Peabody Early Learning Center, Watkins Elementary, and Stuart-Hobson Middle School.

Initially, OP&A was asked to do a student outcomes evaluation. However, it quickly became clear that this was premature. After a series of meetings with EdLab staff, it was decided to focus on participating teachers and their experience of the program, as well as exploring the issues associated with implementing mission-based learning in a formal classroom setting.

REPORT STRUCTURE

This report is divided into Findings, Conclusions, and Recommendations. The Findings are in turn divided into sections on

- Mission-based learning pedagogy;
- Program design and implementation; and
- Assessment of the program in terms of a standard evaluation model that considers five distinct levels:
    - Teacher reactions
    - Teacher learning
    - Organizational (administrative) support
    - Classroom application
    - Student outcomes

METHODOLOGY

Planning for the evaluation began in summer 2012, and data collection commenced in September 2012. Data collection activities included the following:

- A review of published literature and unpublished documentation on pedagogical methodologies related to mission-based learning.

- Pre-program interviews with a core group of participants, conducted over the phone or in person in October 2012.
- A pre-program survey administered to the core participants at the first EdLab workshop on October 13, 2012 (five surveys completed[1]).
- An online survey distributed to CHCS teachers not participating in the EdLab program, administered in January 2013 (15 surveys completed).
- Interviews conducted over the course of the program with
    - CHCS administrators;
    - EdLab staff;
    - EdLab teacher-alumni;
    - Outside experts on inquiry-oriented pedagogies.
- Observation of four field trips undertaken by classes of participating teachers to
    - The National Postal Museum on December 7, 2012
    - Smithsonian Gardens on December 19, 2012
    - The National Museum of American History on January 11, 2013
    - The Peabody Institute on March 14, 2013.
- A mid-program survey of core participants, administered in January, 2013 (six surveys completed).
- Post-program interviews with participants (core and non-core), conducted over the phone or in person in June and July 2013.
- A post-program survey of all participants, administered at the final EdLab workshop on June 15, 2013 (11 surveys completed[2]).

Some challenges emerged in the course of collecting information. These included the following:

- The OP&A study team initially recommended in-class observation of participating teachers. However, because such observation had not been discussed with teachers at the time of their decision to participate and because of concerns that some would not be comfortable with this method, in-class observation was not undertaken.

[1] Five of six core teacher participants completed surveys. An additional three surveys were completed by others present at the first EdLab workshop, including two DCPS IT support personnel and one administrator.
[2] Surveys received from the original six core participants plus five others who joined the program later.

- Some administrators and others approached for interviews did not respond to repeated requests for interviews.
- The response rate to the non-participant survey was low (19 percent), and respondents included a number of teachers who subsequently joined the program, making it difficult to draw conclusions about differences between participants and non-participants.
- The number of responses to all other surveys was low, simply because the number of participants was low.
- The response rate of program participants to post-program interview requests was low.

PROGRAM BACKGROUND

EdLab emerged from a three-year partnership between the Smithsonian and the Pearson Foundation that initially focused on using new media technology to boost student engagement. The partnership had two prongs: NPM's EdLab, which focused on teacher professional development, and the ArtLab program at the Smithsonian's Hirshhorn Museum and Sculpture Garden, which worked directly with students.

At first, EdLab had a narrow focus on video production and NPM content. However, it rapidly evolved to place greater emphasis on promoting a pedagogical approach called "mission-based learning," with the media technology dimension moving from the center of the program to a supporting role. One EdLab staff member described the beginning of this evolution as follows:

> *We started to think, the Smithsonian has all of these museums and collections—how does this stuff relate to the world around us? That's where this notion of mission-based learning started to emerge. Can you take [an object in a museum collection] and make it about real and relevant issues in the world today? Can you make it a starting point for student inquiry? Can we go to museums to gather data and material for a mission your teacher has set out for you? Can you use museum collections as the basis for solving some kind of problem?*

The resulting philosophy of mission-based learning (which is unpacked in much greater detail below) encourages teachers to pose a challenge to their students, and then to think about using museum objects as tangible points of reference for initiating exploration of that challenge. This challenge—or "mission," in the program's terminology—by design relates to an issue that is directly relevant to participating students.

Before the EdLab+Clusters program, the main delivery vehicle for the EdLab program had been "one-shot" workshops or workshop series, at which teachers picked up what they could and took it back to their classrooms to implement to the best of their ability. However, from the beginning, EdLab was concerned not just with presenting the techniques of mission-based learning in workshops, but with supporting implementation of these techniques in the classroom. As one interviewee put it:

> *One of the key things that sustained the program through those [first] three years was responding to the teachers' need for ongoing community support. We realized the importance of EdLab staff staying in communication with program alumni. We did not want this to be "drop-in-and-go" kind of training. … We wanted to build a community, because what we hear from teachers is that you cannot just learn something, be dropped into the classroom, and be expected to enact it.*

Prior to the Clusters program, post-workshop support for EdLab alumni had been offered primarily through online platforms that provided participants with access to resources and a space to interact with program staff and alumni. The Clusters program was conceptualized as an experiment to take this learning community concept to the next step: to work intensively with a group of teachers over the course of an academic year to implement mission-based learning, with the support of their administration. Thus, the program was built around the idea of selecting a core group of participants and supporting them through regular face-to-face meetings with EdLab staff, practical assistance with planning and scheduling field trips, and other channels.

The program consisted of the following elements:

- *Weekend workshops* held on Saturdays and typically running from 9:00–3:00, which brought participants together to learn, practice, and brainstorm issues related to mission-based learning and its implementation at CHCS. Originally four of these were scheduled, but only three were held. The first (October 13, 2012) was an introductory session for core program participants, consisting of two teachers each from Peabody, Watkins, and Stuart-Hobson. The second (March 2, 2013) introduced a second group of participants to the program, as well as checking in on the progress of core participants and getting the two groups to work together. The last (June 15, 2013) was a debrief session, in which participants presented the missions they had implemented and discussed the successes and obstacles they had encountered.

- *Weekly after-school check-in meetings,* held separately at each of the three schools and focused on providing personalized feedback on the nuts-and-bolts of planning and implementing missions.

- *Occasional field trips* that were integrated with class missions, accompanied by EdLab personnel, and typically undertaken with EdLab scheduling and logistical support. EdLab also provided buses and technology tools (iPods and iPads) for use during some field trips.

- *Miscellaneous additional interactions* between participants and EdLab staff, such as class visits by EdLab staff to facilitate the introduction of new technologies.

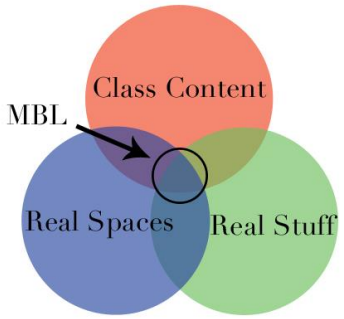
Participants also had access to EdLab online resources such as the online Digital Toolkit (a searchable database of education-relevant online tools), a mission planning template, the EdLab Educator Community on Facebook, and the Living Archive of EdLab alumni missions and mission concepts.

FINDINGS

PROGRAM PHILOSOPHY/PEDAGOGY

At the core of the EdLab program is the philosophy of pedagogy called "mission-based learning." Online program literature describes mission-based learning in the following terms:

> *Mission-based learning brings classroom content to life by challenging students to use real stuff in museums and technology tools to investigate and solve problems that exist in the real spaces around them. Mission-based learning increases relevancy between subject matter and real life experiences of students, getting to the heart of the "why do we have to know this" question.*



However, "mission-based learning" is not a term in general use in educational literature and practice, and there remains some disagreement about what precisely it means, even among program staff, alumni, and others who are very familiar with EdLab. Core features of the mission-based approach on which there is little disagreement include the following:

- The goal is engaging students with curricular material by framing it in terms of issues that are directly relevant to kids, and challenging them to formulate responses to these issues. (This usually means working in teams to research, formulate, and present solutions to a problem associated with a particular issue.)

- Media technology is a means in the mission-based learning paradigm, not an end. While technology retains a vital instrumental role in the program—and while the allure of technology is clearly a factor motivating many teachers to participate—the fundamental purpose of EdLab is *not* to train participants in the use of technology per se.

- The mission-based approach insists on physically getting students out of the classroom for part of their mission exploration and research.

One important issue that remains somewhat unclear in the mission-based approach is the role of museums and museum objects. Program literature emphasizes this aspect, and getting kids out of

the classroom could certainly mean a trip to a local museum, historical society, zoo, or aquarium.[3] But it could also mean other things—visiting a local park, library, business, research lab, civic association, performance venue, homeless shelter, or dozens of other places that have the capacity to spur inquiry in the context of a mission assignment. It is not clear why *museum* objects and resources should have a privileged status in this schema, and interviews with those familiar with the program revealed some ambivalence on this point. Some saw museums as merely one possible source for out-of-class exploration among many, while others insisted on a special role for museums in the mission-based philosophy. For example, one interviewee noted:

> *It's sometimes hard for people to understand how museums are a part of this, and we could do a better job of emphasizing how this is a museum-specific thing. It may seem like the museum aspect is tangential, but that's not what we're trying to do. We want the museum to be the first step in making connections. I always want to make museums the emphasis, but I'm not sure that's always the case [when teachers apply the mission-based learning concepts]. … We want participants to incorporate museums, but sometimes it's not the best fit. Sometimes I get the feeling that museums are an afterthought, rather than the central focus.*

The ambiguity inherent in the mission-based concept is by no means unusual. On the whole, the terms used in the educational literature for pedagogical approaches that engage students in inquiry-driven experiences are not consistent or precise. The next section represents the study team's effort to sort through these terms and relate them to the EdLab approach.

Inquiry-Oriented Learning Approaches

To understand mission-based learning, it is probably easiest to think of it as EdLab's brand name for its contribution to a class of pedagogies that share certain family resemblances, which we will refer to as *inquiry-oriented learning*.[4] The inquiry-oriented approach, which has been making inroads into the American educational establishment in recent years, is usually presented as an "active" alternative to traditional pedagogies that emphasize "passive" assimilation of curricular content. Inquiry-oriented learning is also promoted on the basis of its hypothesized superiority in fostering the development of a set of interpersonal, communications, technology, and critical-reasoning skills generally known as "21st Century Skills." with the implication that mastering these skills is a key to success in the rapidly-developing economy and society of the present day.

The best-established inquiry-oriented model is *project-based learning,* to which mission-based learning bears a striking resemblance.[5] According to Larmer and Mergendoller (2010), project-

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[3] From this point on, "museum" is used as a short hand for museums and similar cultural, scientific, and educational organizations such as historical societies, historical sites, zoos, and aquaria.

[4] These are often referred to as "inquiry-based learning" as well, but we will use the term "inquiry-oriented" to avoid confusion with a specific model within this family that goes by the name of "inquiry-based learning."

[5] Project-based learning was described in a seminal paper written by William H. Kilpatrick (1918) that promoted the role of student choice in learning activities (Waks, 1997). However, the conceptual basis dates back to 17th century Italy, and it had already been introduced across Europe and the United States in the mid-19th century in technology and engineering courses (Knoll, 2012). See also Savery, 2006.

based learning differs from traditional classroom pedagogy primarily in its focus on student-centered activities that are personally meaningful to children. Project-based tasks are student-driven in the sense that the learner herself raises a set of open-ended questions; determines how she will go about answering them; devises and implements methods for collecting and analyzing information; and ultimately presents her findings in some formal way (Bell, 2010).

In this approach, students can determine a topic of interest, the pace of research, the sequencing of information and content, and the final product (Papanikolau and Boubouka, 2010). Teachers are instrumental as facilitators, providing guidance on timelines, project planning, research methods, and presentation of results (ChanLin, 2008; Raes, Schellens, De Wever, and Vanderhoven, 2011); they do not, however, act in their traditional role as dispensers of subject-matter content. Evaluation from peers is also an essential component; typically, students critique others' work, reflect on the feedback they receive, and revise their work accordingly. In recent years, technology tools have increasingly been integrated into project-based learning programs.

Project-based programs follow a general prescribed path that includes the following components, albeit with any number of possible variations:

- Students engage in an "entry event" that introduces an issue of interest in a provocative way, usually as a problem for students to address (Rubenstein, 2012).[6]
- After the entry event, students form teams in which members translate the challenge into specific research questions and develop a plan for research.
- The research process itself is the core of a project-based learning unit. It may take a number of forms: online research, experiments, field research, site visits, interviews, etc.
- The end result is usually a presentation in which students voice their own conclusions on the issue they have researched.

Several other established inquiry-oriented models can be identified in the literature. They resemble project-based learning in general outline, but with subtle distinctions:

- *Problem-based learning* is also centered on collaboration and inquiry. Although sometimes used interchangeably, problem-based and project-based learning are not identical concepts (Ravitz, 2010). In problem-based learning, the emphasis is on guiding learners through the

[6] In one dramatic illustration of this approach, a section on the Epic of Gilgamesh in an ancient history class in Texas began with a warrior on horseback entering class and challenging students to explain why his army had been defeated in a military campaign (Boss, 2011). The entry event for the MarineTech Project (a program that promotes science, technology, engineering, and mathematics to students in grades 8 through 12) presents students with pictures of a ship disaster, after which they are challenged to pinpoint its possible causes (Verma, Dickerson, and McKinney, 2011). In a mission-based learning unit, the entry event might be a museum field trip or inspection of a historical, scientific, or cultural object. For example, in one workshop, EdLab staff demonstrated how an illustration of a postal truck from decades ago could be used as an entrée to study of the historical era represented in the poster.

steps involved in raising questions and researching their answers, rather than on reaching and presenting conclusions (Donnelly and Fitzmaurice, 2005; Savery 2006).

- *Inquiry-based learning* differs from the two methods discussed above in that the teacher has a dual role. Within this framework, which is most often used in science classes, teachers provide direct content instruction as well as serving as facilitators to guide student inquiry (Savery, 2006; Spronken-Smith & Walker, 2010; see also Kim, 2011; and Chinn and Malhotra, 2002).

- *Challenge-based learning* is a more recent concept that is specifically associated with the use of technology as a research tool. While there is less published literature on it than the other approaches discussed above, one recent evaluation concluded that student engagement, attitudes, and content knowledge were positively impacted by challenge-based activities (Johnson and Adams, 2011).

In addition to these terms, which have some currency in educational literature and practice, the study team encountered other names for inquiry-oriented approaches that, like mission-based learning, appear to be brand names for variants of the established pedagogical models listed above.

As the discussion above suggests, mission-based learning bears a close resemblance to project-based learning in almost all of its core features. To the extent that it has a distinctive feature, it appears to be its emphasis on physically moving students out of the classroom and into surrounding communities and museums as part of the research process. However, out-of-class components are by no means uncommon in inquiry-oriented learning approaches, and mission-based learning is not the only approach that emphasizes such components.[7]

PROGRAM DESIGN/IMPLEMENTATION

To the extent that best practices for teacher professional development have been identified, evaluation of EdLab+Clusters design and implementation could begin, and perhaps end, with a simple review of whether the relevant practices were followed. Unfortunately, the status of best practices in this area is somewhat ambiguous.

On the one hand, it could be argued that a reasonable level of agreement has emerged on a general set of best practices—things that "everyone knows" about what works. (See for example Berry, Daughtrey, and Wieder 2010; Darling-Hammond et al 2009; Zapede 2008; Garet et al 2001; Birman et al 2000; Abell 2009). Depending on the source consulted, these may be described, organized, or enumerated in different ways. However, the following elements tend to appear, in some guise, in most discussions of best practices:

[7] For example, the *expeditionary learning* package offered by Expeditionary Learning Schools stresses out-of-school exploration as an integral part of the research experience.

- **Active/participatory pedagogy.** Programs that encourage trainees to actively think about, explore, question, and grapple with training material tend to be more effective than passive programs (the "sage on the stage").

- **Follow-up.** Successful implementation of training material in the classroom typically requires some degree of post-program support from trainers or others (such as more-experienced peers) who are familiar with the material.

- **Sufficient duration.** In simple terms of hours and days, sustained exposure to training material is usually necessary for teachers to properly assimilate it.

- **Practicality.** Effective training provides material that is immediately applicable and relevant to classroom needs, particularly in the context of core curriculum subjects.

- **Subject-matter focus.** Training is more likely to be effective when it focuses on the specific subject-area content of target teachers or pedagogical issues relevant to this content, as opposed to generic instruction in educational issues, methods, or theories.

If we think in terms of these criteria, EdLab would clearly meet some (active pedagogy and follow-up) and not meet others (subject-matter focus). However, critics have pointed to the relative vagueness of these criteria, the weak research base on which much of what "everyone knows" rests, and factors that limit the practical usefulness of best-practice lists when it comes to designing, implementing, and evaluating teacher professional development programs in the real world. For example, Guskey (2003) reviews 13 lists of best practices as identified by various organizations and researchers, and argues not only that these lists suggest relatively little practical consensus, but also that the research underlying most of them relies on comparatively weak evidential foundations, such as self-reported teacher opinions.[8] Guskey also argues that any general assertions concerning best practices must be hedged with the caveat that training always takes place in a unique context, and context has an enormous influence on prospects for success. For example, effective practices for training of science teachers may not work well with history teachers. Effective practices for training teachers who are compelled to teach outside of their areas of certification might be very different from effective practices for training teachers within their areas of certification. His overall conclusion is that:

> *The characteristics that influence the effectiveness of professional development are multiple and highly complex. It may be unreasonable, therefore, to assume that a single list of characteristics leading to broad-brush policies and guidelines for effective professional development will ever emerge, regardless of the quality of professional development research.* (P. 750.)

[8] Boyle, While, and Boyle (2004) concur: "Although there is a large body of international literature on professional development, little high-quality research has been conducted on either the relationship between characteristics of professional development and changes in teachers' classroom teaching practice or the relationship between the characteristics of professional development and gains in pupil achievement." (P. 48)

Given the uncertainty about what constitutes "best practice" in teacher professional development, the study team has chosen here to focus on two specific issues of design and implementation that stood out as problematic: scalability and technology.

However, one point should be noted. Despite the ambiguity about what constitutes "best practice" in teacher professional development, there appears to be a consensus that "one-shot" workshops, no matter how enjoyable to participants, are not likely to constitute effective training.[9] Rather, effective training needs to be ongoing, interactive, and embedded in the professional lives of teachers. Such practices might include school-based study groups, individual coaching or mentoring trainers, opportunities for teachers to intern with subject-area experts, individual or team research projects, and all manner of physical or virtual networks that enable teachers to work among themselves and with others (such as subject-area specialists, trainers, and administrators) to identify, explore, discuss, refine, and disseminate effective teaching practices. In this sense, EdLab in general and the Clusters program in particular do reflect something of a consensus on best practice in teacher professional development. The interactive, ongoing nature of the relationship between EdLab staff and Clusters participants and the extended, facilitated process of mission design and implementation clearly fit any reasonable definition of embedded training.

Scalability

Scalability emerged as *the* major design/implementation issue for the EdLab+Clusters program. "Scalability" refers here to the potential to replicate the program on a substantially larger scale than the CHCS pilot. It is closely related to the concept of *sustainability*, which refers to the potential for program participants to continue to effectively implement mission-based learning in their own classrooms after the withdrawal of direct, intensive EdLab support. Because the issues with sustainability and scalability are so similar, they will be discussed together here, with the latter term serving as a proxy for both.

Interaction with EdLab Staff

EdLab was initially conceived as an in-person, face-to-face workshop experience, and by all accounts EdLab staff are exemplary trainers and coaches. For example, "interactions with EdLab staff" was one of the most highly rated aspects of the program on the post-program survey, and staff were uniformly praised in post-program interviews. Participants particularly stressed the value of getting regular feedback from EdLab staff throughout the mission planning process:

> *When you teach by yourself, you are in a little hole. There are other people at the same grade level, but not necessarily in your subject. Having [the EdLab staff] here … really helped with brainstorming. I will miss that, as well as the resources they come up with and the people they know.*

[9] In the literature review of his doctoral dissertation, Camerino (2009) provides a good overview of the emerging consensus and the implied obsolescence of the traditional "one-shot" workshop.

When I wanted to create a new mission, four heads were better than one. [EdLab staff] helped me in that way. The Saturday workshops and [the weekly check-in sessions] were invaluable. Creating new missions will be difficult without their assistance, although modifying the one I already have is something I can do.

To have constant feedback was immensely beneficial. I would say, "I'm here at this piece right now, and don't know what to do with it," and then Jeff and Kim would say, "well, why don't we do this." Having their experience and their knowledge was really valuable.

In addition to support in mission planning, some participants singled out the advice and support that EdLab staff offered with respect to technological challenges in the course of implementing missions. For example, some noted that it was helpful to have EdLab staff give in-person demonstrations of new technologies to their classes.

However, scalability by definition requires moving away from models based on extensive one-on-one interaction with specific personnel, and the Clusters program entailed a notably large investment of staff time per participant. The original core group of participants consisted of just six teachers. These were joined by several others over the course of the academic year, but the final count still totaled only about a dozen. On the other side, the program was a major—although not exclusive—focus for three NPM staff members for the better part of the academic year.[10] By any reasonable measure, this makes EdLab+Clusters an extremely labor-intensive program, even allowing for the indirect beneficiaries.[11]

The initial program concept for a partnership between CHCS and EdLab envisioned a train-the-trainers approach to scalability. The idea was to invest heavily in training a small number of teachers, then enjoin them to convey what they learned to their peers to create a widening circle within and eventually beyond CHCS. However, to scale the program in this way, core teachers would have to take over many functions initially served by EdLab staff, including:

- Training others in the basic concepts and techniques of mission-based learning;
- Advising on appropriate technologies and online tools for particular purposes, and on their proper use;
- Providing feedback on mission development and implementation; and

[10] Across the three staff members, time devoted to the EdLab+Clusters program was equivalent to over one full time employee (FTE). According to program documents, one staff person spent about 70 percent of their time on Clusters; another, about 30 percent; and the last, about 20 percent. Within the time spent on the project, staff spent between 25 and 75 percent on weekly check-in meetings, and an average of about a third on planning and leading field trips. Only small amounts (about 5 percent in each case) were spent on Saturday workshops and online work (i.e. reviewing mission plans).

[11] That is, each participating teacher was bringing mission-based learning to her students, making the number of persons indirectly served much higher than the number of direct participants. However, in contrast to the situation with direct participants, the quality of this indirect service is inevitably variable and difficult to control; it depends on how much time teachers are able to devote to missions in class and their skill at implementing what they learned from EdLab staff.

- Advising on integrating external (museum and community) resources into missions.

The program in its current form does not appear to be appropriately designed to prepare participants for such responsibilities. As with previous iterations of EdLab, the emphasis in the Clusters program was on training teachers to be effective *practitioners* of mission-based learning, not to serve as mission-based learning trainers and consultants to others. While achieving the former may be necessary for achieving the latter, there is no reason to believe it is sufficient; that is, having the ability to effectively *use* mission-based methods oneself does not necessarily imply an ability to effectively *train and support others* in the application of these methods.[12] Methodologies specifically designed to achieve the latter goal were not part of the program.[13]

In the absence of such criteria, the study team asked participants at the end of the program about their comfort level with the prospect of serving in a trainer role. Two expressed confidence in their ability to train others, although they had not yet done so. Another indicated he had already coached a colleague in the mission-based approach, although the success of this knowledge transfer is not known. The rest indicated that they did not yet feel comfortable with the prospect of training others in mission-based approaches.

Logistical and Practical Support

In addition to some level of dependence on direct interaction with EdLab staff for feedback in the course of mission planning and implementation, participants also relied, to various degrees, on EdLab for practical and logistical support. This was most notable in two areas: (1) scheduling, planning, and providing transportation for field trips; and (2) providing technology tools (iPads, iPods) for student use.

As noted above, a key part of the mission-based pedagogy is the imperative to do mission-oriented exploration outside of the classroom, and field trips were one of the most highly rated elements of the EdLab program. Comments like the following illustrate teachers' positive assessment of the out-of-class component:

> *The EdLab staff went above and beyond to plan amazing trips and experiences for the students in my class.*
>
> *Learning shouldn't happen in a bubble, just in a classroom. Being out of the classroom gives students a chance to see people, and to hear people's views and opinions. We went to the Zoo, where they interviewed people about animals and collected information. That helps them with communication skills, organizational skills, collaborative planning with a group.*

[12] There is also the practical issue of whether teacher-participants would have sufficient time in their busy schedules to serve as trainers and mentors to their peers.

[13] Such methodologies might include giving core participants opportunities to train and mentor their colleagues in mission-based pedagogy in a structured, supervised environment; testing core participants on their basic knowledge of technology tools in the Digital Toolkit; and so on.

> *The students were highly motivated and engaged while doing their missions, which included [several out-of-class components]. They enjoyed going out into the community and using hands-on technology to capture what they were seeing and hearing. They learned new ways to research and display information using technology. They were inspired to innovate and customize their mission projects. In addition, the community was cooperative and supportive of the students.*

Field trips were taken at different stages of the mission process; some kicked off the mission, while others took place in the middle. All were designed to be different from the traditional, passive model of school tours in that they included elements of investigation, usually in the form of taking photos, doing interviews at the field trip site, or participating in structured explorations of the space or the objects within it.

However, participants generally indicated that the out-of-class dimension would be a much greater challenge in the absence of direct EdLab support, even for teachers who felt comfortable with mission-based pedagogy. One reason for this was simply that EdLab provided buses for some of the field trips—a convenience that was always appreciated, and in some cases instrumental.[14] Even more difficult to replace, participants suggested, would be Edlab's logistical support for field trips. EdLab staff helped teachers integrate field trips into mission plans and provided extensive scheduling and logistical support; in many cases, they made use of personal connections within the Smithsonian and elsewhere to facilitate trips. This kind of personalized support for out-of-class experiences was extremely valuable to participants; but, like the intensive personalized feedback on mission planning discussed above, it raises questions about scalability, because it relies on specific people with specific skills and relationships devoting a lot of time and attention to individual program participants.

Another valuable form of practical support that EdLab provided to Clusters teachers was the loan of EdLab iPad and iPods. In the words of one interviewee:

> *The availability of up-to-date and compatible technology proved critical to maintaining student interest and motivation, and to the completion of a successful mission project. EdLab was invaluable in providing iPods and iPads for students to use while on field trips. The students were able to download their field trip information through apps recommended by the EdLab mentors from the Digital Toolkit. … Without the technology provided by EdLab, the students would not have been able to integrate technology at the same level. The students were handicapped by the type of computers available in the computer lab and the lack of computers in their classrooms.*

Once again, however, the flip side of this resource-intensive, personalized approach to support is the scalability issue.

[14] Some participants thought they could get by with public transportation in the absence of buses, but others (for example, teachers of pre-K and K-level students) said this was not an option for them.

The Digital Toolkit: A Scalable Element

The EdLab Digital Toolkit, a searchable online database of online technology tools appropriate for various pedagogical purposes, was used by almost all Clusters participants in the course of mission planning and execution. It is an example of a program component that does support scalability, because it is available online and usable by any number of individuals without direct investment of EdLab staff time or other resources.

However, the availability of the online Digital Toolkit did not prevent some Clusters participants from seeking EdLab staff guidance on appropriate technologies for their missions. This suggests that perhaps the Digital Toolkit is not entirely self-explanatory.

Technology Issues

In addition to the scalability question, the technology element of the program emerged as sometimes problematic in implementation.

As noted above, media technology plays an important but supporting role in mission-based learning, and pre-program interviews suggested that access to and training in technology was a major draw of the program for some participants.[15] However, in the course of mission implementation, technology proved to be a source of many headaches for program participants. Issues included the availability of digital devices such as iPods and iPads outside of those provided by EdLab; the reliability and availability of technology infrastructure in the schools; and school district blocking of certain websites. At present, reliable access to technologies and online tools is clearly a constraint on most teachers' ability to plan and implement missions, although the significance of these factors, and teachers' abilities to find adequate work-arounds, varies by teacher, mission, and school.

One of the teachers explained that she was unable to complete either of her two missions because of technological obstacles. She expressed regret that her students were not exposed to more digital tools because of a lack of reliable WiFi and outdated hardware. Another teacher expressed thoughts on the technology issues:

> *The program was excellent. However, our school's internet and tech issues made mission completion cumbersome and draining. The idea of using digital technology to research and present missions is only as good of the resources in your school.*

It may be that glitches with technology will gradually work themselves out in the coming years as schools themselves become more wired and technology becomes more widely available in the classroom. Indeed, the CHCS schools are currently getting technology infrastructure upgrades. In the meantime, however, programs like EdLab need to be aware of the limitations that face teachers with respect to the technology assets at their disposal in the classroom.

[15] This may raise the question of whether program literature is sufficiently clear that media technology training per se is not the focus of the program.

THE FIVE-LEVEL EVALUATION APPROACH

This section assesses the EdLab+Clusters program in terms of a standard five-level framework for evaluation of teacher professional development programs created by Thomas Guskey (see Guskey, 2000), and based on a general model of professional development evaluation created by Donald Kirkpatrick (see 1959/60). The five levels of evaluation are the following:

- *Teacher reaction.* The lowest level of evaluation, *teacher reaction,* asks how teachers feel about the program. Examples of appropriate questions at this level might include: Did participants like the program? Did it cover the material they expected? Was it well-administered and well-organized? Would they recommend it to a colleague, and why? These questions can be addressed through exit surveys and interviews with participants.

- *Teacher learning.* At the next level, *teacher learning,* evaluators examine how the program enhances pedagogical skills or augments content knowledge. Because subjective and objective assessments of learning may diverge, two types of measures need to be distinguished:

    - *Subjective assessment.* Do teachers *believe* they gained pedagogical or content-knowledge benefits from the program? If so, what do they believe they gained? Methods to answer these questions may include survey or interview questions that probe what teachers believe they have gained, changes in their comfort levels with the relevant concepts, and so on.

    - *Objective assessment.* Can teachers *demonstrate* they have assimilated key pedagogical concepts or content knowledge? What is the evidence for this? Methods here involve looking at the results of written or practical tests administered to exiting participants, ideally baselined against pre-program performance on similar instruments.

- *Organizational support.* At the third level, *organizational support,* attention turns to the context in which the learning gained by teachers through professional development is implemented in the classroom. It asks how school administrators, policies, infrastructure, and other environmental factors support or stymie implementation. Questions here might include: Were organization changes made to facilitate implementation, if necessary? Were resources made available for implementation, if necessary? Did administrators take an active interest in implementation? What sort of administrative or peer-culture obstacles to implementation were present? How were lessons learned shared across the organization? Relevant research methods include follow-up interviews with participants, interviews with administrators and colleagues, and analysis of district and school records in cases where professional development would be expected to have major organizational implications.

- *Classroom application.* At the fourth level, *classroom application,* evaluators look for changes in teachers' behavior, activities, practices, and general competence that can be attributed to the professional development program. These can be assessed by following up with teachers after some period of time and asking questions such as: Have they applied pedagogical skills or content knowledge from the program in their teaching? To what extent? How have they done so? How has it changed what they do as teachers? Methods for this level of evaluation might include interviews with or reports from teachers themselves, administrators, professional colleagues, and students; direct observation of teacher behavior by evaluators; and review of teacher portfolios.

- *Student learning outcomes.* Finally, at the fifth level, *student learning outcomes,* evaluation addresses whether and how teachers' application of material from the program has improved their students' learning. Questions might include: How have skills or knowledge learned in the program and applied by teachers in the classroom affected student behavior, competencies, or learning outcomes? How were these effects measured? Here, evaluators might look at student portfolios, test scores, and other records; interview students and parents; and administer their own surveys to gauge (changes in) student behaviors or competencies of interest.

Level 1: Teacher Reaction

Undoubtedly, participating teachers were satisfied with the EdLab program. On the post-program survey, they unanimously answered that the program exceeded their expectations, and rated their overall experience highly on a five-point satisfaction scale: 25 percent gave it the highest rating of *superior*, 63 percent *excellent*, 13 percent *good*, and 0 percent for both *fair* and *poor*. In interviews, participants emphasized their satisfaction with the program, with their largest regret generally being that they did not have more time to devote to it and that the demands of prepping students for standardized testing often worked at cross-purposes with their hopes for implementing mission-based learning on a larger scale. As one interviewee put it succinctly but profoundly:

It allowed me to step out of traditional education and make learning meaningful.

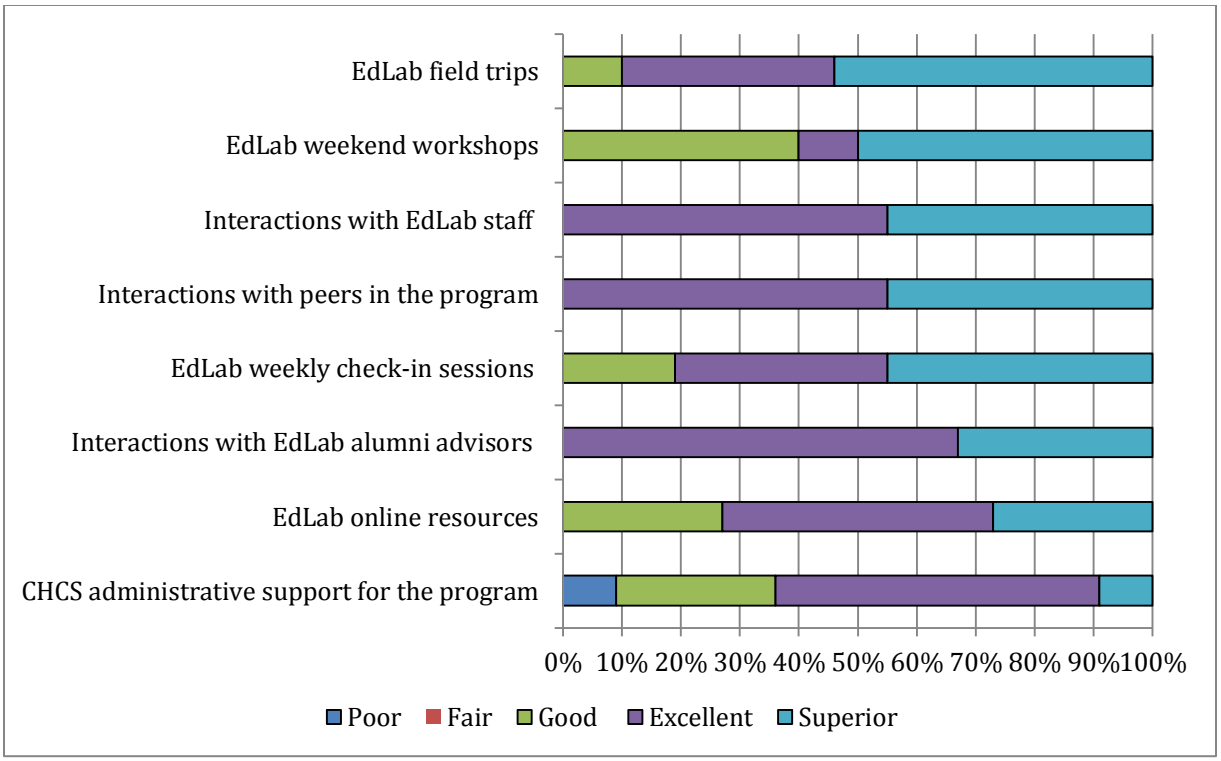
Participants were asked to rate their satisfaction with several elements of the program on the same five-point scale. In terms of *superior* ratings, the aspects that were rated highest were "EdLab field trips" (55 percent) and "EdLab weekend workshops (50 percent), although the latter also received a high proportion of less-than-*excellent* ratings (40 percent). "Interactions with EdLab staff" (45 percent) and "interactions with peers in the program" (45 percent) also received high proportions of *superior* ratings, and in neither case did any participants rate these elements below *excellent*. None of the program aspects about which teachers were asked received any ratings below the middle category of *good,* except for a single *poor* rating for "CHCS administrative support for the program" (which was also the element with the lowest percentage of *superior* ratings).

Level 2: Teacher Learning

To assess how EdLab affected teacher skills and attitudes, the study team asked a set of questions on the pre- and post-test surveys that set out a number of elements associated with mission-based learning and inquired about teachers' (1) comfort levels with and (2) assessment of the pedagogical importance of these elements. These elements were the following:

- Using technology and online resources for classroom instruction;
- Integrating technology and online resources into student projects and assignments;
- Tying classroom material to contemporary issues;
- Tying classroom material to issues that are personally important to kids;
- Facilitating projects undertaken by collaborative groups of students;
- Integrating physical objects into lessons or projects;
- Teaching in venues outside the classroom (e.g., museum, a local historical district, etc.);
- Collaborating with other educators;
- [Having their students learn] flexible problem-solving skills;
- Having students share their work with others in their community in outside venues

Figure 1: Participant Assessment of Program Elements



The results are shown in Table 1 on the next page. The numbers in this table represent the mean responses for all respondents on a five-point scale, with the categories translated into integers.[16] Because of various sources of noise in the data, *small differences in pre- and post-test scores are unlikely to be meaningful,* and overall inspection of the table suggests few before-and-after differences with respect to the elements about which the survey asked.[17] However, this may be at least in part because initial scores were quite high.[18] There is some evidence for an increase in

[16] *Very uncomfortable* (or *unimportant*) = 1; *uncomfortable* (or *slightly important*) = 2; *neutral* (or *somewhat important*) = 3; *comfortable* (or *very important*) = 4; *very comfortable* (or *critically important*) = 5. Thus, an index number of 5 on a "comfort" question would mean everyone marked *very comfortable*; 1 would mean everyone marked *very uncomfortable*; 2.5 would result if exactly half marked *very comfortable* and exactly half marked *very uncomfortable*; and so on.
Technical note: Although indexing procedures like this are not uncommon for scaled questions such as this, the results should be treated with caution. The answer scales were ordinal, not interval, and this kind of weighted index technically can be used only for the latter, because there can be no presumption that ordinal categories (e.g., *very uncomfortable, uncomfortable, neutral*, etc.) are equally spaced. Thus, we cannot deal with them as arithmetic quantities as we can with interval-scale units. For example, a response that codes as a 5 (say, *very comfortable* on the comfort question) is not "five times more" than a response that codes as a 1 (*very uncomfortable* on the comfort question), in the sense that a brick that weight 5 kilos is five times more than a brick that weighs 1 kilo.
[17] The study team arbitrarily set the cut-off difference at 0.5. Reasons to disregard small differences include: (1) answer categories were subjective and inexact; (2) total number of respondents was very small; (3) respondents cannot be considered a random sample of CHCS teachers; (4) individuals responding to post-program survey were not exactly the same ones who responded to pre-program survey (some non-core participants did not take the pre-program survey).
[18] This raises the issue of how self-selection among program participants may have affected results. The study team hoped to get at this issue by comparing pre-program survey results for participants with non-participant survey results. But the response rate on the latter too low to allow confident conclusions to be drawn, and some non-participant survey responders subsequently joined the program as non-core participants.

comfort levels with "integrating technology and online resources into student projects and assignments" and "teaching in venues outside the classroom," and an increase in teachers' assessment of the importance of "having students share their work with others in their community in outside venues." The relevant cells are highlighted in yellow in the table.

Table 1: Pre- and Post-Program Comfort Levels with, and Assessment of Importance of, Mission-Based Learning Elements

	Comfort, Pre-Test	Comfort, Post-Test	Importance, Pre-Test	Importance, Post-Test
Using technology and online resources for classroom instruction	4.0	4.3	4.3	4.3
Integrating technology and online resources into student projects and assignments	3.7	4.2	4.3	4.2
Tying classroom material to contemporary issues	4.3	4.4	4.4	4.1
Tying classroom material to issues that are personally important to kids	4.4	4.6	4.4	4.5
Facilitating projects undertaken by collaborative groups of students	4.0	4.3	4.4	4.5
Integrating physical objects into lessons or projects	4.8	4.4	4.2	4.1
Teaching in venues outside the classroom (e.g., museum, a local historical district, etc.)	4.0	4.6	4.3	4.6
Collaborating with other educators	4.7	4.6	4.9	4.6
Learning flexible problem-solving skills	Not asked	Not asked	4.9	4.5
Having students share their work with others in their community in outside venues	Not asked	Not asked	3.8	4.3

Level 3: Organizational Support

If teachers are to effectively implement what they learn in professional development programs in their own classrooms, support from their organization is critical. In the course of the EdLab+Clusters program, it became clear to the study team that organizational support for the program was uneven at best, and that this was animpediment to implementation for some of the participants. Three levels of CHCS administration influenced the ability of participants to

implement what they learned in EdLab: school-level, cluster-level, and district-level. These will be discussed in turn.

School-Level

In addition to a unified CHCS administration headed by a principal, each of the three CHCS schools has an assistant principal who is responsible for day-to-day management. Administrative support for the program at the school level appeared to be mixed.

The school-level administrations at Peabody and Stuart Hobson seemed to back the program, perhaps because of its fit with their histories—Peabody's as a hands-on learning center, and Stuart Hobson's as a museum magnet school in the recent past. However, teachers at Peabody, the early learning center, seemed to enjoy more time and freedom to implement the program, probably due to (1) the greater pressure at Stuart-Hobson, a middle school, to focus on standardized testing; and (2) the natural fit of mission-based learning with the exploratory, hands-on approach to learning that usually characterizes kindergarten and pre-kindergarten classes.

Evidence from Watkins is less clear; the study team had difficulty communicating with and getting responses from that school's administration.

CHCS-Level

Turning to the unified CHCS administrative level, there was no mistaking the CHCS principal's enthusiasm for inquiry-oriented approaches in general, and for EdLab in particular. She was very accessible to both the study team and EdLab staff, and demonstrated a high level of familiarity with and affinity for inquiry-oriented pedagogy.

However, it was not clear to the study team that the interest of the CHCS principal in the EdLab program translated into practical, day-to-day action to support and promote it. Indeed, it is probably not within the power of the CHCS principal to clear some of the larger institutional obstacles that impeded the implementation of mission-based learning, such as the blocked websites, the focus on standardized tests and prepping for them, and the lack of time available to CHCS teachers during the school day to pursue more "experimental" approaches. For the most part, these reflect policies and norms not subject to administrative control at the CHCS level.

One area where greater support from the CHCS principal might have made some difference is in the initial roll-out of the program. Results of the non-participant survey suggested that basic awareness of the EdLab+Clusters program was far from universal among CHCS teachers.[19] Interviewees also suggested that lack of awareness and understanding of the program was common among other program stakeholders (for example, parents).

[19] As noted above, the response rate for this survey was disappointing, with only 15 responses to 81 survey requests (about a 19 percent response rate). Still, the fact that nearly half of those responding (7 out of 15) had not heard of the program suggests that many CHCS teachers simply were not aware of it.

DCPS-Level

The requirements and policies of the District of Columbia Public Schools (DCPS) administration posed the largest organizational obstacles to the implementation of mission-based learning by CHCS teachers. The most salient issue here with respect to EdLab is the emphasis, which has been in place at least since the signing of the No Child Left Behind legislation in 2002, on the use of standardized testing to assess academic performance.

Interviews with teachers and administrators indicated that they are aware that their professional fortunes turn on their students' standardized test results, which creates enormous pressure to prioritize test preparation. This has two effects. First, it discourages outside-the-box approaches to classroom instruction, because of the risk that these will prove less effective than established methods in preparing students. Second, testing, test prepping, and related DCPS-imposed accountability requirements simply eat up a lot of classroom time, especially at certain points in the school year. This creates constraints on teachers' discretion to schedule and shape their curriculum. Comments from EdLab participants on this point included the following:

> *If you have to cram all your [mission-based learning] into the last few weeks of the school year after the [DCPS standardized tests have been taken] because something like this is considered "fun" and supplementary, you don't get as much out of it as you might.*
>
> *People who came on board with the program later in the year probably had a worse experience than those who started in the fall, because the spring schedule is jam packed with student testing and other administrative requirements.*
>
> *I had to postpone my field trip [because of a scheduling issue with the D.C. CAS exam]. That seems like small thing, but [it totally threw off the schedule]. … I couldn't even start our project [until the school year was almost over,] because the first part was based on the field trip. … The central offices have this notion that D.C. CAS is the end-all-be-all, whereas if you're going on a field trip, that's not for educational purposes. It's like you're taking the kids to Playland or somewhere that doesn't exist. You cannot get them to see that … authentic learning is what takes place outside of the classroom. There's a notion that D.C. CAS is the way we get students to learn, and quite frankly it's stupid.*

Another obstacle to mission implementation imposed at the DCPS level concerned the blocking of websites that EdLab participants wanted to use for their missions. One program participant also noted that mission-based learning methods tended to be penalized in the in-class observation component of teacher assessment by DCPS personnel, as the class could appear chaotic and uncontrolled to an observer unfamiliar with or unfavorably predisposed toward inquiry-oriented pedagogies.

Level 4: Implementation

At the fourth level, *classroom application,* evaluators look for changes in teachers' professional behavior, activities, and practices that can be attributed to the professional development program. To this end, the study team attempted to evaluate participants' use of mission-based learning in their classrooms. EdLab has not established observable or testable criteria for assessing the implementation of mission-based learning in the classroom, but study team looked for changes that could be plausibly attributed to participation in EdLab, asking questions such as the following:

- Do teachers have workable mission plans? To what extent did they rely on EdLab staff to assist them in formulating these plans?

- Are they successfully implementing mission plans? For example, are field trips being taken? Is time being devoted to missions in the classroom?

- Are teachers more frequently using elements of mission-based learning in their classrooms in general, such as media technology?

On the most basic implementation level, the post-program survey indicates that all respondents completed at least one mission, and four participants completed two missions over the school year. Comments made by teachers at the last EdLab+Clusters weekend workshop, however, suggest that some teachers found it difficult to work missions into their schedules to the extent that they would have preferred.

Mission plans posted on the EdLab Google site give some insight into the question of the workability of missions. Most participants did not update their mission plans on a regular basis throughout the year, but they were asked to spend time updating these documents at the final EdLab workshop. Both interviews and survey comments suggest that many participants found mission planning to be the most challenging part of the program, and some received a great deal of personalized assistance from EdLab staff in this stage of the process:

> *At first it was hard to focus and get your mind wrapped around your ideas. The weekly meetings helped to manage and gather my thoughts back to the direction I wanted.*
>
> *Without their feedback, I would still be in the planning stages. They have helped me organize my thoughts and make the mission clear.*
>
> *At first [the planning process] wasn't teacher-friendly; it seemed overwhelming—getting everything written down and having to put my ideas on paper was overwhelming.*

In the absence of in-class observation, observation of class field trips provided some insight into the real-time implementation of missions. As noted above, comparison of the pre-and post-program surveys suggests that participants were more comfortable with teaching outside of the classroom at

the end of the year than at the beginning. The pre- and post-program surveys also asked participants about the frequency with which they employed various elements of mission-based learning in their classrooms, and "teaching in venues outside the classroom" appeared to be more frequent at the end of the year as well (see Table 2, next page).

However, during the class trips that the study team observed, the participating teachers, by and large, did not play a major role in leading activities for the students. Instead, EdLab staff or staff of the outside venues—mainly Smithsonian and non-Smithsonian museums—led the experiences and discussions, and teachers mainly provided order and discipline. While other field trips may have been different, the evidence of the events observed by the study team suggests that some teachers may have been interpreting "teaching in venues outside the classroom" simply to mean taking field trips, as opposed to actually leading classes in unfamiliar venues.

Aside from the possible increase in the frequency of "teaching in venues outside the classroom," comparison of pre- and post-program surveys provides little evidence of any increase in the use of mission-based teaching elements by program participants. (As with Table 1 above, the study team would advise against interpreting small differences—say, less than 0.5—in the pre- and post-test results as strong evidence for any actual change.)[20]

Teachers reported varied levels of success implementing their missions. Lack of success in mission implementation was often attributed to the institutional obstacles mentioned above, such as the focus on mandated testing and problems with technology:

> *I did not get through my missions the way they were supposed to be completed. We got through them, but we never got to the part where we were supposed to share them with the community. We had already spent so much time on the other parts that the school year ended and we did not go to the last step.*

[20] Scale: 1= "Almost never or never"; 2 = "Rarely (e.g., once a year)"; 3 ="Occasionally (e.g. once a month); 4 = "Frequently (e.g., once a week)"; 5 = "Daily or almost daily."

Table 2: Pre- and Post-Program Use of Mission-Based Learning Elements

	Frequency-Pre	Frequency-Post
Using technology and online resources for classroom instruction	4.1	3.9
Integrating technology and online resources into student projects and assignments	3.3	3.6
Tying classroom material to contemporary issues	3.9	3.9
Tying classroom material to issues that are personally important to kids	4.0	4.4
Facilitating projects undertaken by collaborative groups of students	3.3	3.5
Integrating physical objects into lessons or projects	3.7	3.8
Teaching in venues outside the classroom (e.g., museum, a local historical district, etc.)	2.6	3.2
Collaborating with other educators	4.0	3.7

At the end of the year, several teachers reflected on what worked and did not work in their missions and thought of how they would change it for the following year. They were confident that they could improve their mission implementation with the lessons learned in the first year. Several also commented that they would want to start their missions earlier in the year and better align them with Common Core standards.

One teacher summed up what he felt he had gained from his experience implementing mission based learning in these words:

> *Today's teaching is so rigid. You feel you cannot mess up. EdLab made you feel like it was okay to mess up—like if you messed up, you were just taking it in another direction. I gained the confidence to understand that it doesn't have to be perfect or completely under my control; it is about the learning. … [The kids] were learning, just not necessarily [in the way I originally intended.] I was a little nervous because they were all doing different things, but my principal said: "Yes, they are all doing different things, but I like it—they are learning." It was hard at first for me to give up that control of what they were doing, and [run the risk that] they were going to mess up. But I [finally] was able to give up that control.*

Level 5: Student Outcomes

Anecdotal evidence can be adduced for the positive effects of the mission-based learning experience of the CHCS students exposed to it through the EdLab+Clusters program, either directly through the study team's field trip observations, or indirectly through the comments of teacher-participants and EdLab teacher-alumni.

> *At the museums, I was surprised by the students who showed the most enthusiasm, because in class they are the ones who tend to not be inspired. I think it's because they felt empowered, they had a grasp on what they needed to do; and when that happens they'll do it. … There were students who were saying "This is the best project I've had all year, because it's something I care about." That was really nice to hear.*

> *When we went to the museums and did the interviews [with visitors], the kids told me: "You wouldn't believe it—these people have no clue about [the subject we're studying here]!" They were educating the people [they talked to,] and I think they learn best that way.*

On field trips, the study team observed that students were generally very well behaved, and they appeared comfortable talking with visitors and operating iPods and iPads to record interviews and take photos.

One of the EdLab alumni interviewed by the study team who has become successful with mission-based learning shared the following about the benefits of this approach for her students:

> *Last year we finished the mission in mid-March and had [standardized] testing in mid-April. I used that as a motivator for my students. I said: "Look what you have done [in this mission]. You read a book. You brainstormed. You came up with your own idea and turned into a persuasive multimedia campaign that has impressed everyone who has seen it. You can do anything." … I tell students that they are much smarter than the test. A lot of students have anxiety that causes them to underperform on the tests, especially when they have performed poorly in the past. When I have them do these projects, it shows that they can do it. My students performed better last year than the year before. In terms of my impact evaluation, [using mission-based learning] actually helped my scores a lot. I feel that it is directly related to the project and success from the project.*

Such anecdotal observations cannot be considered rigorous evidence for positive student outcomes, for various reasons; but they are suggestive.[21] Rigorous outcomes evaluations, especially those based on a controlled experimental model, are required before any strong conclusions can be drawn about educational impact. Unfortunately, these require a longer period of planning, greater

[21] Observations about student reactions to field trips are particularly suspect, because such trips are special occasions that kids tend to be excited about, regardless of their educational impact. More generally, we cannot equate student enthusiasm or enjoyment with educational impact; students may find an activity deeply engaging even if it fails to provide any meaningful educational impact.

support from school administration, and usually larger budgets than were possible for this assessment.

No published research supports the effectiveness of mission-based learning in terms of student outcomes at this time, but some of the other inquiry-oriented models discussed above are supported by decades of research. Project-based learning in particular has received a good deal of attention from researchers. Therefore, to the extent that mission-based learning can—as the study team believes—be considered a variant of project-based learning, findings on student outcomes for this pedagogy should apply with similar force to mission-based learning. The balance of this section provides a brief overview of some of the recent literature on student outcomes of project-based learning program. It is not meant to be a comprehensive literature review; it aims only to provide some examples of rigorous outcomes research that suggest that well-implemented project-based learning programs can indeed have positive effects on student outcomes, such as increasing student academic achievement, promoting conceptual understanding, fostering critical thinking skills, and motivating students (Ravitz, 2010; Buck Institute for Education, 2009).

Hernández-Ramos and De La Paz (2009) examined the impact of a project-based learning experience on academic achievement and historical reasoning abilities for 8th grade history students. Their study, conducted in northern California, was based on a pre- and post-test design with a control group. Students from two locations who were studying 19th century western expansion were divided into a comparison group (n = 771) that was taught using traditional methods and a treatment group (n = 746) that received a project-based approach with technology integration. The culminating project for the latter group was a presentation to the school and an open house for adults. Analysis of pre- and post-test results indicated that students from both groups had comparable levels of content knowledge prior to the instruction, but those in the project-based learning group surpassed their peers in content knowledge in the post-testing.

Similarly, a quasi-experimental evaluation conducted by SRI International on the Challenge 2000 Multimedia Project focused on identifying whether project-based experiences were having a positive impact on student academics and technological skills (Penuel and Means, 2000). Twelve project-based classrooms (n = 314) and six comparison classrooms (n = 133) at the 6th and 7th grade levels participated in the study. In both cases, students were challenged upon completion of an instructional unit to create a brochure on the problems facing homeless elementary students. Six trained individuals scored the student products on a five-point scale across three domains: content, audience, and design. There were significant differences in mean scores for all three domains, favoring the project-based learning group. In addition, on a survey administered to the children, those in the project-based learning classrooms reported using technology more often, perceived a greater ability to complete the task within the allotted time, and used more documents to support their conclusions. Finally, results from the SAT-9 tests indicated that students in the project-based group had higher reading and language scores than the students that received traditional instruction.

A study by Chu, Tse, Loh, and Chow (2011) demonstrated an increase in reading ability and interest among primary-school students (n = 132) following a technology-related project-based program collaboratively administered by classroom teachers and librarians. These collaborative teams guided the students in locating resources and developing projects based on three themes explored over 10 weeks: the Earth, history of Hong Kong, and history of China. One week prior to the first unit and six months later, students completed a standardized reading test and an attitudinal survey on their perceptions of reading. Results from paired sample t-tests indicated statistically significant gains on overall reading performance, as well as an increase in interest in reading among students who indicated a medium (neither high nor low) initial level of interest. Student responses to open-ended survey questions corresponded with the quantitative findings, suggesting more positive perceptions about reading following the project-based experience.

Mioduser and Betzer (2007) studied the impact of project-based learning on academic achievement, problem solving, and attitudes in a technology course for high-achieving secondary students. The quasi-experimental, pre- and post-test design separated students into an experimental group (n = 60) and a control group (n = 60). Participants completed five measures including a standardized content-knowledge test, attitudinal survey on technology, scope-of-knowledge scale, source-of-knowledge scale, and assessment of capability in design. Both groups received training in a curriculum that aims to develop scientific, mathematical, and design skills for understanding control systems and processes. Although both groups received training with the same curriculum, the experimental group was taught with a blend of project-based learning and traditional methods, while the control group received only traditional instruction. Results suggested that students in the experimental group emerged with a stronger technology base, better technological skills, superior mastery of concepts, and larger improvements in attitudes towards technology than the control group. They also showed improvement in organization and collaboration skills.

Other literature supports the use of project-based learning to positively influence student outcomes across ages, and in a variety of academic domains and ability levels. Overall, the research highlights a variety of content-knowledge and attitudinal-interest benefits, including for students with specific learning needs (ChanLin, 2008; Chu, Tse, Loh, & Chow, 2011). In addition, the research suggests that students who engage in project-based learning may experience gains in problem-solving skills and the ability to work effectively with their peers when compared with students who receive traditional instruction. The current literature suggests that thoughtfully designed project-based learning programs are viable pedagogical approaches which promote student academic achievement and 21st century skills to a greater extent than traditional pedagogical techniques.

CONCLUSIONS

EDLAB+CLUSTERS

Based on OP&A's analaysis, the takeaway messages of the EdLab+Clusters program evaluation can be summed up as follows:

- Based on self-reports, participants liked the program, experienced it as a positive and collaborative effort, and believe they benefitted from it in a professional sense.
- Participants generally felt their missions were favorably received and promoted student engagement.[22] While OP&A was not able to collect data on student impact, published research supports the efficacy of similar pedagogical approaches (i.e., project-based learning) in promoting positive student outcomes.
- Implementation of mission-based learning at CHCS would have benefitted from greater administrative support and a more hospitable institutional environment for the implementation of non-traditional pedagogical approaches.
- The scalability of the program in its current form is doubtful, because it relies on a high degree of personalized EdLab support for participants.

To the extent that the program's goal was to introduce mission-based learning to CHCS as a viable, long-term alternative to traditional curricular instruction, no firm conclusions can be drawn. These would require follow-up studies to investigate (1) whether and how CHCS teachers continue to employ mission-based methods after the withdrawal of intensive EdLab support; (2) how this affects student learning; and (3) whether these methods spread to teachers who did not participate this year. Unfortunately, preliminary results are not encouraging, given:

- The lack of a deep commitment to the program by school administration at some levels—school, cluster, and district.
- Other priorities and demands on public school teachers, which greatly reduce the time and opportunity available for implementing missions; and
- Some participants' heavy dependence on EdLab support in planning and implementing missions, which raises questions about participants' ability to continue to effectively employ mission-based approaches in the absence of such support. This point applies both to the advice and support from EdLab staff, and to the provision of transportation and technology tools.

[22] Albeit subject, in some cases, to the obstacles cited in the next bullet. As noted, some participants felt the time and opportunity available to them to conduct mission-based learning in the classroom were too restricted.

The EdLab+Clusters experiment seems to have been most valuable in clearly exposing the formidable obstacles to implementing inquiry-based approaches in public schools without major changes in the administrative and institutional environment. It may simply be that the public schools are not ready for such non-traditional pedagogies in anything beyond a supplemental role. The obstacles faced by EdLab participants—disincentives to risk-taking among teachers, heavy focus on standardized test scores, and so on—reflect the current dominant thinking about how public education should be conducted, and are probably present to some degree in any public school district.

The major message from the 2012-13 EdLab+Clusters program is that successfully transferring mission-based learning into a formal educational environment such as CHCS requires much more than dedicated program staff and enthusiastic teacher-participants. It requires an administrative commitment and an institutional framework that actively support such experiments.

EDLAB ITSELF

While the main obstacles to the success of EdLab+Clusters arose on the "Clusters" side, the study team believes some issues on the "EdLab" side need to be addressed if the program is to grow and thrive.

First, as discussed above, there is a large and growing universe of inquiry-oriented pedagogical methods, tools, resources, and models that are broadly similar to mission-based learning. Because some of these are much better established and researched than mission-based learning, they offer a valuable, off-the-shelf source of case studies, best practices, and evidence that can be used by EdLab in moving forward. It is not clear that EdLab staff have fully utilized these resources, including investigating possible partnerships that could greatly leverage EdLab's efforts to promote inquiry-oriented learning as an alternative to traditional methods. In addition, the study team believes that EdLab needs to clarify its niche within the inquiry-oriented learning universe. Presumably, the key element that differentiates mission-based learning from its "competitors" is the emphasis on out-of-class exploration in general, and use of museum resources in particular.

Second, the program's goals and criteria for success remain somewhat vague—too vague, the study team believes, to allow rigorous assessment of outcomes without some clarification. Such clarification would help the program to move forward in a more focused way. For example, consider two alternatives that more or less represent the extremes of what EdLab's goals might be:

- Under the least ambitious scenario for the program, EdLab could aim primarily to give teacher-participants the tools to create more active, curriculum-relevant, and engaging out-of-class museum experiences for their students (in contrast to the stereotype of the museum field trip as a free-for-all with little educational content). If this approximately describes EdLab's chief goal, the current workshop-based format is appropriate, and future plans to extend these workshops with the assistance of Affiliate partners (for example,

through the proposed "Connecting Classrooms" initiative) represent a reasonable step toward scaling up.

- Under the most ambitious scenario, EdLab could cast itself as part of the educational movement to replace traditional "passive" approaches to pedagogy with inquiry-oriented approaches, by creating successful models in partner schools. (In some ways, this appears to what was envisioned for EdLab+Clusters in a best-case scenario.) If this is a better description of the goal that EdLab sees for itself, the program needs to move away from its focus on workshops and personalized support for teachers and toward higher-profile activities that are more likely to influence the national debate about inquiry-oriented pedagogy. The revolution is not going to happen one small, informal workshop at a time.

Between these extremes, there are a variety of other possibilities. Is EdLab more about using museum resources in the curriculum than about out-of-classroom museum experiences? Is it more about out-of-classroom experiences in general than about museums or museum resources? Is it about creating a learning community centered on Smithsonian resources? It is not the place of the study team to say what EdLab's goals should be, but the study team does believe

- These goals need to be better defined. As it stands now, the vagueness of the program's goals is as an obstacle to both effective long-term planning and rigorous evaluation.
- These goals should be commensurate with available resources. To the extent they tend toward the more ambitious end of the spectrum, EdLab needs to prioritize collaborative efforts with major partners that allow it to leverage its own modest resources.

Third, the core strength of EdLab continues to lie in the personal interactions between its staff and program participants. As noted above, approaches based on personalized support are difficult to scale up, at least with resources on the order available to EdLab. To the extent that EdLab seeks to scale up, it must systematize and "automate" aspects of the program to a greater extent. Some recommendations along these lines are proposed in the next section.

RECOMMENDATIONS

EDLAB IN FORMAL EDUCATION

- If EdLab were to undertake another crossover into formal education along the lines of EdLab+Clusters, the program should invest in securing a much stronger administrative commitment prior to the program launch. To do so, it should develop a strong business case that shows how mission-based learning makes a major contribution to accomplishment of academic goals and positive futures for students.

- Ideally, such an effort would aim to secure the following commitments from all relevant levels of administration:

    - Support for a highly visible roll-out of the program, including extensive outreach to stakeholder groups (teachers, students, parents) to create a high level of awareness, interest, and "buzz," as well as to answer questions, quell concerns, and build buy-in.

    - A commitment to address institutional obstacles (for example, blocked websites, dearth of technology, and lack of funds for transportation) in a timely and effective manner.

    - Permission for EdLab trainers and evaluators to observe teachers in situ, to better understand where their real-time implementation of mission-based learning works and where it needs improvement.[23]

    - Compensation to participating teachers (for example, reductions in their teaching and non-teaching responsibilities) for time spent on EdLab activities—particularly for teachers who reach the level where they can mentor peers in mission-based pedagogy.

    - Permission for EdLab evaluators to do experimental-design evaluation of student outcomes onsite (for example, by administering pre- and post-program tests to students in EdLab classes and control classes).

PROGRAM PHILOSOPHY, PEDAGOGY, AND GOALS

- Formally clarify the core features of mission-based learning, particularly in terms of what differentiates it from the myriad other variants of inquiry-oriented learning.

[23] This would presumably require participants to understand when enrolling that such observation is expected as part of their participation in the program.

- Reduce this to a clear, concise statement on the program website and application materials that effectively conveys the essence of mission-based learning (and its pedagogical value-added) to stakeholders such as potential participants, donors, school administrators, partner organizations, and so on.
- Clarify specific and realistic goals for the EdLab program in terms of outcomes for:
    - Casual teacher-participants (e.g., what should a teacher who attends a single EdLab workshop come away with?)
    - Committed teacher-participants (e.g., those who attend multiple workshops, implement missions in their classrooms, and potentially could serve as mentors and trainers for their peers in mission-based learning)
    - Other participants and stakeholders (e.g., school administrators and support staff; museum staff; the online EdLab mission-based learning community; etc.)
    - Partner/collaborator organizations (e.g., Smithsonian Affiliates, school partners, nonprofit partners such as the Pearson Foundation, etc.)

SCALABILITY

- Create and make available online resources that, to the extent possible, systematize and automate program activities that currently require face-to-face interaction with EdLab staff. For example:
    - Training materials that introduce the concept of mission-based learning and basic approaches to planning and implementing missions (i.e., material typically covered at the beginning of EdLab workshops).
    - Step-by-step mission plans for teachers who wish to implement their own adaptations of missions that have been successful for others in the past.
    - Instructions for integrating out-of-classroom experiences into curricular material, coupled with
        - A step-by-step checklist for conducting successful mission-based field trips; and
        - An online tool for planning and booking a Smithsonian mission-based field trip, available only to EdLab workshop attendees or members of the EdLab online community.

    - A tool—presumably an expansion of the current Digital Toolkit—that allows teachers to select appropriate media technology resources on the basis of parameters such as grade level, subject, and other criteria.

- Define concrete, testable/observable criteria for assessing participants' competence to (1) teach using mission-based learning approaches; and (2) train/mentor peers in mission-based learning approaches:
    - Criteria for successful mission plans[24] (e.g., explicit connection with curricular content; integration of out-of-classroom exploration components with classroom work; a realistic schedule, given other demands on classroom time; etc.)
    - Criteria for successful real-time implementation of missions (e.g. effective management of students working in groups; use of the Socratic method; etc.)
    - Criteria for successful peer-to-peer training/mentoring of mission-based learning methods (e.g. knowledge of content related to the previous two bullets, and of the basic philosophy of mission-based learning, common media technology tools appropriate for missions, etc.)
- Partner with other organizations that specialize in project-based learning approaches; within these partnerships, focus on EdLab's area of comparative advantage in out-of-classroom explorations, particularly in museums.
- Encourage all teachers who plan and implement missions to document them in greater depth (including content, challenges faced, strategies used, lessons learned, etc.), and post the results on the EdLab website.

[24] To some extent, these are implicit in the current EdLab mission plan template.

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APPENDIX B: MUSEUM-SCHOOL PARTNERSHIP REFERENCES

Late in the research process, the EdLab team asked OP&A if it might identify, in general terms, the attributes of a successful museum-school partnership.

The OP&A study team believes this could be an interesting research question for a future study. However, the research for this study was not specifically oriented toward this question, and it would be difficult to answer it with any confidence on short notice, for several reasons:

- It begs the question of what is meant by a "partnership." Many relationships between schools (or school districts) and museums exist, but whether any given example rises to the level of a "partnership" is a subjective question. Should *any* formal agreement between school and museum administrations be considered a "partnership"? Must a "partnership" impact the formal curriculum, or can the provision of supplemental resources qualify as a partnership? Is an ongoing commitment required? If so, how is this commitment defined?

- The definition of "successful" is similarly subjective. Is "success" defined by a program's longevity? Its participation rates? Its ability to attract funding? Does "success" require evidence of improved student outcomes? If so, are objective measures of performance (e.g. standardized test scores, graduation rates, grade-point averages, etc.) the only ones of interest? Or can subjective changes in student priorities and attitudes (e.g., improved appreciation for art or greater awareness of environmental issues) be sufficient?

- Objective information on museum-school partnerships, however they are defined, is not easily accessible. Web searches for "school-museum partnership" and similar terms result in a fair number of hits, but most are general descriptions of existing programs on organization websites, usually with little detail and no links to evaluation reports or other critical assessments.

Thus, before the OP&A study team would be willing to endorse particular programs as possible models for future EdLab partnerships with schools, it would want to formally clarify the definition of a "successful program" in this context, and undertake its own research into programs that potentially fit the bill. That said, the OP&A study team can provide the following short list of critical resources on the subject of museum-school partnerships.

Elliot, J.R. (2012). *The Infinity and Beyond: Museum-School Partnerships Beyond the Field Trip.* Seton Hall Theses, Paper 216. Accessed September 10, 2013 at http://scholarship.shu.edu/theses/216.

Elliot reviews four partnerships between schools and informal science institutions (museums, aquariums, zoos, science centers) around the country, providing extensive documentation of these programs and a valuable bibliography. The programs explored are Urban Advantage (New York City, Denver, Miami, and

Boston); Calument Environmental Education Program (Chicago); Watsonville Area Teens Conserving Habitats (Monterey); and Quasars to Sea Stars (Santa Barbara). Elliot examines includes the results of evaluation studies of all these programs, and offers a suggested list of criteria for defining program success, including (1) meeting formal standards; (2) impacts on tests and grades; (3) changes in student and teacher attitudes; (4) increases in college enrollment among participants; and (5) the collection of usable data for research.

Fortney, K., & Sheppard, B., eds. (2010). *An Alliance of Spirit: Museum and School Partnerships.* Washington, D.C.: American Alliance of Museums (AAM).

An edited volume on building partnerships between museums and schools that combines "how-to" instruction, theory, and case studies. Published in cooperation with EdCom, the Educator's Committee of the AAM. In an appendix, Fortney and Sheppard provide a consensus list of characteristics of an "ideal" museum-school partnership, framed collectively by participating AAM members.

Early Elementary Science Partnership (E2SP) Three-Year Summative Report, Executive Summary. (2008). Accessed September 20, 2013 at http://fieldmuseum.org/sites/default/files/E2SP_%20Evaluation_Summary.pdf.

E2SP is a partnership among the Field Museum, Peggy Notebaert Nature Museum, Chicago Children's Museum, Lincoln Park Zoo, Chicago Public Schools (CPS), and Northwestern University. It targets K-3 teachers, school support staff, and administrators in participating schools for professional development directed at improving their science content knowledge, understanding of inquiry-based approaches to teaching science, and use of museums and other informal learning resources.

School in the Park website. Accessed September 22, 2013 at http://parks.sandi.net/Pages/SITP/.

School in the Park is a collaborative effort among nine San Diego informal learning institutions and several schools, aimed at students in the 3rd-7th grades. This website contains links to program evaluations at http://schoolinthepark.net/.

APPENDIX C: SURVEY FREQUENCIES

PRE-PROGRAM SURVEY

I am a... **75%** Teacher **15%** Administrator **15%** IT coordinator

Have you taken an EdLab workshop before today? **50%** Yes **50%** No

In general, how *comfortable* are you with the following teaching approaches?

	Very un-comfortable	Uncom-fortable	Neutral	Comfort-able	Very Comfort-able
Using technology and online resources for classroom instruction	0%	0%	15%	71%	14%
Integrating technology and online resources into student projects and assignments	0%	14%	15%	57%	14%
Tying classroom material to contemporary issues	0%	0%	14%	43%	43%
Tying classroom material to issues that are personally important to kids	0%	0%	14%	29%	57%
Facilitating projects undertaken by collaborative groups of students	0%	14%	14%	29%	43%
Integrating physical objects into lessons or projects	0%	0%	0%	17%	83%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	15%	71%	14%
Collaborating with other educators	0%	0%	0%	29%	71%

About how *frequently* do you employ the following teaching approaches?

	Never or almost never	Rarely (e.g. 1x/year)	Occasion-ally (e.g., 1x/month)	Frequently (e.g. 1x/year)	Every day or almost every day
Using technology and online resources for classroom instruction	0%	14%	14%	15%	57%
Integrating technology and online resources into student projects and assignments	0%	14%	57%	15%	14%
Tying classroom material to contemporary issues	0%	0%	42%	29%	29%
Tying classroom material to issues that are personally important to kids	0%	0%	29%	42%	29%
Facilitating projects undertaken by collaborative groups of students	0%	29%	29%	28%	14%
Integrating physical objects into lessons or projects	0%	0%	50%	33%	17%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	14%	43%	14%	29%	0%
Collaborating with other educators	0%	0%	14%	72%	14%

When you think about your ideal classroom, how *important* do you consider the following features?

	Not important	Slightly important	Somewhat important	Very important	Critically important
Using technology and online resources for classroom instruction	0%	0%	29%	14%	57%
Integrating technology and online resources into student projects and assignments	0%	0%	14%	43%	43%
Tying classroom material to contemporary issues	0%	0%	0%	57%	43%
Tying classroom material to issues that are personally important to kids	0%	0%	0%	57%	43%
Facilitating projects undertaken by collaborative groups of students	0%	0%	0%	57%	43%
Integrating physical objects into lessons or projects	0%	0%	33%	17%	50%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	14%	43%	43%
Collaborating with other educators	0%	0%	0%	14%	86%
Learning flexible problem-solving skills	0%	0%	0%	14%	86%
Having students share their work with others in their community in outside venues	0%	0%	50%	17%	33%

NON-PARTICIPANT SURVEY

My school is **27%** Peabody **53%** Watkins **20%** Stuart Hobson

Before receiving this survey, were you aware of the EdLab + Clusters partnership initiative between the Smithsonian Institution and the Capitol Hill Cluster schools? **53%** Yes **47%** No

EdLab's mission-based learning approach is described on the Smithsonian EdLab website as follows:

> "Mission-based learning brings classroom content to life by challenging students to use real stuff in museums and technology tools to investigate and solve problems that exist in the real spaces around them. Or you could look at it this way: mission-based learning = (classroom + museums + community) x technology."
>
> **Based on this description, does mission-based learning sound like an approach you would be interested?**
>
> **93%** Yes **0%** No **7%** Cannot say from this description

Participation in EdLab involves attending one or more Saturday workshops in which educators are introduced to concepts, tools, and resources to help them create and implement their own mission-based learning plans. To the extent that they wish, participants can continue to receive feedback and support from EdLab staff for their subsequent mission-based learning efforts. The larger goal is to create a self-sustaining community of educators interested in taking learning outside the classroom and making it as interesting, relevant, and engaging to their students as possible.

> **Based on this description and any other knowledge you may have about the EdLab + Clusters partnership, would you consider participating in an EdLab workshop?**
>
> **79%** Yes **0%** No **21%** Cannot say from this description

The main subject or subjects I currently teach are ... (Mark all that apply)

38% All subjects -- elementary or pre-elementary classroom
8% Science
8% Math
23% English/ Language Arts
0% History
8% Civics/ Social Studies
0% Art
15% Music
0% Technology skills
8% Library/ research skills
0% Physical education
15% Special education
0% Other

Years of teaching: 16 (Average)

When you think about your ideal classroom, how *important* do you consider the following features?

	Not important	Slightly important	Somewhat important	Very important	Critically important
Using technology and online resources for classroom instruction	0%	0%	9%	55%	36%
Integrating technology and online resources into student projects and assignments	0%	0%	9%	64%	27%
Tying classroom material to contemporary issues	0%	0%	18%	55%	27%
Tying classroom material to issues that are personally important to kids	0%	0%	18%	18%	64%
Facilitating projects undertaken by collaborative groups of students	0%	0%	18%	27%	55%
Integrating physical objects into lessons or projects	0%	9%	9%	46%	36%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	0%	36%	64%
Collaborating with other educators	0%	0%	9%	36%	55%
Learning flexible problem-solving skills	0%	0%	9%	36%	55%
Having students share their work with others in their community in outside venues	0%	9%	9%	27%	55%

In general, how *comfortable* are you with the following teaching approaches?

	Very un-comfortable	Uncom-fortable	Neutral	Comfort-able	Very Comfort-able
Using technology and online resources for classroom instruction	0%	0%	0%	73%	27%
Integrating technology and online resources into student projects and assignments	0%	0%	18%	46%	36%
Tying classroom material to contemporary issues	0%	0%	18%	27%	55%
Tying classroom material to issues that are personally important to kids	0%	0%	0%	45%	55%
Facilitating projects undertaken by collaborative groups of students	0%	0%	18%	36%	46%
Integrating physical objects into lessons or projects	0%	9%	0%	36%	55%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	9%	27%	64%
Collaborating with other educators	0%	0%	0%	36%	64%

About how *frequently* do you employ the following teaching approaches?

	Never or almost never	Rarely (e.g. 1x/year)	Occasion-ally (e.g., 1x/month)	Frequently (e.g. 1x/year)	Every day or almost every day
Using technology and online resources for classroom instruction	0%	0%	36%	37%	27%
Integrating technology and online resources into student projects and assignments	0%	0%	45%	45%	10%
Tying classroom material to contemporary issues	0%	0%	18%	73%	9%
Tying classroom material to issues that are personally important to kids	0%	0%	0%	64%	36%
Facilitating projects undertaken by collaborative groups of students	0%	0%	64%	27%	9%
Integrating physical objects into lessons or projects	0%	9%	27%	37%	27%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	9%	73%	9%	9%
Collaborating with other educators	0%	18%	18%	37%	27%

POST-PROGRAM SURVEY

My school is **27%** Peabody **53%** Watkins **20%** Stuart Hobson

Number of EdLab weekend workshops attended since the beginning of this school year:

18% one **55%** two **27%** three

Number of missions completed in this school year:

64% one **36%** two **0%** three **0%** 4 or more

How would you rate your overall experience with the EdLab program this year?

0% poor **0%** fair **18%** good **45%** excellent **36%** superior

Please rate the following elements of the EdLab+Clusters program:

	Poor	Fair	Good	Excellent	Superior
Interactions with EdLab staff	0%	0%	0%	55%	45%
Interactions with EdLab alumni advisors	0%	0%	0%	67%	33%
Interactions with peers in the program	0%	0%	0%	55%	45%
EdLab weekend workshops	0%	0%	40%	10%	50%
EdLab weekly check-in sessions	0%	0%	18%	37%	45%
EdLab online resources	0%	0%	27%	45%	28%
EdLab field trips	0%	0%	9%	36%	55%
CHCS administrative support for the program	9%	0%	27%	55%	9%

Did the program meet your expectations?

100% Yes **0%** No **0%** Not sure

When you think about your ideal classroom, how *important* do you consider the following features?

	Not important	Slightly important	Somewhat important	Very important	Critically important
Using technology and online resources for classroom instruction	0%	0%	9%	55%	36%
Integrating technology and online resources into student projects and assignments	0%	0%	9%	64%	27%
Tying classroom material to contemporary issues	0%	0%	18%	55%	27%
Tying classroom material to issues that are personally important to kids	0%	0%	18%	18%	64%
Facilitating projects undertaken by collaborative groups of students	0%	0%	18%	27%	55%
Integrating physical objects into lessons or projects	0%	10%	9%	45%	36%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	0%	36%	64%
Collaborating with other educators	0%	0%	9%	36%	55%
Learning flexible problem-solving skills	0%	0%	9%	36%	55%
Having students share their work with others in their community in outside venues	0%	9%	9%	27%	55%

In general, how *comfortable* are you with the following teaching approaches?

	Very un-comfortable	Uncom-fortable	Neutral	Comfort-able	Very Comfort-able
Using technology and online resources for classroom instruction	0%	0%	0%	73%	27%
Integrating technology and online resources into student projects and assignments	0%	0%	18%	45%	37%
Tying classroom material to contemporary issues	0%	0%	18%	27%	55%
Tying classroom material to issues that are personally important to kids	0%	0%	0%	45%	55%
Facilitating projects undertaken by collaborative groups of students	0%	0%	18%	37%	45%
Integrating physical objects into lessons or projects	0%	9%	0%	36%	55%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	0%	9%	27%	64%
Collaborating with other educators	0%	0%	0%	36%	64%

About how *frequently* do you employ the following teaching approaches?

	Never or almost never	Rarely (e.g. 1x/year)	Occasion-ally (e.g., 1x/month)	Frequently (e.g. 1x/year)	Every day or almost every day
Using technology and online resources for classroom instruction	0%	0%	36%	36%	28%
Integrating technology and online resources into student projects and assignments	0%	0%	45%	45%	10%
Tying classroom material to contemporary issues	0%	0%	18%	73%	9%
Tying classroom material to issues that are personally important to kids	0%	0%	0%	64%	36%
Facilitating projects undertaken by collaborative groups of students	0%	0%	64%	27%	9%
Integrating physical objects into lessons or projects	0%	9%	27%	36%	28%
Teaching in venues outside the classroom (e.g., in a museum, a local historical district, etc.)	0%	9%	73%	9%	9%
Collaborating with other educators	0%	18%	18%	36%	28%

APPENDIX D: CASE STUDIES

Case Study One: 7th Grade Science Teacher

Doug Creef is a 7th grade Science teacher at Stuart Hobson Middle School. Doug was attracted to EdLab because he wanted expand use of technology in his classroom and because it was presented as "a very teacher-friendly and risk-free environment."

Over the 2012-2013 school year, Creef implemented two missions, *Viruses* and *Ecosystems*. The *Viruses* mission directed students to study diseases from the past and present and figure out how to prevent it for the future. The class' mission was to raise community awareness about the spread and prevention of common virus-based diseases.

Students researched a virus, took a trip to the National Museum of American History to hear about viruses from experts and interview visitors about their knowledge of the viruses. Students continued research using resources from the Center of Disease Control and the DC Department of Health. Based on their research, students created products to raise community awareness about the spread and prevention of diseases.

The purpose of Creef's second mission, *Ecosystems* was to teach students about how ecosystems function. The class took a field trip to the zoo to speak with zoo curators, who explained how the zoo and exhibits are designed to create an appropriate ecosystem for the animals. Creef was absent from school for the majority of the second mission. This provided a good opportunity to practice teaching Mission-based learning to another teacher. Over the course of the year, Creef was able to involve the rest of his teaching team in MBL.

At the end of the program, Creef shared that the biggest challenge and yet most rewarding part of participation in EdLab was learning to give up some control in his classroom in order to allow students to direct their experiences. He explained:

> "Today's teaching is so rigid and you feel you cannot mess up and EdLab made you feel like it was okay was to mess up. That if you did, you were just taking it in another direction. I gained confidence in giving up control and realizing and what the students are doing does not have to be perfect or the way I would do it, it is about the learning."

Creef's favorite aspects of EdLab included: brainstorming about his missions with EdLab staff and EdLab's technological resources and connections that were particularly helpful with field trips. He expects to continue planning and implementing missions for his classroom although expects challenges due to the limited access to technology (i.e. iPods, laptops) at Stuart Hobson.

Case Study Two: Pre-K Teacher

Kristin Wood is a pre-kindergarten teacher at Peabody School. She was interested in participating in EdLab because she enjoys learning experiences outside the classroom—taking things from the surrounding community and the world around, rather than just reading about things in books. She wanted to have hands-on experiences that get her students excited and motivated to learn. She hoped that by the end of the program she could be a resource for teachers who are less comfortable with teaching outside of the classroom.

Wood worked on a year-long mission focused on improvement of Peabody School and the surrounding communities. She worked on transforming her Pre-K students into philanthropists; partially inspired by an exploration of who the school's namesake, George Peabody was and how the class could continue his altruism. Activities over the school year included: making sandwiches for homeless people, used clothing drive, participating a field trip to Smithsonian Gardens and going to the National Zoological Park tying into the "making the world better" theme by talking about taking care of animals.

From Wood's point of view, by the end of the year there was a lot of evidence that kids were more sensitized to the idea of helping others, as a result of this mission. For example, the day after the Oklahoma tornado, her class discussed what happened and whether the kids could do anything to help the people suffering in Oklahoma. The class came up with the idea that they needed money to rebuild their communities and decided to hold a bake sale to raise these funds. Kids' families and teachers baked things and "sold" them to each other, ultimately raising $1,002. She shared that the kids were very proud of their efforts. Wood strongly believes that the year-long "making the world better" mission helped to develop the students' "fundamental social and emotional skills."

At the end of the program, Kristin Wood reflected that the program exceeded her expectations in many ways:

> "The EdLab staff went above and beyond to plan amazing trips and experiences for the students in my class. The trips seamlessly fit into and supported the PreK learning standards in a myriad of ways. I feel much more confident in my ability to lead meaningful, authentic learning experiences outside of the classroom."