“Distinct from the School Experience”: The Development of Pedagogical Authority Through Teacher Programs at the American Museum of Natural History, 1880–1962

By

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Introduction

In 2011, the first cohort of students was accepted to the American Museum of Natural History's Master of Arts in Teaching program to become certified earth science teachers for grades 7-12.[1] The core of the fifteen-month program—the first teacher certification program offered at a major American science museum—was coursework ranging from urban education to content-rich sessions on earth and space science, and a ten-month classroom residency.[2] The coursework and classroom residency were bookended by two summers at the museum. Participating students spent their first summer doing a museum teaching residency, where they gained "insight into how informal education resources, distinct from the school experience, can support student learning and be adapted for a variety of learning modes."[3] The second summer was a science practicum with research scientists at the museum to "develop firsthand knowledge of the practice of science through . . . fieldwork expeditions, investigations in laboratory settings, and engagement in secondary research methods."[4] This summary raises an important question: How do museum teaching and research experiences translate to school-based teaching? More broadly stated, how has a science museum, admittedly described by its own staff as "distinct from the school experience," come to be viewed as an appropriate place to train classroom

1. "Master of Arts in Teaching Program Overview," American Museum of Natural History, accessed July 13, 2018, https://www.amnh.org/learn-teach/master-of-arts-in-teaching/mat-program-overview

2. The first museum program that certified teachers for classroom practice was the Teachers' School of Science offered at the Boston Society of Natural History in the late 1870s, led by former teacher Lucretia Crocker and the museum's director, Alpheus Hyatt. See Sally Gregory Kohlstedt, "Innovative Niche Scientists: Women's Role in Reframing North American Museums, 1880–1930," *Centaurus* 55, no. 2 (May 1, 2013): 157.

3. "Museum Residencies," American Museum of Natural History, accessed July 13, 2018, https://www.amnh.org/learn-teach/master-of-arts-in-teaching/mat-program-overview/museum-residencies.

4. Ibid.

teachers? This history of the American Museum of Natural History's teacher-support programs is an attempt to answer that question.

Several key participants in the Master of Arts in Teaching program have commented on how the museum came to certify classroom teachers, and their statements illuminate the complex relationship between scientific practice and instructional expertise in American natural history museums—a tension at the core of this study. Specifically, museum staff created the Master of Arts in Teaching program in response to a call for alternate pathways to teacher certification from the New York State Education Department. But officials from the museum and the state cite different museum practices as qualification for the role. In a video published online in 2012, museum trustee Christopher C. Davis described the museum as "the science lab to the New York City Schools," where school students can "see the fruits of science."[5] The program, he continued, gives its fellows a passion for science "that they can then take out to the schools." In this view, the museum's value to teachers is based on the research conducted by the museum's scientists; teachers access scientific processes and findings, which they then transfer to their classrooms for student learning. The summer fellows spend doing research with museum scientists is a deeply immersive example of this philosophy, where newly trained teachers learn and do science under the watchful eyes of museum scientists, expecting that the experience will help them become more effective science teachers.

To the modern observer familiar with longstanding calls for student engagement with science practice, Davis's comments about the museum's activities and collections would seem a logical justification for training teachers at the museum. Teachers have long been urged to bring "real" science into classrooms, dating back to the teacher courses led by naturalist Louis Agassiz

5. Christopher C. Davis, *Master of Arts in Teaching Program at the Museum*, published Oct 25, 2012, https://www.youtube.com/watch?time_continue=1&v=zSa5HejvMyQ.

on Penikese Island off the coast of Massachusetts in the 1870s wherein research skills including observation and description were presented as the best methods for teaching what quickly evolved into nature-study curriculums.[6] Another more heralded spike of interest in teachers engaging with authentic science came when elite American scientists released curriculums after the 1957 launch of the Russian satellite *Sputnik 1* fueling the idea that the best science education approximates and involves doing science.[7] This view persists, as seen in 2012's *A Framework for K-12 Science Education*, from which the widely implemented Next Generation Science Standards were developed.[8] The framework, which drew heavily from several decades of science-reform documents including 1993's "Benchmarks for Science Literacy," lists "Science and Engineering Practices" as one of three "dimensions" around which all of K–12 science education should be constructed.

Yet, when explaining why the museum was selected as a site for teacher certification in earth science, Dr. John B. King, Jr., then New York State education commissioner, pointed to the fact that the museum is more than a site for scientific research and highlighted the museum's significant history of teacher programs across a range of subject areas.[9] King noted that the museum, "has a long track record of helping teachers who serve high-needs students excel in the classroom," and "a long history of doing great professional development for teachers, particularly science teachers" using the museum's "rich resources." In citing the utility of the

6. Kevin C. Armitage, *The Nature Study Movement: The Forgotten Popularizer of America's Conservation Ethic* (Lawrence: University Press of Kansas, 2009).

7. See John L. Rudolph, *Scientists in the Classroom: The Cold War Reconstruction of American Science Education* (New York: Palgave, 2002).

8. Helen Quinn, Heidi Schweingruber, and Thomas Keller, eds., *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (The National Academies Press, 2012).

9. John B. King, Jr., *Master of Arts in Teaching Program at the Museum*, published Oct 25, 2012, https://www.youtube.com/watch?time_continue=1&v=zSa5HejvMyQ.

museum's programs for teachers of "high-needs" students, King points to the instructional value of the museum's explicitly pedagogical resources, which have proven useful in reaching learners of differing abilities. That the Master of Arts in Teaching program opens with a museum teaching residency reflects this perception and suggests that its stakeholders view the museum's pedagogical resources as not only useful for classroom teachers, but also as a legitimate way to frame teaching as a profession.

Anyone familiar with modern collaborations between museums and schools might find King's assertion that a science museum has sufficient resources to train and support teachers to be almost self-evident. A survey published in 2007 identified 279 American science museums and other informal science institutions that offered teacher professional development programs and that 199 offered classroom materials and curriculum development programs.[10] Most of the programs described in the study were designed to support teachers with classroom activities and strategies for integrating informal science-institution resources, thereby bolstering educators' science content and pedagogical knowledge. Given that science museums are frequently named in national science education-policy documents—including the aforementioned *A Framework for K-12 Science Education*—as institutions that can, and should, support school science, these programs are likely to remain prominently featured among teachers' professional development opportunities. Still, among the many models of teacher support programming offered at American science museums, the Master of Arts in Teaching program remains rare as a teacher certification program.

10. Michelle Phillips, Doreen Finkelstein, and Saundra Wever-Frerichs, "School Site to Museum Floor: How Informal Science Institutions Work with Schools," *International Journal of Science Education* 29, no. 12 (October 2007): 1495.

The comments made by museum trustee Christopher C. Davis and New York State Education Commissioner John B. King attributing the museum's usefulness for training teachers to scientific research and the museum's educational resources, respectively, are surprisingly divergent, raising several questions. While the two views are certainly not mutually exclusive, neither administrator offers any insights into the relationship between the two, or if either has been a stronger draw for teachers. Have teacher programs at the museum historically been led by curatorial scientists, staff educators, or both? Are museum educators creating classroom materials directly from scientific research or are they pulling from instructional approaches used on the exhibit floor? Or, are museum scientists borrowing pedagogical approaches from staff educators to use with teachers? What specific programs initiated by the museum's staff have drawn the most interest from classroom educators? King's reference, in passing, to the long history of teacher programs at the museum makes clear that these are no new phenomena, which raises the question of how long programs for teachers have been offered at the museum. In sum, the administrators' comments highlighting the idea that the common assumption that museum resources can help improve classroom teaching is actually based on a longstanding and poorly understood set of relationships between two dynamic and complex institution types—relationships that can, and should, be investigated more closely.

The central question raised by the Master of Arts in Teaching program concerns how the museum's curators and/or educators came to be perceived as possessing the expertise necessary to define and shape best methods for classroom teaching. For the purpose of this study, I've appropriated the term "pedagogical authority" to describe that perception. It was the belief in the pedagogical authority of the museum staff by state education administrators and accepted by school principals, student teachers, private donors, and program directors at the National Science

Foundation that resulted in this museum-based program to train and certify science teachers. It is a belief that, based on King's comments, has been built over a long period of time.[11] More specifically, this project seeks to answer three questions about how this belief emerged: First, who were the historical actors that have conceived of, supported, and delivered teacher support programs at the museum? Second, how did those actors cultivate and utilize the pedagogical authority needed to act as instructional experts relative to teachers? Lastly, given that the Master of Arts in Teaching program remains an anomaly among the many professional development programs for teachers offered at American science museums, what was it about the historical actors, practices, and contexts at the American Museum of Natural History that facilitated the development of such an immersive manifestation of pedagogical authority?

I aim to identify the sources of museum-based pedagogical authority through a historical case study of the teacher-support programs offered at the American Museum of Natural History from their introduction in 1880 through 1962. It was during that time period, I argue, that all of the programmatic and ideological foundations of museum-based pedagogical authority was established at the museum. I use the term "teacher-support programs" to describe targeted efforts to shape or improve teacher practice, including pre- and in-service training, pedagogically focused professional development programs, and classroom instructional materials developed and/or delivered by staff working from the museum. These programs feature direct interactions between school-based educators and administrators and museum-based educators, administrators, and scientists. By following the shifts in power between these groups of

11. I have appropriated the term "pedagogical authority" from educational research discussing power dynamics between teachers and students. In recent years, pedagogical authority has been used interchangeably with "classroom authority," which I argue is preferable for describing how power is created and deployed in schools. Pedagogical authority, however, is more appropriate for describing how the power to determine best practices for teaching has been distributed among different groups of professionals at different times. See chapter 1.

professionals, and the programs and ideologies that drove and reflect those shifts, I identify how pedagogical authority has been constructed and deployed at the American Museum of Natural History and consider how the models developed may have seeded similar programs throughout the country.

Certainly, there are several areas of museum practice that contribute to their pedagogical authority. But, in using the history of teacher programs as a lens, education professionals working in and alongside the museum emerge as the primary architects of museum-based pedagogical authority.[12] These professionals included New York State school administrators who contracted with the museum to provide materials for normal schools (teacher-training institutions) and teachers in the late-nineteenth century; New York City teachers who requested museum objects to use in their classrooms; museum staff with educational training who created courses for pre- and in-service teachers that showed how to teach in classrooms using the museum's exhibits, collections, images, and facilities; and leaders of teacher education institutions, including late-nineteenth-century normal schools and New York City–area teachers colleges, who promoted the museum's resources to student teachers, accredited the museum's teacher courses, and, in several cases, advised educational research studies conducted by members of the museum's staff.

The groups of educators who contributed to the development of pedagogical authority at the museum did so through three strategies. First, using the broad pedagogical frame of "visual

12. I use the terms "education professionals" and "professional educators" interchangeably as an overarching category encompassing historical actors that worked in school administration and teaching. For the late nineteenth century, when normal schools for teachers were the only form of advanced training in education, these terms designate a field of employment. After colleges of education offered specialized degree programs in the first decades of the twentieth century, the terms education professionals and professional educators can be used to describe teachers and administrators that have been formally trained and credentialed in any aspect of K–12 schooling. For details on the development of college training for professional educators, see David L. Angus, "Professionalism and the Public Good: A Brief History of Teacher Certification." (Washington, DC: Thomas B. Fordham Foundation, January 2001).

instruction" that emerged from museums in the late-nineteenth century and was used in schools nationwide through the mid-twentieth century they aligned museum programs with shifting classroom curriculums in several subjects. Second, educators worked to fill perceived gaps in teacher education, such as supplying visual aids for normal schools in the 1880s and delivering space science lectures for student teachers attending schools without astronomy departments after the launch of the Russian satellite *Sputnik*. Third, educators established educational programs to address emergent national concerns about workforce development, particularly training army enlistees during World War II and bolstering teachers' capacity to teach toward strengthening America's scientific workforce during the Cold War.

These educators were successful in delivering programs that raised the pedagogical profile of the museum, in part, due to their deft utilization and reproduction of the museum's scientific and cultural authority and unparalleled public financial support. The scientific authority of the museum was based on its status as one of America's premier research museums, with its researchers working at the forefront of their respective fields including anthropology, which was, for most of the period of this study, considered one of the natural sciences.[13] In order to create teacher-support programs, school administrators and educators drew materially, intellectually, and, by the 1950s, methodologically from these researchers' collective work.[14]

The museums' cultural authority was more complex, derived in part from museum researchers' activities in scientific and public spheres; the European tradition of museums as touchstones of modern nation-states; public exhibitions; and the shifting social implications of

13. From the museum's founding in 1869 through the mid-twentieth century, anthropological research was considered a natural science, similar to botany or geology. See chapter 1.

14. The National Science Foundation-funded summer teacher institutes in the late 1950s involved taking teachers to the museum's research field stations to learn scientific practices. This approach to training teachers is still used at the museum, as seen in the summer research practicum for the Master of Arts in Teaching program. For more on the late 1950s teacher institutes at the museum, see chapter 5.

the political, industrial, and military applications for the science generated in the museum. Educators contributed to the museum's cultural authority by making the museum's science more accessible and understandable, while simultaneously leveraging authority for the freedom to professionalize their own work. The museum's leaders also used the educational programs to help garner public funding (in addition to the annual appropriations from New York City) to expand the museum's facilities, creating a positive feedback loop that fed decades of pedagogical innovation.

Methodology

To identify the teacher-support programs offered at the American Museum of Natural History from 1880 to 1962 as well as the primary actors, motivations, and methods that drove them, I consulted primary sources including museum publications such as annual reports, newsletters, educational texts, teacher guides, and marketing materials. My work in the institutional archives of the museum included analyzing internal documents such as personnel files, memorandums, project proposals, and original writings of key historical actors. Where available, I surveyed corresponding resources for school districts and educational personnel that collaborated with museum professionals. Performing targeted research in newspaper archives helped me identify critical supplemental details and helped flesh out the historical narrative. In addition, I have drawn from secondary literature to clarify the educational, scientific, and cultural contexts—both regional and national—in which museum-based teacher programs were offered.

By charting the development of teacher-support programs at the American Museum of Natural History, I aim to understand how various actors operating in different social, political, and economic contexts created programs to fit their historical moment. In addition, I explore

how, or even if, those shifts informed how teachers, administrators, and even the general public valued museums as educational institutions. This approach is informed by historian Sally Gregory Kohlstedt's argument that museums "layer meanings generated by the culture of which they are a part." Their success, she writes, "depends on their congruence with the rules, structures, and premises of a particular place in time."[15] Viewed thusly, each iteration of the teacher-support programs offered at the American Museum of Natural History since the late nineteenth century consists of a set of practices negotiated by a particular group of people operating within a unique set of circumstances that both reveal truths and raise questions about the programs that came before and those that followed. As a result, no history of teacher programs could profess to chart their development in a positivist sense. Instead, I use this project to show how successive teacher-support programs at the museum have contributed to the view that museums are appropriate spaces to train teachers for classroom practice.

It is critical to investigate museum programs as the creations of people, as opposed to institutions, to better understand how professionals working in or with museums have navigated these organizational contexts. As Kohlstedt explains regarding museum scientists, "Museum staff needed to be versatile. Understanding their skilled labor as it applied to preparations, documentation, and education reveals the multiple and interconnected dimensions of scientific practice."[16] Because her statement is based on the activities of museum scientists, Kohlstedt's perceptive characterization understandably depicts these varied tasks as aspects of science. This conflation of science education with scientific production is symptomatic of what Kohlstedt recognizes as a dearth of "historical investigation of the activities of educational staff employed

15. Sally Gregory Kohlstedt, "'Thoughts in Things': Modernity, History, and North American Museums," *Isis* 96, no. 4 (2005): 599.

16. Ibid., 597.

to work on exhibits, labels, pamphlets, guide-books, school tours, and other interpretive efforts for children and adults."[17] Further research is needed to determine the manner in which the activities and products of museum educational staff represent the interests of museum scientists, the broader social contexts that museums consistently navigate, neither, or both.

Museum programs such as those for teachers are highly malleable and fluid, which presents methodological challenges for the historian. Museum programs have historically been—and continue to be—ephemeral, and therefore not always well-documented. In addition, based on Kohlstedt's depiction, museum staff have been responsive and adaptable to their historical context, so a study of the history of museum educational programs of any type should account for a great deal of flux, with practitioners applying and discarding approaches based on an array of factors. In addition, staff at many museums have found that, over the course of decades, program documents such as curriculums, scripts, classroom activities, and even evaluations cannot be practically kept. In many cases, remaining documents have been preserved more by chance than archival strategy.[18] The methodological challenge of studying the history of educational programs is akin to Kohlstedt's account of studying scientific activity in early America. It is, in her words, similar to "aligning and realigning a kaleidoscope with its glittering bits of evidence that change with each refocus of the lens. Irregular fragments emerge and recede, creating ever-changing patterns."[19]

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17. Ibid, 598.

18. I conducted historical research on several museums before settling on this project focusing on the American Museum of Natural History. Few of those museums kept many records of educational programs, with even fewer of those records processed and described by archivists. In one case, I was asked by archival staff to consult with current museum educators to help them identify records with historical value and to encourage them to maintain those documents.

19. Sally Gregory Kohlstedt, "Parlors, Primers, and Public Schooling: Education for Science in Nineteenth-Century America," *Isis* 81, no. 3 (1990): 443.

By identifying professional educators as central figures in infusing instructional expertise into the institutional identity of the museum, this project highlights the important role that this overlooked group of actors played in the development of American museums. Through programs for science teachers, educators codified how the collections and exhibits at the museum could be used to support classroom teaching. These findings push against arguments asserting that the instructional value of science museums, particularly for teachers, lay in original research, the aggregation of scientific information, and exhibits. In addition, this research clarifies that professional educators sought out museums to use as authoritative spaces to support and improve their own practice and even to professionalize classroom teaching from outside of schools. Indeed, professional educators were among the first groups of external actors to recognize the potential of museums to help promote their own initiatives.[20]

The first professional educators who recognized the instructional potential of the museum—among them its lead naturalist and founder Albert Bickmore—were school administrators in New York City and New York State in the late nineteenth century. My historical narrative begins in chapter 2 with Bickmore's first lantern-slide lecture delivered for twenty-eight New York City teachers in 1880. Four years later, the museum entered into a contract with the New York State Department of Public Instruction that sent Bickmore to every corner of the state. Over the next twenty years, administrators in New York City's board of education, the state superintendent of Public Instruction, and several regional superintendents assigned Bickmore hundreds of lecture topics to research (at his own expense), design, and

20. A wide range of historical actors have worked through American museums to promote their messages, through both exhibits and educational programs. This phenomenon is most closely associated with the American industrial science museums that emerged in the 1930s, including the Museum of Science and Industry, Chicago and The Franklin Institute Science Museum in Philadelphia, each of which featured exhibits created and funded by corporations. As a result, these museums have been critiqued by museum historians and theorists alike. See D. O. McCullough, "The Franklin Institute Science Museum's Cold War Consortium for Science Recruitment, 1955–1960," *American Educational History Journal* 46, no. 1 (January 2019): 107–23.

deliver for tens of thousands of teachers statewide. In addition, Bickmore duplicated and distributed full copies of the lantern slides and text (as well as the requisite projection equipment needed to repeat the lecture) to each of New York State's normal schools, teacher institutes, and teacher education organizations, all with hopes of improving nature study and geography instruction and helping the state's immigrant population master the English language. By the time Bickmore retired in 1904, he and the state's school administrators had facilitated the implementation of visual instruction as a pedagogical approach and established the museum's capacity to support classroom teachers—the first major step toward pedagogical authority.

Chapter 3 begins in 1903, the year before Bickmore's retirement, when another of the museum's scientists, zoologist George H. Sherwood, created traveling museum collections for loan to New York City teachers. Sherwood started the loan program in response to requests from teachers for specimens to use in the rapidly emerging nature-study classrooms of the time and to justify the annual appropriations the museum received from the City of New York. Sherwood grew the loan program by adhering closely to nature-study syllabi and relying on feedback from teachers. In addition, Sherwood's loan program was a catalyst for two important transformations at the museum from 1903–1919: the reinstatement of the Department of Public Instruction and the hiring of educational staff, including the first museum employees with pedagogical training. Collectively, Sherwood's management decisions created a department that was closely attuned to the needs and interests of classroom teachers and effective in supporting their work. Here I also discuss Agnes L. Roesler, one of the world's first museum instructors, who was hired in 1906 to relieve museum scientists overly taxed with engaging museum visitors. Roesler established instructional approaches for use with school and public audiences that later staff would apply as a coherent museum pedagogy in their training programs with teachers. This chapter closes with

the museum's educational staff tailoring their programs for servicemen during World War I, illustrating broader social applications for their work.

Chapter 4 opens with the City of New York's decision in 1922 to build a separate facility for educational programs at the museum, which the museum's staff used to create a series of innovative programs that contributed greatly to the museum's pedagogical authority. Many of the programs described here, however, were products of the 1920 partnership between the museum's education department and the new Bureau of Visual Instruction in New York City's board of education. Building on that collaboration, museum staff launched several new programs, including teacher-training courses built around visual instruction and museum-based teaching strategies. The city's Bureau of Visual Instruction supplied city schools with film and slide projectors and helped the museum supply teachers with well-curated media for classroom instruction. The museum's Department of Public Education struggled to keep up with the swelling demand for their loan materials, which contributed to city officials' decision to fund and construct the School Service Building that opened in 1926. The Department of Public Education staff utilized the School Service Building facilities—which included teaching laboratories, auditoriums, and teacher consultation rooms—as an incubator for more in-depth, smaller scale programs that they termed "intensive instruction."

Museum educator and former teacher Grace Fisher Ramsey made great use of the School Service Building by creating courses for teachers in 1929, the other pivotal event in the development of pedagogical authority at the museum as described in chapter 4. Ramsey became a central figure in developing the instructional methods featured in the teacher courses, many based on the pedagogies of visual instruction. The courses that Ramsey developed were rigorous enough that both regional colleges and the board of education offered credits to course

participants.[21] In addition, Ramsey earned a doctorate based on her studies of educational programs in museums nationwide, and she used her scholarly writings to argue that museums were uniquely qualified to train adaptable and competent teachers. As a result, Ramsey was able to make both practical and empirical arguments about the broad applicability of museum teaching methods, a previously unarticulated position that undergirds museum programs for pre- and in-service teachers and is a core tenet of museum-based pedagogical authority.

At the onset of World War II, the museum's educators created programs to meet civilian and military wartime needs, demonstrating their capacity to serve national interests, which they continued to do through the peak of the Cold War. Chapter 5 details how museum educators and scientists ushered in a new phase of pedagogical authority by using the instructional methods developed for students and teachers to address new learning requirements brought on by war. During World War II, the museum's educators applied visual instruction as utilized in special wartime school-exhibit models to help prepare army enlistees for deployment. Meanwhile, William H. Barton, the curator of the museum's Hayden Planetarium (established under the leadership of the Department of Public Education's Clyde Fisher in 1935) used its Zeiss projector and astronomy models to develop celestial navigation trainings for the navy. After the war ended, and the Cold War with Russia deepened, the museum's staff began to change their approaches to align with new calls for more disciplinary content in science classrooms. In the early 1950s, new Department of Public Education curator John Saunders placed credit-bearing teacher programs under the umbrella of adult education, and the staff and methods connected with visual instruction were replaced by educators who had been trained as scientists. In the

21. The colleges and universities conferred academic credits while the board of education gave professional development credits. See chapter 4.

planetarium, former classroom teacher and head educator Franklyn Branley steered the astronomy courses for teachers toward instructional methods for the first time.

After the launch of the Russian satellite *Sputnik* in 1957 placed a national premium on teachers' ability to educate the next generation of the American scientists, the Department of Public Education staff was the first in the country to receive National Science Foundation funding to host a teacher institute at a museum. The department's head of adult programs, C. Bruce Hunter used his travel-tour program model to bring teachers to the museum's research field stations for immersive summer institutes based on learning science content and research methods. Meanwhile, Branley hosted National Science Foundation–funded teacher institutes at the Hayden Planetarium that highlighted instructional methods for astronomy teaching at the dawn of the space age. Collectively, these wartime-era programs represented a shift in the museum's educational approach toward workforce development programs—first for military enlistees and then teachers—grounded in the knowledge and practices needed to achieve goals associated with national security. The partnerships and financial investments from the military and federal government, combined with the long-established approval of professional educators, effectively cemented the museum's pedagogical authority.

In the concluding chapter, I briefly summarize the teacher-support programs offered at the museum from 1962 through the debut of the museum's Master of Arts in Teaching program in 2011, showing that the developments in the late twentieth century were a continuation of an established trajectory. I then recount the factors that made the American Museum of Natural History uniquely capable of cultivating such pedagogical authority through a comparison with the relatively sparse programs offered at Chicago's Field Museum over the same period. I close

by arguing that education professionals in science museums and in science classrooms are more alike than different, suggesting that more educators should be viewed as pedagogical authorities.

Chapter 1

Science Museums and Education

Conducting a study on educational programs in American natural history museums, particularly those for teachers, necessarily requires considering a wide range of scholarship. In the review that follows, I begin by clarifying my conception of pedagogical authority, which I have constructed based on historical and theoretical works that explore authority related to both science and classrooms. I then use scientific authority to contextualize the prestige associated with museums and classroom authority to address the relative lack of prestige attributed to educators. Similarly, I use research on scientific practice and education, respectively, to inform my discussion of what historians have deemed to be the uniquely American tension between research and public exhibitions in natural history museums. For many of those historians, museum education has been tacitly synonymous with exhibitions, and they have overlooked or incompletely considered instructional programs–oversights that this project will address.

For the purposes of this study, I have appropriated the term *pedagogical authority*, which can be traced back to Bourdieu and Passeron's 1977 work on reproduction in education systems, where the term was used to describe power relationships between teachers and students.[1] Subsequent scholars engaging the topic of power relationships in schools have used the term similarly, though they began using the term *classroom authorit*y interchangeably with *pedagogical authority* as seen in Pace, Hemmings and Bixby's collected volume on the subject.[2]

1. Pierre Bourdieu, *Reproduction in Education, Society and Culture,* trans. Richard Nice (Newbury Park, CA: Sage in association with Teesside Polytechnic, 1990).

2. Judith L. Pace, Annette Hemmings, and Janet Bixby, eds. *Classroom Authority: Theory, Research, and Practice* (Mahwah, NJ: Taylor & Francis Group, 2006).

In fact, most of the authors included in Pace et al.'s text use *classroom authority*, save Mullooly and Veranne. Classroom authority is the more appropriate term for describing power dynamics in interactions between teachers and students, because those interactions are tied to the practice of schooling more than instruction. Interactions between students and teachers are also fundamentally different than power dynamics among educators and administrators who are adjudicating which teaching theories, methods, and content are preferred. Such interactions, I argue, are explicitly pedagogical.

While I argue that the two are fundamentally different, my conceptualization of pedagogical authority does draw from how researchers have described classroom authority, in addition to other scholarship that discusses the social standing of teachers. First, scholars agree that classroom authority is socially constructed. Pace and Hemmings, for example, argue that classroom authority is "jointly negotiated" through "symbolic actions" of both teachers and students, shaped by local context and broader social, political, and cultural forces—a conceptualization that pushes back against the assumption that authority is embedded in the role of "teacher" and analogous to discipline.[3] Second, scholars see the authority of teachers as having contested zones of influence, which Pace and Hemmings assert is limited to curricula and classroom discourse.[4] Researchers agree that teachers have historically held little authority outside of classrooms, such as in society or even as decisive voices on the nature of their own profession. Labaree offers a terse assessment of teachers' status in his discussion of teacher training in colleges, stating that "teaching is an extraordinarily difficult job that looks easy,

3. Judith L. Pace and Annette Hemmings, "Understanding Classroom Authority as a Social Construction," in *Classroom Authority: Theory, Research, and Practice*, eds., Judith L. Pace, Annette Hemmings, and Janet Bixby (Mahwah, NJ: Taylor & Francis Group, 2006), 1.

4. Ibid., 2.

which is a devastating combination for its professional standing and for the standing of its professional educators."[5] Meanwhile, Herbst argues in his history of teacher professionalism that the field has lacked the autonomy, internal codes of ethics, and peer review that sociologists associate with more authoritative and prestigious professionals such as lawyers and doctors.[6]

Because this project explores how pedagogical authority is distributed between museum educators and scientists, it is important to note that scholars in science and technology studies also see authority as socially constructed within contested zones of influence. Gieryn's seminal *Cultural Boundaries of Science* uses historical case studies to argue that what he calls "epistemic authority of science"—the power of scientific actors to "define and explain nature and other realities" in public discourse—is socially constructed.[7] Gieryn presents the epistemic authority of science as a cultural space defined through what he calls "boundary-work" enacted through localized conflicts where actors determine whose work is "scientific" and who can represent science in society. Moreover, scholars have identified the wide-ranging social influence of scientific actors in what can broadly be called the "cultural authority of science." In the introduction to his edited volume exploring scientific authority in twentieth-century America, Walters argues that the "cultural power of science . . . helps structure how Americans think and talk about their society."[8] Still, Walters suggests that science's cultural power is dependent on the acceptance and respect of politicians, business people, and consumers.

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5. David F. Labaree, "An Uneasy Relationship: The History of Teacher Education in the University, in *Handbook of Research on Teacher Education* (Manassas, VA: Routledge, 2008), 298–9.

6. Jurgen Herbst, *And Sadly Teach: Teacher Education and Professionalization in American Culture* (Madison: University of Wisconsin Press, 1989).

7. Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999), ix.

8. Ronald G. Walters, ed., *Scientific Authority & Twentieth Century America* (Baltimore, Md: Johns Hopkins University Press, 1997), 7.

Using these discussions of scientific and classroom authority as my conceptual foundation, I view pedagogical authority as similarly socially constructed and influential within continually contested boundaries. The historiography of teacher education shows that the task of preparing classroom educators has been taken on by many different institutions using many different approaches since the advent of common schools.[9] In my view, the culturally contingent processes by which different actors have come to hold the power to define appropriate methods for teacher practice can be described as social constructions of pedagogical authority. In addition, the constant debates about how teachers should be trained and expectations for their job performance illustrate the tenuousness with which pedagogical authority has been held. Still, when education administrators, for example, recognize or deem an institution such as the museum as capable of training teachers, they agree to the pedagogical authority of that institution. Ultimately, however, pedagogical authority is dependent on the consent of educators. Regardless of how politicians, parents, or administrators decide how students should be taught, those approaches can be effectively implemented only by the teachers working semi-autonomously in classrooms. As we will see, in the case of the museum, even teachers accustomed to operating with little or no power found ways to make the museum their own space.

The scientific authority of museums can be partially attributed to their long global history as institutions where early natural sciences were formalized. Historians agree that museums are traceable to Renaissance-era " curiosity cabinets"—private collections owned by European aristocrats and stocked with natural, ethnographic, and technical artifacts.[10] During the

9. See Christine A. Ogren, *The American State Normal School: An Instrument of Great Good* (New York: Palgrave Macmillian, 2005); Angus, *Professionalism and the Public Good*.

Enlightenment, European elites funded nascent scientists who transitioned curiosity cabinets into exclusive museums to generate knowledge about the natural and man-made world. These nascent museums possessed authority as early vessels of rationality, their provenance from the European ruling class, and their continued inaccessibility to the public.[11]

Early American museums, according to Orosz's history, were similarly created from "curio cabinets" of specimens in the eighteenth century. The first American institution to have the title "museum" was created to be a "center for the study of science."[12] Meanwhile, Benson's account of the shift in American biology from museums to academic science in the twentieth century identifies natural history museums as the institutions where amateur naturalists professionalized and standardized methods for gathering, describing, ordering, and presenting collections in the nineteenth century.[13] Those research collections, Rader and Cain assert in their historical study of life science displays in American museums, remained the "binding thread" connecting those institutions through the early twentieth century.[14]

Museum science was not limited to the burgeoning fields of biology, however. Historians have also identified anthropological research and collections as key in building the public prestige and authority of these institutions. Anthropologist Don Fowler's instructive summative

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10. See Edward P. Alexander, *Museums in Motion: An Introduction to the History and Functions of Museums* (Nashville: American Association for State and Local History, 1979).

11. Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1996).

12. Joel Orosz, *Curators and Culture: The Museum Movement in America, 1740–1870* (Tuscaloosa: University of Alabama Press, 1990), 23.

13. Keith Rodney Benson, "From Museum Research to Laboratory Research: The Transformation of Natural History into Academic Biology," in *The American Development of Biology*, eds Ronald Rainger, Keith Rodney Benson, and Jane Maienschein (Philadelphia: University of Pennsylvania Press, 1988), 49–83.

14. Karen A. Rader and Victoria E. M. Cain, *Life on Display: Revolutionizing U.S. Museums of Science and Natural History in the Twentieth Century* (Chicago: University of Chicago Press, 2014).

essay on anthropology, science, and museums shows that anthropology was considered a core field of museum-based science in the early nineteenth century and for much of the twentieth century.[15] Fowler locates ethnology—the study of racialized ideas of human difference, and both precursor and subset of what is now known as anthropology—within the overarching field of natural history. Natural history, Fowler illustrates, was characterized as the study of "the non-cultural world," to which "uncivilized" people were thought to belong, placing ethnology alongside fields such as botany and zoology.[16] In addition, as racial science grew in social and political prominence in the late nineteenth century, Fowler explains, "both ethnologists and anthropologists saw themselves as scientists" tasked with generating "'objective, value-free, scientific knowledge' about humanity."[17] In the process, curators—or scientists—in the various fields of natural history used museums to authorize knowledge about culture and nature and the intersections between the two.

Authority writ large is played out in social contexts, and scholars addressing authority in American museums often focus on how science is communicated through public exhibits. Their findings illustrate that museum exhibits facilitate a fascinating co-constructive relationship between scientific and cultural authority wherein displays are valued because they feature scientific knowledge and the exhibits communicate to visitors what scientific knowledge is to be valued and how. Livingstone discusses the power of this interplay in his essay describing how geographic and institutional locations shape scientific practice, where he argues that science is used in museums to design exhibits and floor layouts.[18] The result, Livingstone contends, are

15. Don D. Fowler, "A Natural History of Man: Reflections on Anthropology, Museums, and Science," ed. Stephen Edward Nash and Gary M. Feinman, *Fieldiana*, 1525 (2003): 11–22.

16. Ibid., 15.

17. Ibid., 17.

displays of scientifically derived "classification, location, and genealogy," that are arranged in ways "crucial to the cognitive claims" they deliver.[19] The impact can be significant, as seen in Conn's work exploring how scholarship and exhibits derived from museum specimens shaped American intellectual life from Reconstruction to the Great Depression through what he called "object-based epistemology."[20] Bennett, meanwhile, maintains in his work on the legacy of colonialism embedded in museum practice, that science museum exhibits also fixed racist ideologies through anthropology displays that conferred social superiority to viewers expected to understand another culture based on a few strategically arranged artifacts.[21]

Exhibits in American museums are more than simply vessels of scientific authority, however, as scholars agree that these institutions have been defined—and complicated—by educational missions realized through broad public access. In Roberts' combined auto-ethnography and history of museum education, she opens by succinctly stating what has become a scholarly consensus, that museum education is "a distinctly American idea" that promotes democracy and "equality for all through rational enlightenment."[22] This "nation-building through education" project that historians have attributed to the founders of early American museums is similarly described by Orosz.[23] However, as Orosz illustrates, public access to exhibits has, at

18. David N. Livingstone, "Science and Place," in *Wrestling with Nature from Omens to Science*, eds. Peter Harrison, Ronald L. Numbers, and Michael H. Shank (Chicago: University of Chicago Press, 2011): 377–400.

19. Ibid., 389.

20. Steven Conn, *Museums and American Intellectual Life, 1876–1926* (Chicago: The University of Chicago Press, 1998).

21. Tony Bennett, *Pasts Beyond Memory: Evolution, Museums, Colonialism* (Florence, United States: Taylor and Francis, 2004.

22. Lisa C. Roberts, *From Knowledge to Narrative: Educators and the Changing Museum* (Washington, DC: Smithsonian Institution Press, 1997), 4.

23. Orosz, *Curators and Culture*.

times, been viewed as a threat to the research conducted by the professionalizing natural scientists who collected the objects and generated the knowledge that was being displayed. Orosz argues that, after years of contests between successive groups of museum leaders through the first two-thirds of the nineteenth century, these institutions arrived at a functional balance between research and education—what he calls the American Compromise—which is still evident in museums today.[24]

Some museum historians depict the tension between research and education in American science museums as a zero-sum game, with education winning out over the course of the twentieth century at the expense of museum science. Rader and Cain, for example, attributed the growth of museum education in the 1930s to leaders' attempts to redress the declining prestige of museum science caused by the rise of laboratory science in public consciousness.[25] Conn, meanwhile, argues in his discussion of American museums' late twentieth-century move away from object-centered exhibits that the process started with institutional leaders who infused education and entertainment into exhibits to court child audiences and remain solvent during the Great Depression and after World War II.[26] In doing so, Conn laments, those museum leaders diminished the social and institutional primacy of museum research. Roberts echoes Conn with more nuance when she points to the widely recognized infusion of entertainment approaches in museum education as representative of a broader shift in institutional authority, away from curators and toward educators, and, by proxy, to the interests of the visiting public.[27] This shift,

24. Ibid., ix.

25. Karen A. Rader, and Victoria E. M. Cain, "From Natural History to Science: Display and the transformation of American museums of science and nature," *Museum and Society* 6, no. 2 (2008): 152–71.

26. Steven Conn, *Do Museums Still Need Objects?* (Philadelphia: University of Pennsylvania Press, 2010).

27. Roberts, *From Narrative to Knowledge*.

Roberts continues, has remade how museums come to and display "legitimate" knowledge, with curators no longer unchallenged in intellectual power.

These discussions of science museum education are incomplete, however, because they have centered on exhibits to the exclusion of museum programs such as school tours, lectures, object loans, and teacher support. Even when Roberts acknowledges that education staff and program models had been established in American museums by World War I, she does so to explain how museum educators had been institutionalized such that they could eventually influence exhibit design as the twentieth century progressed.[28] In Rader and Cain's work tracing the development of life-science display strategies in American museums, they note, only in passing, the presence of educational programs.[29] Admittedly, none of these works aims to engage museum education programs directly, but they never explain why such programs have not been included in their analyses of museums as educational institutions. In what could be read as a justification for marginalizing programs, Roberts claims that through the 1960s and 1970s, museum educators had limited resources, and were rarely involved in exhibit design or museum business.[30] But, if American museums' defining goal has been to impact the broader public, how can scholars accurately characterize their success without considering the professionals who interact directly with visitors or the practices they used to do so?

The few times when historians have discussed museum education programs have been incomplete or done so only as a means to other analytical ends, underscoring how marginalized the subject has been. Sally Gregory Kohlstedt's brief discussion of the museum's late-nineteenth

28. Ibid.

29. Rader and Cain, *Life on Display.*

30. Roberts, *From Narrative to Knowledge*, 65.

century lantern slide lecture distribution program is just an anecdote informing her history of the American nature-study movement.[31] Jennifer Adams's work, by contrast, centers on the American Museum of Natural History and uses a selective, though informative, historical summary of its educational programs to argue that collaborations with teachers initiated in the 1990s represented a seismic shift toward responsive instruction better able to meet schools' needs.[32] However, Adams focuses her historical evaluation on the educational philosophies of the museum's early-twentieth century president, Henry Osborn, overlooking the museum's staff educators in the 1930s who utilized pedagogical approaches she attributes to modern practitioners. Bennett also discusses the museum's programs for teachers and students in New York City schools, but only to argue that they comprised a "distribution network" to spread "objects and messages deep into the social body of New York" focusing on Osborn's baseless racial science aimed at socializing immigrants and establishing a global racial hierarchy.[33]

Historians of educational technology have included museum education in their work via their assessments of the history of visual instruction, which figures prominently in this study. According to Saettler, visual instruction (or education) was an educational movement concerned with disciplining sight as means of structuring thought.[34] In this regard, anything seen could be a source of learning, provided the learner knows proper ways to see and think. Saettler traces the pedagogy of visual instruction back to object-teaching, which gained brief notoriety in the

31. Sally Gregory Kohlstedt, *Teaching Children Science: Hands-On Nature Study in North America, 1890–1930* (Chicago: University of Chicago Press, 2010).

32. Jennifer D. Adams, "The Historical Context of Science and Education at the American Museum of Natural History," *Cultural Studies of Science Education* 2, no. 2 (July 25, 2007): 393–440.

33. Bennett, "Selective Memory," 123.

34. Paul Saettler, *The Evolution of American Educational Technology* (Greenwich, CT: Information Age Publishing, Inc., 2004).

United States after 1860, based on the philosophies and teachings of Edward A. Sheldon, head of the Oswego State Normal School in New York.[35] Object and image-based learning re-emerged through museum lecture and loan programs in the early twentieth century that Saettler argues were the first phase of the formal visual instruction movement.[36] The slide, film, and object libraries in museums became the material and ideological foundations of the visual instruction departments created in school systems around the country in the early 1920s, which, over the course of the succeeding decades, evolved into school audiovisual departments.[37] Saettler's account, while deeply informative, looks at the evolution of visual instruction from the vantage point of schools, and the analysis, therefore, is more focused on historical figures in schools, treating museums effectively as fixed sources for classroom instruction rather than dynamic institutions shaped by educators as well as scientists.

Even historians of education who have discussed visual instruction in museums have rarely engaged programs directly, with one instructive exception. Museum historian Victoria Cain has considered the intersection of visual instruction and museums as manifest in the exhibit design methods pioneered by the American Museum of Natural History's Henry F. Osborn, but not in the museum's pioneering programs for schools.[38] Likewise, Cain's analysis of how the authority of visual images was deployed in geography classrooms to promote conservative ideals

35. Ibid., 40.

36. Ibid., 129. Saettler identifies the St. Louis Educational Museum, established in 1905 explicitly to provide services for schools, as the first municipal unit of visual instruction.

37. Ibid., 135. According to Saettler, visual instruction specialists institutionalized the approach in the 1920s through professional organizations, journals, and committees in national organizations, such as the National Education Association.

38. Victoria E. M. Cain, "'The Direct Medium of the Vision': Visual Education, Virtual Witnessing and the Prehistoric Past at the American Museum of Natural History, 1890–1923," *Journal of Visual Culture* 9, no. 3 (December 1, 2010): 284–303.

of American identity in the late-nineteenth and early-twentieth centuries overlooks the role that museum education departments had in accumulating and distributing images to schools and publishers in the same period.[39]

Alison Griffiths, however, uses the slide and film loan programs at the American Museum of Natural History to investigate the museum's role in promoting visual instruction and the use of visual media in schools.[40] Griffiths also considers the degree to which museum leaders valued film among their institution's many activities. Griffiths impressively navigates the web of factors that shaped the film loan programs, including school access to appropriate projectors, challenges in finding adequate storage for the museum's growing film library, how museum actors produced and acquired films for education programs, and the overall standing of visual instruction in the museum and educational communities. In the process, Griffiths provides a useful overview of how such educational programs are realized, based on multiple sets of professional relationships between museum staff, the city's board of education, regional colleges, teachers and principals, technicians, film producers, and more. As an essay in an edited volume on educational film, Griffiths' work is perhaps most useful in raising several questions about how and why museums and schools have engaged in such programs, and if there have been any long-term impacts on those institutions and society. This project aims to answer just one of those questions—about how scientists and educators have contributed to the perception that the American Museum of Natural History was viewed as an institution where teachers should go to

39. Victoria E. M. Cain, "Seeing the World: Media and Vision in US Geography Classrooms, 1890–1930," *Early Popular Visual Culture* 13, no. 4 (November 2015): 276–92.

40. Alison Griffiths, "Film Education in the Natural History Museum: Cinema Lights up the Gallery in the 1920s," in *Learning with the Lights Off: Educational Film in the United States*, eds. Devin Orgeron, Marsha Orgeron, and Dan Streible (Cary, NC: Oxford University Press, Incorporated, 2011), 124–44.

get films and learn how to use them for teaching in classrooms. Essentially, how did the museum become a space of pedagogical authority?

Chapter 2

Albert Bickmore and the Birth of Visual Instruction, 1880–1904

On a cold Saturday morning in the winter of 1880, Albert S. Bickmore, superintendent and lead naturalist at the American Museum of Natural History in New York City, rode a small elevator up to a workroom to deliver a slide-based lecture for a group of teachers. He did so with tempered expectations. Bickmore's lecture, "Corals and Coral Islands," was the first of a new six-session course which he had proposed to the city's board of education and superintendent's office with hopes of supporting teachers and boosting the museum's underwhelming attendance. Unfortunately, a sleet storm from the night before had covered the upper part of Manhattan in ice and Bickmore didn't think many teachers would make the suddenly arduous trip. "I can hardly describe my surprise and my gratification," Bickmore would later recall, "when I entered the little room and found that out of thirty teachers who had been invited, no less than twenty-five had come through the heavy storm. The superintendent of the New York City schools and the president of Hunter Normal College braved the weather to attend as well.[1]

Bickmore may have been surprised by the enthusiasm of those teachers, school administrators, and teacher educators, but their collective dedication set the stage for the far-reaching lecture programs that followed. After the successful completion of Bickmore's first six-session course of lantern slide lectures, New York City educators requested two more; each presentation was filled to capacity. Armed with this proof of teacher interest in the lectures and early evidence of improvement in student learning, Bickmore and a small group of colleagues successfully petitioned the state legislature in 1884 for funds to continue the museum-based

1. Albert S. Bickmore, *An Autobiography, with a Historical Sketch of the Founding and Early Development of the American Museum of Natural History* (2011), 58–9.

lectures for city teachers, and also to give the lectures for each of New York State's normal schools. It was the first program of its kind in the United States—a systemic partnership between a research-based science museum and schools undertaken to support teacher practice.

Over the next twenty years, under the supervision of the New York State Superintendent of Public Instruction and several regional superintendents, Bickmore created and delivered 418 distinct lectures on 213 separate subjects. At the program's peak, Bickmore spoke to roughly 20,000 teachers annually throughout New York State. In the process, he amassed a collection of 70,000 slide negatives covering the natural sciences, ethnology, national and world geography, cultural history, and industry, which Bickmore and his staff at the museum used to supply the state's normal schools, teachers institutes, village superintendents, teacher-institute conductors, and individual schools with the requisite lantern slides (as well as the projection equipment and manuscripts) needed to repeat the lectures for school and public audiences.

While Bickmore's research expeditions and professional network were the sources of the images and information featured in his lectures, the topics of which were dictated by the needs and interests of school administrators, teacher educators, and teachers themselves, thereby imbuing the museum with an emergent pedagogical authority. These educators saw broad instructional potential in Bickmore's innovative slides and projection technologies—methods those educators soon labeled "visual instruction"—and they tasked Bickmore with lecturing on a range of subjects, many spurred by concerns about assimilating new citizens into American culture in an era when the country was welcoming large new immigrant populations.[2] In order to meet topic requests, Bickmore embarked annually on research expeditions and networked with

2. New York State administrators' use of the term "visual instruction" in the late nineteenth century predates Saettler's argument that the term originated in the early twentieth century. See Saettler, *American Educational Technology*.

experts, all at his own expense. For its part, the state bore the costs for reproducing and distributing the slides, purchasing and maintaining the stereopticon projectors, and even for improvements to the museum's facilities, all expenses approved by the state superintendent of Public Instruction.

By the time the program ended in 1904, Bickmore and the state's teacher educators and administrators had established illustrated lectures as a viable teaching method in an early manifestation of visual instruction, and successfully promoted broad acceptance of museums as a source of pedagogical resources that can support classroom learning. Building from this foundation, administrators around New York purchased their own slides and stereopticon projectors, using them in ways that extended past Bickmore's lectures to new topics and audiences. In New York City, the board of education took up Bickmore's approach and established a successful public education series. Educators in other states and countries purchased slides and lectures from Bickmore, extending his approach well beyond New York State.

In order to achieve these unprecedented outcomes, state and museum leaders had to invest in the museum's physical, administrative, and material infrastructure, building it into an institution capable of impacting many thousands of teachers. Bickmore and subsequent leaders of the museum have justifiably cited the lecture program as the first systemic partnership between a science museum and regional schools in the United States, and by the time the program ended in 1904, educators throughout the nation and world had come to view museums as important resources for classroom teachers and visual instruction as an important instructional approach for subjects across school curriculums.

Of course, a program so auspicious had to emerge from a very specific set of circumstances that facilitated its creation and growth. First, Albert Bickmore's professional and academic background uniquely qualified him to meet the needs and interests of New York State's education administrators. In particular, New York education administrators were deeply concerned about the effects of immigration, which was the second factor that shaped the museum's teacher lecture program. As the Gilded Age gave way to the Progressive Era, America's strong economy drew millions of people from poor European countries, and educators throughout New York State scrambled to improve immigrants' mastery of English and to help them assimilate into American culture and politics. Third, elected officials in New York, both at the state and city levels, voted consistently to invest public funds in the museum since the museum's inception in 1869. The museum's leadership responded to that municipal support by prioritizing public service, which helps explain their steadfast work on behalf of New York's teachers.

Even a cursory look at the life of Albert Bickmore before he helped found the museum reveals that he had been cultivating the core tenets of what became a lecture program—travel, museum work, and study in both science and ethnology—for some time. Bickmore was born on March 1, 1839, to a family of seafaring fishermen in the coastal village of St. George, Maine, which he saw as the source of his passion for travel and exploration. In his unpublished autobiography, Bickmore describes being introduced to scientific illustrations through a small text, *Goldsmith's Natural History: Abridged for the Use of Schools*, which he credited with inspiring his faith in images as educational tools. After attending secondary school in New London, New Hampshire, Bickmore earned both his bachelor's and master's degrees at Dartmouth University, finishing the latter in 1863. After a brief enlistment in the Civil War,

Bickmore's interests in natural history, travel, and education coalesced under the tutelage of famed naturalist Louis Agassiz at Harvard University's Museum of Comparative Zoology, where he was placed in charge of caring for the museum's specimens of radiates and mollusks.

Despite his experience working in the Museum of Comparative Zoology at Harvard, Bickmore's work with teachers owed more to his research experiences in biology and ethnology. Just one year after beginning his doctoral research, Bickmore set out to reconstruct the lost mollusk shell collection that Linneus had analyzed for his seminal *Systema Naturae*.[3] The specific set of shells used by Linneus had been collected by German biologist Georg Eberhard Rumphius in the mid-seventeenth century. Bickmore used Rumphius's notes to revisit all the sites where the shells had originally been discovered, and in the process took detailed notes on the various locations, peoples, and customs he had encountered along the way. Upon his return to Harvard in 1867, Bickmore compiled his notes into what was published as *Travels through the East Indian Archipelago* in 1868. As the title suggests, *Travels* is not a work focused on Bickmore's biological research but is instead an ethnological study. Bickmore's work in this regard was by no means anomalous, as his later title of curator of ethnology at the museum would attest.[4]

Once Bickmore had published his ethnological reflections on his research expeditions, he turned his attention toward a long-held goal: creating a museum in New York City. Bickmore had come to the idea for a grand museum of natural history in New York City sometime before 1861, and he told of carrying those plans in his pocket as he fought in the Civil War, studied

3. Bickmore, *An Autobiography*, 46–7A.

4. American Museum of Natural History, *Annual Report, 1884–1885* (New York: American Museum of Natural History, 1885), 5.

under Agassiz, and traveled the world conducting his doctoral research.[5] Convinced that New York needed a museum to rival those in Philadelphia, Chicago, Cambridge, and London, Bickmore dedicated himself to realizing his plans in 1868. He assembled a group of early supporters, including Theodore Roosevelt, Sr. and J. Pierpont Morgan, whose collective import swayed New York State's legislature to approve the plan for a museum. On April 8, 1869, just two days after the proposal had been signed by Governor John T. Hoffman, Bickmore and the group of trustees unanimously voted to accept the charter of what they named the American Museum of Natural History. Two years and several collection acquisitions later, the museum opened on the upper floors of the Arsenal Building in New York's Central Park.

The Needs of Educators in New York State

As Bickmore was guiding the early years of the museum, members of the New York City Board of Education were seeking ways to teach language skills to help socialize the city's growing immigrant population. This was the primary motivation for working with the museum. The 1881 *Annual Report of the Board of Education of the City and County of New York* included the ominous warning that "unless strenuous efforts are made, the number of people in this city totally ignorant of our language may become so large as to be an element of great danger to municipal prosperity."[6] Years later, on October 14, 1893, Governor Roswell P. Flower spoke about the educational imperative presented by immigrants in an opening address to teachers attending Bickmore's new slate of state-funded lectures. Flower noted the estimated 300,000 New York City residents unable to speak or write English, saying, "we bid them welcome, but

5. Bickmore, *An Autobiography*, 21A–23A.

6. Board of Education of the City of New York, *Fortieth Annual report of the Board of Education of the City and County of New York* (New York: The Board of Education, 1881), 10.

we ask them merely to put their children into our common schools; and no matter what their brogue is, whether it is Irish, German, Scotch, Swedish, Norwegian, Dutch, or what else it is, we ask them to put their children in this hopper of the common schools, knowing that their brogue will be rubbed off in a year, and they will become able and good American citizens."[7]

School administrators were particularly interested in using the museum's artifacts and specimens to implement Object Lessons and Oral Instruction, the preferred method for teaching Language Lessons. In the 1882 annual report the city superintendent of schools, John A. Jasper, detailed the pedagogical approach as, "*oral*, because they are to be given without books either in print or in manuscript; they are *objects*, for the purpose of developing the pupil's perspective, conceptive and reflective powers; and are called *language lessons*, because their leading purpose is to train the pupil to express in his *own words* what he thinks and what he has learned of the objects considered."[8]

At first blush, a curriculum of "Language Lessons" would seem too far afield for Bickmore and the museum to consider supporting, but he was driven to find ways to justify the city's investment in the museum. The facilities at the Arsenal Building that housed the museum at its opening in 1869 were always understood to be temporary, and Bickmore and the museum's trustees worked diligently to find support for a new home. By 1871, Bickmore garnered needed support in the state legislature to authorize the City of New York to give the museum land and money to construct new buildings, as well as a pledge to provide funds annually, in perpetuity, to

7. Bickmore, *An Autobiography*, 114–5.

8. Board of Education of the City of New York, *Forty-First Annual report of the Board of Education of the City and County of New York* (New York: The Board of Education, 1882), 162 (emphasis original). "Object," as used in the quoted passage, appears to describe any prompt that would lead students to think deeply, including artifacts, images, or even ideas. This use of "object" presages the learning philosophy behind visual instruction.

pay for the staff and materials needed to maintain those facilities.[9] The museum's trustees, meanwhile, agreed to pay for institutional research, staff, and programmatic resources. For Bickmore and the trustees, the investment by the city came with a charge to serve its populace through education and enrichment, although those intentions were originally conceived as little more than allowing public access to the museum's world-class exhibits.

In 1872, New York City's park commissioners designated the undeveloped and remote Manhattan Square section of Central Park as the museum's permanent home. The location was difficult for most New Yorkers to reach, causing attendance problems that fueled Bickmore's later partnerships with school leaders. Bickmore recalled his concern when he first surveyed the Manhattan Square site, writing that "it seemed an almost hopeless task that we were undertaking to make this place accessible and attractive to the masses of our citizens."[10] Bickmore's fears came true, as the flow of street traffic limited the number of potential visitors, and planned improvements to the Square and a nearby stop on an elevated railroad were yet to be completed. Reflecting on the day after the grand opening of the new museum building on December 22, 1877, Bickmore lamented that "we experienced the depressing effect of finding our spacious exhibition halls nearly deserted" and that "we were evidently doomed now for a number of years to experience the unfavorable effect of our isolated position."[11] Seeking a way to increase the museum's public profile and impact, Bickmore turned his attention to the city's growing school system.

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9. Bickmore was inspired (and encouraged by the museum's trustees) to pursue such an arrangement based on Louis Agassiz's partnership with the cities of Cambridge and Boston, Massachusetts, which provided the land and money for the Museum of Comparative Zoology at Harvard.

10. Bickmore, *An Autobiography*, 29.

11. Ibid, 50.

The Early Teacher Lectures

Bickmore aimed to work with schools to justify the civic backing he received and to maintain the prestige of the museum. By settling on teacher lectures, he stumbled upon an approach that maximized both his skills and the museum's resources. Bickmore himself thought his early lectures were little more than "informal" talks enriched by specimens taken from the museum's exhibit cases.[12] In fact, it was only because the largest of his selected specimens could not be brought up to the small room where he was speaking for teachers that he decided to include the images that would define his lecture style. Bickmore described his early, crudely projected illustrations, as "shown on a transparent screen through a door from an adjoining room, and the size of the screen was limited by the width of the door to two feet and a half square."[13] Bickmore selected "Corals and Coral Islands," as his first topic without considering school curriculums, presuming that it was best to start with "lower and simpler forms of animal life."[14] He also thought the topic would interest teachers who had read his geography and ethnology-focused *Travels in the East Indian Archipelago*. Bickmore expected that teachers would be drawn to stories of "the wondrous beauty of those tropical islands and the surprising purity and clearness of its sparkling seas."[15]

After experiencing the first six lectures, New York City school administrators and teachers pushed Bickmore to continue and expand his reach. After receiving several requests from school educators, the museum's leadership approved additional sessions, along with money

12. Albert S. Bickmore, "American Museum of Natural History," in *Thirty-Second Annual Report of the State Superintendent of Public Instruction, 1885* vol. 32 (Albany, NY: The Department of Education, 1886), 117.

13. Bickmore, *An Autobiography*, 58.

14. Ibid., 57–8.

15. Ibid., 57–8.

to pay for the photographer and stereopticon that Bickmore requested to strengthen his offerings. "We have been seeking a wide field of usefulness," Bickmore declared. "We now have a most important one thrust upon us."[16] For the second six-talk series, the board of education asked that Bickmore increase the capacity to fifty teachers. Once complete, another series was agreed upon, and the board then asked the museum to accommodate at least one teacher from each of the schools under its control, a total of one hundred people, for all of the next six sessions. "The Museum of Natural History, thus, through the teachers," wrote city school superintendent Jasper, "reaches the pupils of our schools, and through the latter making itself felt in nearly every household of our great city."[17]

The success of those early lectures was the subject of a pivotal conversation between Bickmore and Thomas Hunter, head of the New York City Normal College, that started the process of expanding the program statewide. In his autobiography, Bickmore wrote out his recollection of that discussion in dialogic detail. Hunter, Bickmore recalled, described the results of the board of education's classroom exams that Jasper used to determine teacher's efficacy and resulting career advancement. "I know personally every teacher who attends your lectures," Bickmore wrote in Hunter's voice, "these classes stand so much and so much percent higher than the classes which have been studying the same subjects under the teachers who have not been under your instruction and so much and so much percent higher than their previous classes ever did before your lectures began."[18] Bickmore may not have recalled the percentage increases in student exam scores, but they were significant enough to convince Hunter and Jasper that the

16. Ibid., 59.

17. Ibid., 61.

18. Ibid., 62–3.

museum lectures were the equal of a normal school in terms of their instructional value for teachers.[19] As such, Hunter proposed that Bickmore and the museum petition the State of New York for the same yearly allotment of $18,000 received by each of the state's normal schools.[20]

In 1884, Bickmore used support from a coalition that included some of the state's highest-ranking education professionals to earn the appropriation of $18,000 for the museum's teacher programs. One of the notable members of the group advocating for the museum was new state superintendent of public instruction, William B. Ruggles, who would be intimately involved in the next phase of Bickmore's work with teachers. The appropriation for the museum was approved by an act of legislation, and under the terms of the new law, Bickmore would continue lecturing at the museum for New York City teachers and other teachers from the state's normal schools which were in commuting distance. In addition, Bickmore was to supply each of the state's then eight normal schools—as well as schools in New York City—with the apparatus and appliances "necessary for the proper presentation to their teachers and pupils of this instruction."[21] In other words, not only was Bickmore to perform his lectures, he was to help outfit teacher educators around the state with the tools needed to repeat the lectures for their own students.

Immediately after the law was passed, state educators began steering Bickmore's lectures to meet their curricular needs. Originally, Bickmore planned out a course of twenty lectures for

19. Normal Schools were the primary mode of teacher training in America during the nineteenth century. Normal schools were noted for being locally controlled, though in many cases, such as in New York, they were managed by the state. For more on state normal schools, see Christine A. Ogren, *The American State Normal School: An Instrument of Great Good* (New York: Palgrave Macmillian, 2005).

20. Hunter had been declining the state's $18,000 allotment for the New York City Normal College so he could maintain control over the curriculum. As a result, Hunter was essentially telling Bickmore to apply for the money that would have gone to the New York City Normal Collage. See Bickmore, *An Autobiography*, 64.

21. Bickmore, "American Museum of Natural History" 1886, 118.

the first four years of the program by, as he described, "following strictly the requirements of the laws of the State as embodied in the Teacher's Manual prepared by the Board of Education of New York City," proceeding from corals to man.[22] Before the program was set to start, the principals of the state's normal schools asked that lectures on human anatomy and physiology (topics outside of Bickmore's academic expertise and the collections of the museum) be offered first for teaching about the negative effects of alcohol—a topic mandated by state law in response to pressure from temperance advocates.[23] Based on the subjects' implementation in Albany, New York, teachers were expected to teach anatomy and physiology without a set curriculum or textbook, because, as explained by that city's superintendent, Charles Cole, "the study and thought necessary to the preparation of a syllabus by each teacher for her own grade will be the very best means of qualifying her for the successful prosecution for her new work."[24] Teachers were to make their own decisions about what to teach while folding instruction on hygiene, stimulants, and narcotics into discussions on bodily organs. Bickmore's information and image-rich lectures were expected to help teachers meet these rigorous expectations.

Given that the requests from educators forced Bickmore to prepare teacher lectures outside of his areas of expertise, he sought out help from more qualified professionals to help him prepare. To show the effects of alcohol, Bickmore consulted with Dr. Francis Delafield and Dr. T. M. Prudden of New York City's College of Physicians and Surgeons, who prepared comparative microscopic sections of healthy organs and those from people dying from

22. Bickmore, *An Autobiography*, 71.

23. For more on the temperance movement's impact on schools, see Jonathan Zimmerman, *Distilling Democracy: Alcohol Education in America's Public Schools, 1880–1925* (Lawrence: University Press of Kansas, 1999).

24. State of New York, *Thirty-Third Annual Report of the State Superintendent of Public Instruction, 1886* vol. 33 (Albany, NY: The Department of Education, 1887), 270.

alcoholism, which were used to create stereopticon slides that were reproduced for each of the state's normal schools. "This part of our work," Bickmore reported to the state superintendent of public instruction, "took on the attractiveness of original research."[25] Furthermore, Bickmore argued, without his state-funded teacher lectures, the law mandating narcotics and alcoholism instruction could not have been fulfilled. In fall 1884, Bickmore delivered the new lectures in New York City, and a group of regional specialists in Albany used the 200 illustrated slides from the museum to deliver the teacher lectures the following spring. According to Superintendent Cole, "the effects of these lectures upon the instruction given to the public school pupils cannot fail to be salutary and lasting."[26]

State Funding and Curricular Oversight of the Lectures

For their part, the state superintendents of public instruction provided important oversight by managing both the course curriculums and spending during the first ten years of Bickmore's lecture program. Each of the state superintendents during this period—William B. Ruggles from 1884–1885, Andrew S. Draper from 1886–1892, and James F. Crooker from 1892–1895—used their power to authorize lecture topics and approve Bickmore's expenditures to steer the increasingly expansive lecture program toward the state's educational interests. Each of the superintendents had a unique management style. Ruggles, an insurance lawyer by training and experience, was measured in his guidance, corresponding with Bickmore largely about balancing his obligations to NY teachers with growing interest from out-of-state and public audiences.[27]

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25. State of New York, *Annual Report of the State*, *1885*, 121.

26. State of New York, *Annual Report of the State*, *1886*, 272.

27. W. B. Ruggles to Albert Bickmore, 24 October 1884, Albert S. Bickmore Collection, MSS.B5354, American Museum of Natural History Library.

Andrew Draper, Ruggles' successor, had been a math teacher and bookkeeper, and he applied his organizational skills to managing Bickmore's more complex expenditures under an 1886 agreement that sent him to lecture personally at each of the state's normal schools. Under the new arrangement, costs had predictably increased as Bickmore traversed the state, but without a commensurate increase in state funding.

Bickmore, meanwhile, focused on preparing the lectures, which increasingly required him to travel to collect requisite images and information at his own expense. A worthy summary of Bickmore's travels on behalf of New York teachers is well beyond the scope of this study, but one particularly busy summer illuminates the nature of his efforts. In 1887, Bickmore started the summer by working on a lecture on the fishing industry.[28] He traveled with his assistant, L. C. Landy, to the New York State Fish Hatchery at Caledonia, a small upstate town just southwest of Rochester, because the hatchery offered the best illustration of "the artificial propagation of trout and salmon, and the other principal food fishes of our fresh waters."[29] Then, at the invitation of the Canadian Minister of Marine Fisheries, Bickmore photographed facilities in Nova Scotia, Cape Breton, New Brunswick, and Quebec. That same summer, Bickmore collected images on the iron, coal, and petroleum industries in Pennsylvania and New York, and several prominent American parks, including Yellowstone, Salt Lake, Yosemite, the Grand Canyon, and Pikes Peak. In total, Bickmore traveled more than nine thousand miles at his own expense.[30]

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28. Albert S. Bickmore, "American Museum of Natural History: Report of Dr. A. S. Bickmore," in *Thirty-Third Annual Report of the State Superintendent of Public Instruction, 1886* vol. 33 (Albany, NY: The Department of Education, 1887), 181. No specific dates were included in Bickmore's recounting of his research trips for the State Superintendent of Public Instruction.

29. Ibid. Bickmore also received "authentic illustrations" of marine fisheries from his friend and United States Fish Commissioner, Spencer F. Baird.

30. Ibid.

Figure 1. Professor Albert Bickmore at Giants Causeway, Dublin, Ireland, circa 1890
AMNH Research Library | Digital Special Collections, accessed April 20, 2020, https://lbry-web-007.amnh.org/digital/items/show/66438

Bickmore's lecture program was also part of a complex push-and-pull between how much value the museum was creating for the public, and how much money the state should spend on the museum. During the summer of 1890, while conducting lecture research in the Mediterranean, Bickmore learned that New York governor David Hill had not approved funding for the program.[31] In response, almost five thousand disappointed teachers and dozens of school administrators contacted the governor and within a year funding was reauthorized. While Hill's original decision may have appeared to be a rebuke, it came during a period of tremendous public investment in the museum. The centerpiece was a $400,000 appropriation for a new wing

31. Bickmore, *An Autobiography*, 96.

and auditorium that the museum's trustees requested in 1886. Funding for the museum's new wing was delayed, giving the city leverage in a long-standing debate over opening the museum on Sundays. That appropriation was advanced in 1889, and a new 1,000-seat auditorium opened in 1890—around the same time that Hill pulled funding for the teacher lecture program. Hill's successor, governor Roswell P. Flower, also vetoed a lecture program renewal for 1892 (he approved the program the following year), that similarly coincided with a major financial outlay for the museum. Weeks before his veto, Flower had signed off on a $50,000 appropriation for the museum's facilities.

Educational Leadership through the Committee on Advice

Educators assumed unprecedented control over the lecture program after the 1895 renewal through a committee assigned to oversee Bickmore's work. The Committee on Advice was established by state superintendent Charles R. Skinner on May 10, 1895, to ensure that Bickmore's lectures represented the interests of the state's many school superintendents.[32] Also, a new provision in the 1895 law stipulated that projection apparatus be made available to "any institution instructing a teachers' training class or any union free school." In other words, Bickmore was now expected to ensure that his lectures could be repeated to every city, village, and teacher in the state, in addition to, based on Skinner's estimate, the 50,000 people already reached annually.[33] In that context, it is easy to imagine Skinner seeking more control over the information and images being extended into every corner of the state.

32. Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Forty-Second Annual Report of the State Superintendent of Public Instruction, 1895* vol. 42, (Albany, NY: The Department of Education, 1896).

33. Ibid., 382.

The appointees to the Committee on Advice were superintendents Charles W. Cole of Albany, Charles E. Gorton of Yonkers, and James Godwin of New York. The three wasted little time in setting Bickmore's curricular agenda firmly on the topics of geography and ethnology. In a letter to Skinner dated May 22, 1895, twelve days after the group had been appointed, the committee reported that it would recommend that Bickmore's first series of lectures under the new law be dedicated to New York State itself, with talks devoted to Manhattan Island and the Highlands of the Hudson; the Catskills and the Adirondacks; the Lakes of Central New York and the Erie Canal; and Niagara Falls.[34] From that point forward, at the committee and the state superintendent's direction, every new Bickmore-led lecture was focused on a specific locale, city, state, country, or geographic region. Any scientific content was subsumed within explicitly geographic or ethnological topics. To ensure that teachers and students statewide had access to the slides and information, the committee recommended that one set of the standard lecture equipment of a lantern, gas cylinders, screen, and "other apparatus used by Professor Bickmore" be sent to "each place where there is a superintendent of free common schools," except for New York City, which was to receive two sets.[35] Skinner approved all of the committee's first recommendations, and Bickmore dutifully carried them out.

The template that the committee established in its first year working with Bickmore remained largely unchanged for the duration of the programs. The committee would start by recommending topics for the coming year's lectures and requesting needed equipment. Once approved by the superintendent, Bickmore would respond with thoughts about the scope of the

34. Ibid., 374.

35. Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Forty-Third Annual Report of the State Superintendent of Public Instruction, 1896*, ed. State of New York, vol. 43, (Albany NY: State of New York, 1897), 280.

research, travel, or networking required to build the talks. After completing the research expeditions at his own expense, Bickmore would prepare drafts of his illustrated lectures for submission to the committee, who, after any needed changes, would authorize the slides and text for distribution to teachers and teacher educators. Occasionally, Bickmore would go directly to classrooms to pilot major new programming initiatives. In 1897, the committee asked Bickmore to create the first lecture designed for primary school and kindergarten teachers, specifying that the lecture feature seventy-two illustrations divided evenly between "a visit to the country," "a visit to the city," and "a visit to the sea shore."[36] Bickmore tested the lectures with classes "of the youngest pupils" himself and pronounced the "experimental trials" successful enough to distribute.

When needed, the Committee on Advice tasked Bickmore with developing classroom materials addressing urgent or emergent topics. For example, as the Spanish-American War was drawing to a close in 1898, Bickmore worked to fulfill the committee's recommendation from June 24 of that year, "that the earliest opportunities be improved for acquiring negatives of Cuba, Porto Rico and the Hawaiian and Philippine islands."[37] Once the Treaty of Paris was signed in late 1898, effectively resolving the war and giving America the "dependencies" of Guam, the Philippines, and "Porto Rico," the original request gained urgency. The committee wrote on Dec 1, 1898, to Superintendent Skinner, "Professor Bickmore has just informed us that he is now able to prepare for the superintendents of schools a lecture upon Cuba and one on Jamaica and Porto Rico and we recommend that he be authorized to substitute those lectures in place of the

36. Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Forty-Fourth Annual Report of the State Superintendent of Public Instruction, 1897*, ed. State of New York, vol. 44, (Albany, NY: State of New York, 1898), 225.

37. Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Forty-Fifth Annual Report of the State Superintendent of Public Instruction, 1898*, ed. State of New York, vol. 45, (Albany, NY: State of New York, 1899), 211.

[lectures] recommended in our previous letter."[38] To acquire slides, Bickmore corresponded with U.S. Geological Survey geologist Robert T. Hill, who agreed to share some of his "superb collection" of West Indian images. For Bickmore, America's expanding global footprint gave the illustrated lecture program "an additional importance," adding, it "indicates that our labors hereafter are destined to have a steadily increasing value in free public education."[39]

Though the committee held significant authority over the teacher lecture program in 1895, the committee still increased its control over the course of the next decade. In 1897, the committee's tone was surprisingly passive, writing to Bickmore that "it is hoped that twelve slides in each lecture including those of flowers and Natural History may be colored."[40] By 1899, the committee had turned that "hope" into policy by limiting the distribution of slides, "in order that hereafter a larger proportion of the slides may be colored."[41] That same year, the committee began deciding exactly which slides would be included in particular lectures. At the committee's request, Bickmore prepared two lectures on the Philippine Islands in 1901, which he presented for groups at the museum. Later that year, committee members Cole and Gorton met at the museum to condense the two lectures into one for distribution to the superintendents. "Professor Bickmore exhibited the aforesaid illustrations," read the meeting notes, "and the committee made their selection."[42]

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38. Ibid., 211.

39. Ibid., 229.

40. Ibid., 226.

41. Ibid., 210.

42. Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Forty-Seventh Annual Report of the State Superintendent of Public Instruction, 1900*, ed. State of New York, vol. 47, (Albany, NY: State of New York, 1901), 672.

Supplying the State: the Scope of Bickmore's Material Contributions for Teachers

The committee was created to guide and shape Bickmore's impact on classroom teaching in New York State, the scope of which, over the course of the twenty years of the program, remains hard to fully quantify. There doesn't appear to be a summative accounting of the material contributions Bickmore made under the state's auspices from 1884 to 1904. To recap, in order to fulfill the state contracts, Bickmore oversaw the distribution of slides, stereopticon projectors, and lecture text, as well as supplementary equipment as needed for each years' programs, plus artifacts and specimens to an ever-changing number of schools and administrators. Bickmore's originally supplied lectures and supplies to schools in New York City, then to each of the state's then eight normal schools in 1884. Four more normal schools were opened and added to Bickmore's ledger in the years that followed. In addition, Bickmore outfitted the five regional organizers of the state's roughly one hundred teacher institutes in 1888.[43] State institutions that were doing any kind of training for teachers were added in 1895, with individual regional schools sprinkled in throughout the program's duration. The materials listed in the inventories that Bickmore included in his annual reports to the state superintendent of public instruction were inconsistent, and varied from year to year, which complicated the task of compiling them into coherent totals.

While there does not appear to be a full tally of the materials that Bickmore distributed throughout the state, summaries included sporadically in his annual reports and the speeches and writings of various participants in the program provide some information. In the annual report for 1895, for example, Bickmore stated that the museum had reproduced and distributed 33,053

43. These teacher institutes were effectively one day workshops for teachers. See Albert S. Bickmore, "American Museum of Natural History, Report of Professor Albert S. Bickmore," in *Thirty-Fifth Annual Report of the State Superintendent of Public Instruction, 1888*, ed. State of New York, vol. 35, (Albany, NY: State of New York, 1889), 291.

slides to date, and because organizations added to the program were sent slide sets from previous years, he estimated that the teacher institutes had received almost 5,000 slides that year alone.[44] On October 30, 1900, State Superintendent Skinner reported that Bickmore had, under the State's auspices, prepared more than 20,000 individual stereopticon views for roughly 200 individual lectures.[45] In addition, Bickmore occasionally updated slides for older lectures, replaced lost or destroyed slides, and retrofitted institutions with copies of established slide sets, so the museum would presumably have distributed many thousands more slides between 1900 and the program's end in 1904.

The Birth and Growth of Visual Instruction

Predictably, there was great variation in how the Bickmore slides were used by educators around New York State, but collectively they began describing the practice by using the new term visual instruction. In 1899 and 1903 annual reports of the state superintendent of public instruction city and village superintendents commented on the use of slides and stereopticons under sections entitled "Visual Instruction." Most of the testimonials praised the value and utility of the lectures. Writing in 1899, Albany superintendent Charles Cole, certainly predisposed to praise the slides as a member of the Committee on Advice, relayed that, "it is the unanimous opinion of the principals and teachers concerned that the outcome has been exceedingly profitable and well worth all the time given and the expense incurred."[46] N. L. Benham of Niagara Falls argued for the educational and entertainment value of the lectures, noting that

44. Bickmore, "Report of Professor," *1895*, 391, 393.

45. Bickmore, "Report of Professor," *1901*, 688. The number of individual slides per lecture ranged widely but settled at around seventy-two slides per lecture shortly after the Committee on Advice began oversight in 1895.

46. *Annual Report of the State, 1899*, 412–3.

"they are extremely instructive and interesting and are appreciated by all."[47] In 1903, James A. Estee of Gloversville asserted that there was "no more important field of instruction."[48] Watervliet superintendent Massee pronounced that, "it would be extremely difficult to give a full statement of the value of this work."[49] Mechanicsville superintendent L. B. Blakeman stated simply that "this form of instruction is one of the best things ever brought out by the Department.[50]

The superintendent testimonials regarding their use of visual instruction provides a revealing glimpse into how their use of the slides was shaped by the availability of lecture spaces, audience interest, speaker effectiveness, and administrator buy-in. In some cities, the lectures were folded into curriculums and delivered for students as well as teachers, while in other areas the lectures were only used to prepare educators for classroom instruction. F. W. Jennings of Johnstown reported that two student lectures were offered per week, correlated with geography and United States history curriculums, so that all students above fourth grade could attend one session per month.[51] Teachers, Jennings noted, also attended so they could build on the lecture content in subsequent classroom lessons. And, while there had always been regional leaders who had delivered Bickmore's lectures for adult audiences, the frequency of those events increased after the 1893 state contract explicitly stated that the slides could and should be used for the public. In fact, some superintendents' descriptions suggest they delivered lectures

47. Ibid., 454.

48. *Forty-Ninth Annual Report of the State Superintendent of Public Instruction, 1902*, ed. State of New York, vol. 49 (Albany, NY: State of New York, 1903), 470–71.

49. Ibid., 476.

50. Ibid., 477.

51. Ibid., 471.

primarily for public audiences. In Cohoes, New York superintendent Edward Hayward reported that "the public seems to enjoy the work exceedingly and to profit thereby," and that teachers and students only attended "when possible." [52] Clearly, educators were exploring the utility of Bickmore's instructional techniques with different audiences and contexts.

Superintendents in several locations described how educators widening the implementation of visual instruction techniques by adding to the resources distributed by Bickmore. In 1903, Syracuse superintendent Blodgett reported the purchase of seven stereopticons in addition to the one provided by the state, so that educators could pass lecture slide sets from school to school; an arrangement that led Bickmore to view Syracuse as a "'banner city' in the line of visual instruction," as Blodgett proudly relayed.[53] In Buffalo, several schools had their own lanterns and slide libraries with images aside from those for the Bickmore lectures.[54] In other areas, superintendents and educators were emboldened by the growth of visual education to use the Bickmore slides in unintended ways. Watervliet superintendent J. Edman Massee, for example, argued that, "it is a mistake to not allow more freedom in using the slides."[55] Elmer S. Redman of Hornellsville didn't wait for permission to use the Bickmore slides as he saw fit.[56] "In fact," Redman wrote, "I find his lectures valuable for reference only."

Even though superintendents were broadly in support of the slide lectures, several expressed concerns or critiques. Superintendent Fred Davis of Plattsburg described some of the

52. Ibid., 469.

53. Ibid., 474.

54. Ibid., 469.

55. Ibid., 476.

56. Ibid., 471.

lectures as "rambling" and asked that they be "more pointed," but still lauded the overall value of visual instruction.[57] Superintendent Harvey Snell of Hoosick Falls thought only a portion of the lectures were valuable, others were just entertaining, and all of them were too dependent on the training of the person delivering them. "I am sure that one needs a better personal knowledge of the subject matter than we have to reach the highest degree of success," wrote Snell.[58] James Crane of Newburgh felt that the lectures needed classroom connections to maximize the learning benefits of the lantern slides, adding that, while "attractive and entertaining," there was no inherent educational value to lectures delivered to large groups of the general public or students.[59] In the view of George Bullis of Oswego, the lectures lacked practical use because they were too focused on artistic topics, and not enough on "modern life, customs, and occupations."[60] Plattsburg's Davis wanted more useful lecture subjects, particularly in the biological sciences that had been largely removed due to the Committee on Advice's focus on geography and ethnology.[61]

Bickmore's Slides and Lectures Across the U.S. and Abroad

Even with the critiques, Bickmore's lectures were clearly impacting instruction around the state and beyond. The first mention of outside interest in the slide lectures was in 1888, when Bickmore reported that "educational authorities" in Pennsylvania had contacted the museum "to

57. Ibid., 474.

58. Ibid., 477.

59. Ibid., 472.

60. Ibid., 473.

61. Ibid., 474.

aid them in establishing a similar system in their State."[62] By 1897, interest from other states had forced Bickmore and the state superintendent of public instruction to establish policies and prices for purchasing and using the lectures, approximately $65 per lecture, all at cost.[63] That same year, Bickmore oversaw sales of lectures and slides to state education officials in Ohio, Connecticut, Massachusetts, Indiana, and Rhode Island. The slide sales came with one requirement: the slides could be used only for free presentations in connection with each state's common schools. As the stock letter sent to other states read, "we are not dealers in slides, but we are desirous of promoting free public education throughout our land by means of illustrated teaching."[64] In the years that followed, officials from the University of Chicago, Vassar College, and state educators in North Carolina, Tennessee, and Iowa all availed themselves of these resources.[65]

International interest in the illustrated lectures came after the turn of the century. In 1901, Bickmore wrote about how his occasional presentations during his research travels were bringing in global requests for lecture materials. Rev. A. W. Rudisill of Madras, India, wrote Bickmore in May 1900, to purchase lectures, arguing "if your illustrated lectures could be distributed to the cities of India as they are to the cities and villages of the state of New York, it would result in an inconceivable uplift of the millions of that vast country, and place India under a cumulative indebtedness to yourself and the Empire state."[66] Later that year, Patrick Geddes of England

62. American Museum of Natural History, *Annual Report, 1888-1889* (New York: American Museum of Natural History, 1889), 8.

63. Bickmore, "Report of Professor," *1897*, 254.

64. Bickmore, "Report of Professor," *1901*, 685.

65. Bickmore, "Report of Professor," *1903*, 616.

66. Bickmore, "Report of Professor," *1901*, 683.

proposed to arrange a tour through his country for Bickmore, and asked the museum to send "a few representative lectures to teachers in various leading cities—such as London and Edinburgh, Liverpool and Manchester, Birmingham, Newcastle and Aberdeen, etc., under the auspices of their school boards and other educational authorities."[67] State superintendent Skinner authorized Bickmore to respond to these requests, and others from France and Canada, at his own discretion.

How the Lectures Changed the Museum

The slide lecture program was designed to extend education resources out into the state, and it sparked several changes at the museum as well. In 1884, the same year that Bickmore established the museum's first contract with the state, the museum's leadership created its own Department of Public Instruction, "with the kind co-operation of the Hon. Wm. B. Ruggles, State Superintendent of Public Instruction, and the Board of Education of this city," according to museum president Morris K. Jesup.[68] Jesup also called for support in upgrading the museum's facilities to help Bickmore keep up his end of the state contract. "It is hoped," Jesup wrote, "the Legislature will be willing to grant the necessary aid to carry out this laudable object."[69] Two years later, the New York State legislature did indeed approve funding for improvements to the museum, "including a lecture hall, which can be used for the purpose of giving to the teachers of the common schools, and the normal schools of the State."[70] Surprisingly little was documented about how state funds were used to build an infrastructure in the museum to duplicate slides and

67. Ibid., 682–4.

68. American Museum of Natural History, *Annual Report, 1884–1885*, 8–9.

69. Ibid.

70. Bickmore, "Report of Professor," *1888*, 199.

distribute materials around the state. The 1886 inventory of property purchased for the museum provides a glimpse into the equipment needed to reproduce the lecture slides, including chemicals and equipment for an expanded dark room, cameras and lenses, boxes for lantern slides, diamonds for cutting glass, and a copying table.[71]

Likewise, Bickmore is vague about how he constructed his staff to fulfill the lecture contracts with the state, as only a few of his colleagues are mentioned by name in his reports. Bickmore refers often to his technical assistant, L. C. Landy, beginning in 1887.[72] Landy helped Bickmore on expeditions with taking pictures, aided with the development and distribution of slide projection technologies, and occasionally delivered lectures. When Bickmore renewed the contract with New York State in 1895, he agreed to supply more institutions than ever, and, as he recalled, "immediately employed the necessary assistants and began our new and widely-extended work."[73] The head of this new workforce was George M. Fuller, who had spent years with New York City's largest stereopticon dealer, T. H. McAllister & Company. Bickmore described Fuller as a "constant adviser and confidential friend" until the end of the program, who also supervised the coloring and duplication of slides.[74] In addition, the Committee on Advice consistently requested more colored slides, so Bickmore had to increase the number of staff colorists from one in 1895 to twenty by 1904.[75] The only other staffer named was Mr. Beseler, who was first mentioned after his death in 1896, who Bickmore called "a faithful and ingenious

71. Bickmore, "Report of Professor," *1886*, 184–5.

72. Bickmore, "Report of Professor," *1887*, 179.

73. Bickmore, *An Autobiography*, 127.

74. Ibid.

75. Ibid.

constructor of the kind of illustrative apparatus we use in giving our lectures and in their repetition, and his place will be one long left vacant."[76]

At regular intervals over the life of the state contract, Bickmore and the museum's leadership also used the teacher program to help justify enlarging and improving the museum's auditorium and overall footprint. Calls for larger space for teacher lectures date back to 1884 and were central to the arguments that the museum's leadership used for a $400,000 appropriation for building expansion in the mid-1880s. In fact, teacher interest in Bickmore's lectures so exceeded the capacity of the museum's small auditorium in 1888, that the trustees opted to rent the much larger Chickering Hall three miles away.[77] Construction on the auditorium started soon after, even though the appropriation request was still pending. When the new 1,000-seat auditorium opened at the museum in 1890, it was already too small. According to Bickmore, "an average of 150 teachers stood throughout the hour and a half that each lecture occupies in its delivery. At the closing talk that year, 1,300 were present, and so many were turned away for want of standing room that the lecture was repeated the following Saturday to 700."[78] The museum's leadership was able to fund a larger auditorium that opened to even greater fanfare in 1900. State superintendent of public instruction Charles Skinner delivered one of the keynote addresses, during which he described the teacher lecture program that was expected to make significant use of the new facility.[79]

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76. Bickmore, "Report of Professor," *1896*, 280.

77. Bickmore, *An Autobiography*, 87.

78. Bickmore, "Report of Professor," *1890*, 223.

79. American Museum of Natural History, *Annual Report, 1900* (New York: American Museum of Natural History: 1901), 44-6.

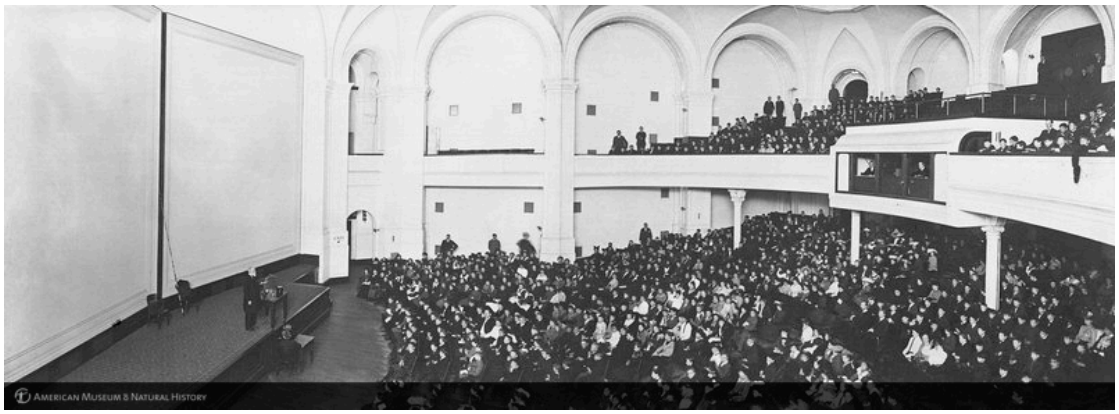

Figure 2. Albert Bickmore lecture for public school children in state-funded museum auditorium, 1904
J. Otis Wheelock (photographer), AMNH Research Library | Digital Special Collections, accessed April 21, 2020, https://lbry-web-007.amnh.org/digital/items/show/22269.

In April 1904, one month after delivering the last teacher lecture of the spring course, Bickmore fell ill. He would never deliver another lecture under the auspices of the State Superintendent of Public Instruction. Bickmore's undisclosed illness kept him from finishing the fall 1904 course, which was left to colleagues to deliver, including Frank Chapman, the Curator of Mammalogy and Ornithology and Otis Hovey, Associate Curator in the Department of Geology and Invertebrate Paleontology. Fittingly, the very last lecture was delivered by Louis P. Gratacap, Curator of Minerology, who had assisted Bickmore with the primitive lantern used for the very first teacher lecture in winter 1880. Aside from sporadic lectures, formal courses for teachers would not be offered at the museum again until 1929. In 1905, the museum's trustees reluctantly accepted Bickmore's retirement, and appointed him Curator Emeritus with the hope "that from time to time he might be able to take his accustomed place upon the lecture platform."[80] Bickmore did lecture again at the museum for members and for the public on select holidays. He also made his vast library of lantern slides available for use in lectures for

80. American Museum of Natural History, *Annual Report, 1905* (New York: American Museum of Natural History: 1906), 14.

students.[81] During his retirement, Bickmore spent his time working on his autobiography, which remains unpublished. He died in 1914 at the age of seventy-five.

Whether because of Bickmore's illness or larger changes in New York's educational administration, in 1904 New York's legislature and education administrators withdrew the contract with the museum. That same year, a new law, the Education Unification Act, merged the State Department of Public Instruction and the University of the State of New York into a single entity: the New York State Education Department.[82] The first annual report of the new department featured a full report on the New York State Museum, part of the state university, which had assumed new prominence amidst the educational interests and activities of the state. However, no teacher programs were mentioned. Negatives of the thousands of images Bickmore had taken on behalf of the state remained at the Library of the New York State Capital Building, and available for educator use, until all were destroyed by a fire on March 29, 1911.[83]

New York's legislature may have halted funding for the museum's lecture program in 1904, but the state's professional educators laid the foundation for the museum's lasting pedagogical authority in two ways. First, by supporting and promoting Bickmore's lecture program, New York's education administrators established the understanding that museums are institutions that can and should support classroom teacher practice. By steering Bickmore's lecture topics toward curricular needs and overarching educational interests, the state superintendents of public instruction, along with regional superintendents, heads of normal colleges, and institute conductors ensured that the museum's offerings held real value for

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81. Ibid.

82. University of the State of New York, *Annual Report of the Education Department, v. 1, 1904* (University of the State of New York: 1905).

83. Wendell G. Johnson, "'A Happier Way of Learning': The Visual Instruction Movement, 1918–1928," (Ed.D., Illinois, Northern Illinois University, 2015), 177.

teachers. In addition, by making Bickmore's lectures the impetus for a larger visual instruction movement, these administrators effectively authorized Bickmore as an expert in a cutting-edge teaching method. In other words, New York's state administrators presented Bickmore as a pedagogical expert in visual instruction, and by proxy, the museum as a site where such expertise is cultivated.

Second, the financial and organizational support that Bickmore and the museum received from New York State educators helped the museum build frameworks for further work with schools. The dramatic, statewide success of Bickmore's lecture program helped establish partnerships with schools not only as an institutional priority, but as a basic activity of the museum's staff. The museum's investment in public education was used to justify more financial investment from New York city and state officials, which, in turn, led professionals at the museum to work more with schools, forming a positive feedback loop that spun off from the teacher lectures into a massive classroom exhibit loan program that started in 1903, one year before Bickmore's retirement. Each of these programs was spearheaded by museum scientists, as were the student lectures that started in 1904, illustrating how ingrained school partnerships had become to the museum's organizational identity. Lastly, the state lecture program was used to build up the educational facilities and resources at the museum. Students received lectures in the auditorium halls built to accommodate large audiences of teachers, and Bickmore's many thousands of slides would be loaned out to New York City teachers in the decades that followed.

The collaborative work done by New York State education administrators and Albert Bickmore was just the beginning of the development of pedagogical authority at the museum and in American science museums overall. Their program was the first, large-scale educational partnership between a research-based civic science museum and schools in the United States. It

was an auspicious outcome for what started as a surprisingly well-attended talk on “corals and coral islands” on an icy Saturday in 1880.

Chapter 3

George Sherwood and the New Department of Public Education, 1903–1919

The 1903 annual report from the American Museum of Natural History's Department of Invertebrate Zoology included a startling and prescient proclamation. The department's scientists had acquired major collections, made progress on a new exhibition, and published several articles, but the report declared, "by far the most important work entrusted to and accomplished by the department was that of Mr. Sherwood, who has succeeded in putting the relations of the Museum to the public schools of the city on a firm scientific and pedagogical basis."[1] At the time, George H. Sherwood was in his second full year as assistant curator of Invertebrate Zoology. In his first year at the museum Sherwood amassed "a good nucleus" of a collection of fishes commonly used as food and published a historical review of biological research on sequoia trees. He appeared set for a fruitful career as a research scientist. However, as described in the 1903 report, requests had come from teachers in "all parts of the city" for materials to help them teach nature study—a new curriculum designed to give students direct experiences with the natural world.[2] Sherwood responded by creating several collections of specimens and "careful outlines of hints" that he loaned to teachers free of charge for use in their nature-study classrooms.[3] These collections were the first step toward a dedicated department for educational programs, which was the beginning of the next stage in the development of the museum's pedagogical authority.

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1. American Museum of Natural History, *Annual Report, 1903* (New York: American Museum of Natural History, 1904), 26–7.

2 For more on the nature study movement, see Sally Gregory Kohlstedt, *Teaching Children Science: Hands-on Nature Study in North America, 1890–1930* (Chicago: University of Chicago Press, 2010).

3. American Museum of Natural History, *Annual Report, 1903*, 26–7.

Sherwood's colleagues in the Department of Invertebrate Zoology clearly understood that the school loan program had great potential, as did other museum scientists and classroom teachers. At Sherwood's invitation, scientists in several other departments created their own collections. Staff from the Department of Entomology prepared thirty-five cases of insects; Mineralogy and Conchology made twenty-five sets of mollusk-shells and twenty sets of minerals; Mammalogy and Ornithology created twenty collections; and Archaeology and Ethnology delivered five sets of "implements."[4] Sherwood added the new collections to the eighty sets of invertebrates he had created from his own department. This made a total of 175 collections available to schools in fall 1903, which were viewed by more than 250,000 students that school year. Interest grew rapidly. By 1905, the museum's staff had created 400 collections that were used by 375,000 students; that number increased to 800,000 students in 1906.[5]

Figure 3. Circulating Nature Study Collections, Department of Public Education Exhibition, 1918
AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/56155

4. Ibid.

5. American Museum of Natural History, *Annual Report, 1905* (New York: American Museum of Natural History: 1906), 24; American Museum of Natural History, *Annual Report, 1906* (New York: American Museum of Natural History: 1907), 15.

Based on the dramatic growth of the loan program, the museum's leadership created a new Department of Public Education in 1906 and named Sherwood the curator. This chapter chronicles the development of this department from 1903 to 1920, during which time Sherwood and the museum's scientists used their content expertise and research collections to create programs that met the needs of New York City teachers. Driven by the city's continued investment in maintaining and growing the museum, Sherwood designed the department's collection loans to align with school syllabi and made concerted efforts to solicit feedback from teachers. His insistence on prioritizing the interests of teachers was key to the program's success. Ultimately, Sherwood decided to hire a former teacher—botanist G. Clyde Fisher—to oversee the school programs and ensure that loans were useful to classroom educators. In building his department around teachers' preferences and requirements, Sherwood cultivated an environment where pedagogy was central to the resources his staff developed for schools. They also created practices that future educators amplified in ways that were crucial to the perception of the museum as a site of unique pedagogical expertise. During these years, Sherwood built the scaffolding that would support one of the most influential groups of museum educators of their time, and their expertise would be deployed in both the routine tasks of serving teachers in the public schools as in the unexpected events that arose with the onset of World War I.

Motivations and Methods for Supporting Schools

The museum's Department of Public Education benefited greatly from two museum administrators who supported Sherwood and contributed to the school programs: Director Hermon C. Bumpus and President of the Board of Trustees, Henry F. Osborn. Bumpus, a Maine

native who attended Brown University before earning his Ph.D. in 1889 at Clark University, was an influential administrator in several important scientific institutions.[6] He taught biology at Brown while also working at the Marine Biological Laboratory at Woods Hole, Massachusetts. After serving as scientific director at the United States Fish Commission, he joined the American Museum of Natural History and was its first leader to officially hold the title of director. It was Bumpus who approved Sherwood's proposed school loan program. He even helped secure artifacts from outside sources once the museum's staff had exhausted the internal supply of expendable specimens.[7] Bumpus also assisted Sherwood with managing logistics for the fast-growing school loan program and a teacher-requested lecture series for students that Sherwood started in 1904. Bumpus left the museum in 1908 to work in college administration. His early support for Sherwood's school programs was an important step for their long-term success.

Henry F. Osborn, who became president of the museum's Board of Trustees in 1908, was a staunch advocate of Sherwood's school programs and the museum's educational mission, but he remains a complicated figure in the museum's history. Osborn was born in 1857 in Connecticut, the son of railroad tycoon William Osborn. Henry Osborn studied collegiately at Princeton University, where he earned bachelor's degrees in archeology and geology, and a doctorate in paleontology. Osborn taught biology at Princeton for several years before moving to New York in 1890 to accept concurrent positions at Columbia University and at the museum. Osborn was curator of the museum's new Department of Vertebrate Paleontology, though he was more successful as an administrator than as a scientist.[8] In 1908, Osborn used his wealth and

6. A. D. Mead, "Hermon Carey Bumpus: May 5, 1862–June 21, 1943," *Science* 99, no. 2559 (1944): 28–30.

7. American Museum of Natural History, *Annual Report, 1906* (New York: American Museum of Natural History, 1907), 23.

8. Ronald Rainger, *An Agenda for Antiquity: Henry Fairfield Osborn & Vertebrate Paleontology at the American Museum of Natural History, 1890–1935* (Tuscaloosa: University of Alabama Press, 1991).

family connections—particularly his personal relationships with banker J. P. Morgan's family—to become president of the museum's board of trustees. Osborn wrote often about the museum's educational philosophies and initiatives and, when needed, communicated directly with the city's decision makers on the education department's behalf. He also pushed aggressively for exhibits on prehistoric humans based on racist theories that were rejected by more respected scientists, including several in the museum.[9] Still, Osborn's efforts on behalf of Sherwood and the museum's education department keyed decades of growth and meaningful work with the city's schools.

Bumpus and Osborn supported Sherwood's school loan program, in part, because they each viewed educational service as an institutional duty given New York City's investments in the museum. The museum's trustees agreed with this assessment and fully financed the loan programs by paying out between $10,000 and $15,000 annually.[10] It is notable that the original influx of teacher requests that led to the loan program came in 1902, the same year that the City of New York gave the museum $200,000 in building appropriations in addition to city's yearly maintenance payment of $160,000.[11] By comparison, the total museum income from member fees, the trustees, and the endowment for 1902 was just over $140,000. The following year, the city gave the museum $348,000, which included both annual maintenance and another special building appropriation. This dwarfed the museum's income of just over $95,000.[12] In this

9. Victoria E. M. Cain, "'The Direct Medium of the Vision': Visual Education, Virtual Witnessing and the Prehistoric Past at the American Museum of Natural History, 1890–1923," *Journal of Visual Culture* 9, no. 3 (December 1, 2010): 292.

10. Henry Fairfield Osborn and George Herbert Sherwood, *The Museum and Nature Study in the Public Schools* (New York: American Museum of Natural History, 1913), 4.

11. American Museum of Natural History, *Annual Report, 1912* (New York: American Museum of Natural History: 1913), 23.

12. Ibid.

context, it is easy to understand why the museum's leadership was eager to prove that the museum was worthy of the city's financial outlay and why the trustees willingly paid for the school loan program.

Sherwood, Bumpus, and Osborn, however, all saw the loan program as more than a quid pro quo to the City of New York. For them, it was a realization of the museum's founding purpose. In recounting the decision to institute the loan program, Sherwood recalled, "The Director of the Museum [Bumpus] realized that there was an opportunity for the Museum to greatly extend its sphere of usefulness," and he saw the loans as a way to "carry out the idea of the Founders."[13] Osborn, meanwhile, argued that the city's contributions necessarily made education the museum's central goal and the product of all of its staff's work—including that of the scientists. As he explained in 1911:

> In so far as we draw on public funds, public education is our chief and final purpose; toward this all our plans tend; for this the City erects the great building and gives the larger part of the maintenance; for this the Trustees and other friends give their time and means; for this members of the Scientific Staff are exploring all parts of the world, collecting and arranging objects of natural history, constantly inventing new methods to attract and to impress visitors, young and old.[14]

With backing from the museum's trustees, Bumpus and Osborn, Sherwood focused on creating loan collections by using the New York City Board of Education's nature-study syllabus as a guide. Writing in 1911, Sherwood explained that the purpose of the collections was to give teachers objects and information "needed to present properly the subject of nature-study."[15]

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13. George H. Sherwood, *Free Education by the American Museum of Natural History in Public Schools and Colleges; History and Status in 1917* (New York, 1918), 9; Sherwood, "Teacher's Day: Quotation from the Talk of George H. Sherwood," *American Museum Journal* 10, no. 8 (December 1910): 258.

14. Henry F. Osborn, "The Museum of the Future," *The American Museum Journal* 11, no. 7 (November 1911): 223.

15. George H. Sherwood, "Cooperation with the Public Schools," *American Museum Journal* 11, no. 7 (1911): 243.

Whenever possible, the museum's staff included specimens of the species mentioned by name in the course syllabus.[16] The museum's education programs were so closely aligned with the nature-study curriculum that Sherwood and Osborn wrote to oppose a 1913 proposal to remove the subject as a separate course.[17] Osborn argued that "it is absolutely essential that nature study should be objective and not from books—in fact, this is the distinctive value of nature-study" and that the museum's collections "carry as many objects as possible to the schools."[18] Sherwood, meanwhile, spoke at a public hearing of the board of education's Committee on Studies and Textbooks. He claimed that nature study helped children develop sympathy for all living things and that "there is no subject so well suited to training the powers of accurate observation."[19] Sherwood often wrote about how central the 1902 nature-study curriculum was to his establishment of the museum's loans, and it was difficult to imagine the program without the structure that the course provided.

A closer look at a single collection shows the results of the department's efforts to balance curricular alignment, ease of use for teachers, and student interest. An updated version of the museum's insect collection was introduced in 1905 with fifty duplicate sets ready for distribution.[20] Each set contained four 9 x 7 removable trays that could be passed around the class.[21] The first tray featured the life history of the Cecropia moth. Actual specimens of

16. George Herbert Sherwood, *The Public Schools and the American Museum of Natural History: History and Present Status of Museum Instruction and the Proposed Extension to the Schools of Greater New York in the Years 1914 and 1915* (New York: American Museum of Natural History, 1914), 7-8.

17. Osborn and Sherwood, *Museum and Nature Study*.

18. Ibid., 3.

19. Ibid., 4.

20. "Circulating Insect Collections," *American Museum Journal* 5, no. 4 (1905): 148.

21. Ibid. Sherwood argued often for the importance of being able to remove specimens from the collections so students could examine them closely. He even suggested that the learning gains from direct experience more than

Cecropia eggs, chrysalis, cocoons, and adult stages were affixed to a life-size photo of a caterpillar (the one life stage that the staff was unable to preserve for accurate representation). The second tray was similarly designed using the Monarch butterfly for comparison. The third tray featured a startling array of honey bee specimens, including a "queen, drone, worker, larva, pupa, drone cells, section of drone cells, worker cells, section of worker cells, queen cells, wax, propolis, artificial foundation, honeycomb ready to receive the honey, cells filled with honey and a vial of pure honey."[22] The fourth tray was devoted to domestic insects, with fourteen species of common household pests including the housefly, roach, and, mosquito. The teacher notes included information on the habits and economic importance of each insect, along with extermination methods for the pests. Clearly scientific experts were needed to build such a rich assembly of information and artifacts, but the content and construction of the cases were based on what was useful for teachers.

Educators' Views on the Museum Loan Program

When creating the collections, Sherwood and his department's staff depended heavily on feedback from teachers. Sherwood would often cite the regular interactions with teachers as one of the primary benefits of loaning the collections to schools rather than simply donating the artifacts. Sherwood surveyed teachers who'd borrowed collections to clarify how the artifacts were being used and to get ideas for additions or improvements. The replies showed overwhelming approval of the loans. In 1903, the majority of the teachers borrowed only a few

made up for the wear and tear of the artifacts, except for the rarest objects included. See George Sherwood H., "Free Nature Education: The School Service of the American Museum of Natural History, New York," *Visual Education* 3, no. 2 (1922): 118.

22. "Circulating Insect Collections," 148.

collections, with birds and insects being most popular.[23] They described using the artifacts and the included manuscripts to lead nature-study discussions, while children handled and investigated the specimens personally. In addition, students had been using the collections as models and prompts for drawing, language, conversation, and reading lessons. Sherwood and his staff created subsequent collections with these extended uses in mind, particularly with specimens mounted on stands that teachers could position for a whole class to observe at one time.[24]

Sherwood's reliance on, and deference to, the views of teachers were clear in the Teachers' Day programs offered from 1910 to 1913, which were designed to promote the museum's school programs. According to Osborn, he and Sherwood created Teachers' Day "to give teachers an opportunity to see what the Museum is prepared to do for them" through lectures, tours of the exhibit halls and laboratories, and demonstrations.[25] Sherwood spoke at the first Teachers' Day, and when he described the still-growing loan program, he acknowledged to the teachers that, "you are better able than I to judge of the practical use of these collections."[26] For the 1911 Teachers' Day, Sherwood assembled a committee of teachers whom he relied on for "valuable suggestions and advice." Sherwood's reflection on the fourth and final Teachers' Day hinted at the outcome he prioritized: "This meeting afforded an excellent opportunity for getting acquainted with the teachers and for finding out their needs; and on the other hand, the

23. American Museum of Natural History, *Annual Report, 1905*, 23.

24. Teacher Letters to George Sherwood, 1905, American Museum of Natural History, Departmental Records, Miscellaneous Correspondence and Materials Department of Public Instruction, 1903-1908, 047, American Museum of Natural History Library.

25. Henry Osborn to Principals of Public Schools, 1910, American Museum of Natural History, Departmental Records, Department of Public Instruction, 055, American Museum of Natural History Library.

26. Sherwood "Teacher's Day," 258.

teachers became more familiar with what we are attempting to do for the schools."[27] While Osborn had conceived of Teachers' Day as a marketing opportunity, he shared Sherwood's view on the importance of remaining connected to teachers. "We want the teachers of New York, he explained, "to feel that this Museum is part of their educational plant, we want their cooperation, their suggestions, and their frequent presence."[28]

New York City academics and school administrators took notice of the department's programs for teachers, and several offered praise and thoughts on possibilities for growth in the November 1911 issue of the *American Museum Journal*. William H. Maxwell, superintendent of the New York City Public Schools, wrote that the museum was helping teachers with several instructional challenges, particularly that of educating the roughly 33,000 students entering the schools each year unable to speak English.[29] Teachers used the museum's collections and lectures, Maxwell argued, to help those students learn English, grade-specific knowledge, and sanitary living. Looking forward, Maxwell pronounced, "it will be increasingly the pleasure of the teachers to use the power the Museum puts into their hands."[30] Dr. Maurice Bigelow, professor of biology at Columbia University's Teachers College and one of the nation's greatest proponents of nature study, wrote about the museum's educational value.[31] Bigelow contended that the museum staff's ability to balance scientific research with effectively "diffusing" that

27. American Museum of Natural History, *Annual Report, 1914* (New York: American Museum of Natural History: 1915), 44.

28. Osborn, "Museums for the Future," 225.

29. William H. Maxwell, "Cooperation in Education," *The American Museum Journal* 11, no. 7 (November 1911): 219.

30. Ibid.

31. Maurice A. Bigelow, "Educational Value of the American Museum," *The American Museum Journal* 11, no. 7 (November 1911): 234–35. For more on Bigelow's importance to the nature-study movement, see Kohlstedt, *Teaching Children Science*.

knowledge to citizens was exemplary.[32] Bigelow recognized that prioritizing education represented a major shift for most museums and noted that the American Museum of Natural History's school programs "would have been considered by an old-time curator as an unpardonable digression from the proper work of a museum."[33] But, Bigelow argued, with new buildings and an improving public transit system, "the educational greatness of the Museum has only begun."[34]

The November 1911 issue of the *American Museum Journal* also featured reflections from New York City high school biology teachers who had been using the museum's resources with their classes. George W. Hunter, a teacher in New York's DeWitt Clinton High School and one of key figures in the development of high school biology, lauded the museum's work with schools.[35] Hunter reported that he and his peers frequently used the museum collections dealing with health and economic welfare in their biology courses. Hunter then looked ahead to the museum's anticipated new department of hygiene, noting the value of a previous Sewerage Commission Exhibit, and concluding, "this kind of cooperation counts much for the making of citizens."[36] Lillian Belle Sage, a biology teacher at Washington Irving High School, praised the museum collection featuring "life histories, economic value and relationship of insects," which she said, "could not be improved for the purpose of supplementing our teaching."[37] Lastly, James

32. Ibid., 234.

33. Ibid., 235.

34. Ibid.

35. George W. Hunter, "Museum and High School United for Health and Economic Welfare," *The American Museum Journal* 11, no. 7 (November 1911): 236. For more on Hunter and high school biology, see Philip J. Pauly, "The Development of High School Biology: New York City, 1900–1925," *Isis* 82, no. 4 (1991): 662–88.

36. Ibid.

37. Lillian Belle Sage, "The Museum Increasingly Helpful for Ten Years," *The American Museum Journal* 11, no. 7 (November 1911): 239.

L. Peabody, who taught biology at Morris High School, explained that class trips to the museum would lead to two or three days "devoted to a discussion of the lecture and the observations made of the animal groups."[38] Even though museum staff and their partners wrote most often about nature study, these teachers showed that the department had a broader impact in schools.

By valuing the needs and perspectives of teachers so highly, Sherwood created a department whose programs were built on pedagogy instead of science. At virtually every stage in the development of school loan program, Sherwood made choices based on how teachers used the resources with students. As a result, the collections were designed to fit neatly into nature-study instruction, while still being adaptable to alternate outcomes like language development and art projects. Sherwood's pursuit of teacher feedback was a tacit recognition that how teachers used the collections would be different with specific groups of students, in individual classrooms, across schools, grade levels, and over time. Rather than relying on communications with principals or school administrators, Sherwood sought guidance from the teachers navigating these unpredictable contexts so that he could update and add to the loans when appropriate. As a result, the museum's loan collections were designed around instruction as much as information.

The Museum's First Professional Educator

Sherwood's approach to designing the loans proved so successful that by 1913 he was struggling to manage the increasingly popular school programs. Between 1904 and 1912, the number of students using the loan collections increased fivefold, from 250,000 to 1,257,890. The department's staff constantly created new collections to meet teacher requests. In 1904 the department rotated 120 cases between 115 schools. By 1912 they were circulating 537

38. James L. Peabody, "How One Crowded High School Uses the Museum," *The American Museum Journal* 11, no. 7 (November 1911): 240–41.

collections among 491 schools. In addition, staff in the museum's new Department of Public Health prepared albums of photos on the spread and control of communicable diseases and vials with different developmental stages of flies and mosquitos for the loan program.[39] Scientists in the Department of Public Health's Museum of Bacteria began distributing samples of non-pathogenic strains to high school teachers 1912.[40] The constantly expanding loan program was only part of Sherwood's growing duties. In 1913, the trustees asked Sherwood, who had been the museum's assistant secretary for several years, to serve as acting director. It proved to be a tipping point for Sherwood's already exhaustive workload.

Sherwood decided that the time had come to hire an assistant curator for the museum's education department and, in keeping with his reliance on teacher input, he wanted someone with experience as a classroom educator to take on the role. In 1913 Sherwood hired George Clyde Fisher—a botanist and trained teacher who'd worked in schools for years—to take control of the museum's school programs. In terms of measurable impact on the programs' success, Fisher's ten years with the education department were relatively uneventful. Fisher's impressive legacy at the museum is largely based on his efforts to establish the museum's astronomy program. Still, Fisher's background as an educator was subtly transformative. He was the first trained teacher hired to take a leadership position at the museum and was far from the last. In that regard, Fisher's presence reflected that Sherwood, Osborn, and the museum's trustees had come to view educational programs as one of the museum's basic functions.

During the hiring process for the education department's assistant curator, Sherwood was clear about his preference for applicants that were proficient in both science and education. In

39. American Museum of Natural History, *Annual Report, 1911* (New York: American Museum of Natural History: 1912), 64; American Museum of Natural History, *Annual Report, 1912*, 75.

40. American Museum of Natural History, *Annual Report, 1912*, 75.

November 1912, Sherwood wrote to Duncan Johnson, professor of biology at Johns Hopkins University, to ask about three students that had been recommended to the museum.[41] Sherwood conveyed that the ideal candidate would have "broad general biology training," and "should have had experience as a teacher and should have the ability to meet teachers and to advise them in their nature-study work." Johnson recommended Fisher, who he described as having a "fine general knowledge of outdoor nature," and who had "shown himself capable of interesting teachers."[42] After conducting interviews, Sherwood wrote to the museum's director, Frederic Lucas, to request approval to offer Fisher the position. In the letter, Sherwood noted that Fisher "has a good voice; a pleasing personality; and personal magnetism, which combine to make him a successful teacher. In Mr. Fisher, I believe we have discovered a man who is especially well fitted for the position."[43]

Clyde Fisher (he preferred to be called by his middle name) was indeed uniquely qualified to lead the museum's school programs given his extensive background in both teaching and research. Fisher was born in 1878 in Sidney, Ohio, roughly thirty-five miles north of Dayton. As a child, Fisher showed great interest in science, particularly astronomy, which he studied with two of his uncles.[44] At the age of sixteen, Fisher started his career as a teacher in country schools near his hometown and started taking classes at Ohio Northern University's normal school soon after. In 1902, Fisher earned a Common School Life Certificate for teaching and then decided to

41. Sherwood to Johnson, November 5, 1912, George Clyde Fisher Collection, Central Archives, Box 240, American Museum of Natural History Library.

42. Johnson to Sherwood, November 11, 1912, George Clyde Fisher Collection, Central Archives, Box 240, American Museum of Natural History Library.

43. Sherwood to Lucas, January 7, 1913, George Clyde Fisher Collection, Central Archives, Box 240, American Museum of Natural History Library.

44. G. Clyde Fisher, "Biographical Sketch of G. Clyde Fisher," December 27, 1912, George Clyde Fisher Collection, Central Archives, American Museum of Natural History Library.

pursue a bachelor's degree at Miami University in Ohio. Fisher took several biology courses and did a Senior Honors project in Geology. After graduating Fisher taught high school science in Troy, Ohio, and then moved to Florida to teach science at the newly established Palmer College. Fisher then went to Johns Hopkins University to pursue a Ph.D. in botany, which he completed in 1913. He also spent four summers studying and researching at the Marine Biological Laboratory in Cold Spring Harbor, Long Island, where he cultivated an interest in birding. Fisher had been trained in several of the subjects featured in the museum's collections and was a veteran educator who could communicate with the teachers using museum resources into their classrooms.

Once Fisher was hired and started managing the school loans and student lectures, Sherwood shifted his attention to expanding the museum's educational programs.[45] In 1914, Sherwood proposed an auspicious three-part plan that included "Local Lecture Centers" for students in schools that couldn't pay for trips to the museum; a series of "Branch Teaching Museums" that would allow teachers to borrow scientific specimens closer to their schools; and adding the museum's approximately 30,000 lantern slides into the loan program. All of the plans did not come to fruition, however. Sherwood was able to establish a few Lecture Centers but was unable to create the Branch Teaching Museums. The most significant outcome was that Sherwood secured funding from the New York City Board of Education to prepare catalogs of the museum's lantern slides and organize several lecture sets with manuscripts that teachers could use for classroom presentations.[46]

45. Sherwood to Frederic Lucas.

46. American Museum of Natural History, *Annual Report, 1915* (New York: American Museum of Natural History: 1916).

Figure 4. Teachers selecting lantern slides for use in schools, Slide Room, Department of Public Education, 1919
Julius Kirschner (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/22401

Sherwood also hired several other staff members with pedagogical training, though most were for administrative positions. The department's secretary, Helen M. Vreeland, joined the museum in 1912 after attending the New York State Normal School.[47] In 1914, Sherwood hired Clarissa A. Kelsey, a recent graduate from the Connecticut State Normal School as the department's photograph librarian.[48] Sherwood also hired Virginia McGivney, a Barnard graduate and former teacher, to be the department's new lantern slide librarian.[49] Like all members of the department, Vreeland, Kelsey, and McGivney were expected to be exhibit-floor educators—or docents—when needed, though that was secondary to their office jobs. Considering that Sherwood hired Clyde Fisher to manage the department's school programs, it

47. American Museum of Natural History, "The News." *Museologist* 1, no. 5 (November 1920): 12.

48. American Museum of Natural History, *Annual Report, 1914*, 53.

49. American Museum of Natural History, *Annual Report, 1917* (New York: American Museum of Natural History: 1918), 59.

appears that Sherwood wanted his staff members with educational training to use that experience to organize and administer the department with the needs of teachers in mind.

In 1914 Sherwood hired Ann E. Thomas, a recent graduate of Brown University, without a degree or experience in teaching, to take on most of the department's instructional work. When she was hired, Thomas was made lead educator for the museum's programs for blind visitors.[50] In 1916, Thomas read a paper, "The Museum as an Aid in the Teaching of Science," at the annual meeting of the Science Teachers Association. Thomas also wrote several exhibit guides specifically for teachers. [51] It remains unclear why Sherwood assigned Thomas so much of the department's work with teachers while staff members with pedagogical training did none. It is possible that Thomas had some prior training in education or worked with teachers in some capacity before coming to the museum, but there is no evidence of either. In the decades that followed, however, trained educators would take on more prominent roles in the museum's support programs for teachers.

Even though Sherwood added more education staff and programs in the early 1910s, circulation for the museum's loan programs dropped for several years. The decrease in school use of museum resources elicited only sporadic concern from the museum's leaders, however. For example, the annual report for 1915—one of the years that saw a slight decline in the number of collections used by schools—contended that the education department's "progress" was a "tribute" to Fisher's "efficiency."[52] Still, some difficult years warranted comment from the department's leadership. In 1916, for example, Sherwood attributed the dropping numbers to the

50. American Museum of Natural History, *Annual Report, 1914*, 52.

51. American Museum of Natural History, *Annual Report, 1916* (New York: American Museum of Natural History: 1917), 35.

52. American Museum of Natural History, *Annual Report, 1915*, 53.

"indefinite" status of nature study in schools, which left the decision to borrow museum materials to individual teachers as opposed to the school-wide initiatives of the previous decade.[53] That same year, a citywide polio outbreak among infants led the board of education to delay the school year, without which, Sherwood argued, "undoubtedly the number of pupils reached would have been greater."[54]

The years of slow decline in school loans coincided with a period when the museum's staff had fewer ways to reach and interact with teachers or help them use the new lantern slides. First, the museum and the board of education didn't have any formal partnerships in the early 1910s, so the board had no internal motivation to promote the museum's programs. Also, the museum's staff was no longer hosting the Teachers' Day programs that brought educators into the museum to learn about the programs and share their needs and preferences.[55] As a result, the only regular interactions the education department's staff had with teachers were through the programs themselves. Sherwood often suggested that the loans provided great opportunities to connect with teachers, but the circulation drops suggest that the programs themselves weren't sufficient to maintain teacher participation. Also, when the board of education decided to subsidize the museum's lantern slide loan program in 1914, most schools didn't have the facilities or projectors needed to use the slides. As a result, the new partnership put resources into an initiative that, in the short term, had limited circulation potential. In sum, the museum's education department was struggling to find the right combination of staff, programs, and

53. American Museum of Natural History, *Annual Report, 1916*, 53.

54. Ibid.

55. The museum's department of education did host several programs during a 1916 Teachers' Institute organized by the city's board of education after the school year was delayed due to a polio outbreak. Sherwood observed that "the Teachers' Institute gave the department an excellent opportunity to come into closer contact with the teachers of the public schools." See American Museum of Natural History, *Annual Report, 1916*, 50.

partnerships to encourage teachers to use more of the museum's instructional materials in classrooms.

By 1917, there was noticeable growth in the lantern slide program, though that success was interrupted in short order. Based purely on the number of students visiting the museum, using the collection loans, and attending lectures, 1917 appeared to be a standard school year.[56] It was anything but. That year America entered into the Great War raging in Europe and the museum's education staff began working with the War Council of the YMCA to develop programs specifically for military audiences. In doing so, the museum's educators illustrated that their programs could be used to help address urgent issues during times of national need.

Entertainments and Distractions for the War

The contributions that the education department's staff made to the War Council of the YMCA featured many of the approaches they used in their school programming, although the goal was to entertain rather than educate the soldiers. As stated in the museum's 1917 annual report "appeals for help in the way of entertainment for soldiers have come to the Museum from the War Council of the YMCA."[57] The department staff created several methods for meeting the request. First, they sent over 4,000 sorted lantern slides that the War Council could use for lectures. Second, department staff prepared a special set of lectures, "Exploration Tales for Soldiers and Sailors," based on stories from museum expeditions because explorers and "good fighting men" were thought to possess similar personal qualities.[58] The explorers dictated the

56. American Museum of Natural History, *Annual Report, 1917*, 59.

57. Ibid., 52–53.

58. Ibid.

lecture text themselves for talks like "Camera Hunting for Whales" by the museum's Associate Curator of Mammalogy, Roy Chapman Andrews. The museum's staff hoped that the lectures would "entertain, amuse and rest the boys in training and those at the front."[59] Third, the department donated motion pictures to the YMCA, including two reels on the museum's Asiatic Zoological and Arctic expeditions. Lastly, based on a special request from the Ladies' Social Welfare Committee of the Y.M.C.A, department staff created special guidebooks for sailors visiting the museum while on shore leave from naval vessels near New York.

In 1918, the museum's Department of Public Education continued the same programs for soldiers, but the school programs suffered from the weight of the war effort. Virtually every member of the education department contributed to the YMCA War Council programs, including department curators Sherwood and Fisher. The department's staff helped write, type, and distribute manuscripts for YMCA lectures and tour guides, and collected slides that were loaned to the War Council.[60] The staff's war-related work was cited as a major reason why the school programs experienced significant drops from the previous year. Attendance for museum-based lectures dropped by more than 60 percent and the number of collection loans fell by more than 25 percent, as schools and the museum struggled with a cold winter, a major flu epidemic, and delivery messengers that were often unavailable due to unspecified war-related duties.

When teachers did use the museum's loan program during the war, they increasingly requested collections connected to the conflict. The education department reported that war-related information was so popular among teachers in 1918 that "it has been difficult to take up

59. Ibid.

60. American Museum of Natural History, *Annual Report, 1918* (New York: American Museum of Natural History: 1919), 55.

subjects not directly connected with it."[61] For example, the lantern slide loans reached a larger audience that year because of new lecture sets such as "Implements of Modern Warfare" and "Our National Heroes."[62] The Annual Report attributed the success of the war-related slide sets to slide librarian and former teacher Virginia McGivney's "intelligent appreciation of the needs of teachers."[63]

After a brief break in school programs in early 1919 due to a temporary suspension of city funds, the education department's circulation numbers rebounded. The City of New York reduced its annual allotment of maintenance funds to the museum for 1919 and the museum's trustees agreed to sustain a limited course of school programs. Meanwhile, museum president Henry Osborn appealed to the board of education to resume support. The board agreed to a reduced annual payment that allowed the museum's educational staff to continue a reduced circulation of loans and a smaller course of museum-based lectures.[64] Even though the resources were available for a shorter time, teachers used the traveling collections with 14 percent more students than in 1918, and 40 percent more students attended museum lectures.[65] The department's staff introduced six new slide sets in 1919, though none had war-related themes, and there were no contributions made to the YMCA's War Council. During World War I, the museum's staff demonstrated they could use their programs to simultaneously entertain soldiers

61. Ibid., 47.

62. Ibid., 50.

63. Ibid., 51.

64. American Museum of Natural History, *Annual Report, 1919* (New York: American Museum of Natural History: 1920), 56.

65. Ibid., 46.

and educate school audiences. It was an unprecedented display the museum staff's ability to adapt their methods for a range of audiences and outcomes.

An unexpected benefit of the education department staff's wartime programs was that they demonstrated new ways to contribute to society just as the museum's leadership was calling for more financial support. The museum celebrated its fiftieth anniversary in 1919 and Osborn used the milestone to petition the city for resources to expand the museum.[66] The department of education's school programs were central to Osborn's case. He reported that the department had reached 5,650,595 children "directly and indirectly" through lectures and traveling museum collections over the previous five years.[67] In addition, Osborn argued that the $1.5 million dollars invested in scientific expeditions produced value for schools through the museum's educational programs.[68] Osborn then proposed that the museum and its education department still had untapped potential:

> During the coming fifty years we hope to continue this kind of education and to do it still more widely and effectively. In view of its future great possibilities we regard nature-education as still in its infancy. We have new ideas and plans for his larger work, we have the intelligence and the sense of public responsibility, but to go ahead we must have more space and more means.[69]

Soon after, New York City's governing body approved Osborn's request, which the museum's staff used to usher in a new era of school programs.

When George Sherwood fielded the first requests from nature-study teachers seeking artifacts in 1902, he did so as a young scientist working in a museum with no department of education. Seventeen years later, Sherwood presided over a department with a staff of educators

66. Ibid., 24.

67. Ibid., 22.

68. Ibid.

69. Ibid., 17.

that reached more than a million students that year. Sherwood was key to the department's rapid and impressive growth, but he was far from alone. First, Sherwood and the museum enjoyed financial support from the City of New York which freed the museum's trustees to fund programs for schools. The city's investment in the museum proved to be powerful motivation for Sherwood and his superiors to find ways to demonstrate their value to the citizens of New York. The new nature-study curriculum presented the museum's leaders with a way to use the information and objects that had been culled from years of research for the benefit of teachers and students.

The lynchpin to Sherwood's ability to build a large and successful education department and the museum's pedagogical authority, was his choice to follow teachers' lead in designing the museum's programs for schools. Sherwood was well aware of his limitations as a scientist and rather than creating programs based on his own perspective on classroom education, he leaned on the structure of the nature-study curriculum and the practical expertise of teachers. As a result, Sherwood created loan collections that met teachers' content needs, were easy to use, and easily accessible. The museum's loan collections were pedagogically sound resources for teachers because they were created based on feedback from teachers. Sherwood then hired professional educators like Clyde Fisher to provide pedagogically informed guidance from within the museum. In sum, Sherwood didn't use science to support teachers; he became a conduit to let teachers create the supports they needed. Between 1903 and 1919, Sherwood built a small loan program into a department that was the face of the museum's value to the City of New York and beyond. Perhaps, then, the Department of Invertebrate Zoology's pronouncement in 1903 that Sherwood's loan program was the most important development of the year was actually an understatement.

Chapter 4

Visual Instruction and the Pedagogies of Museum Teaching, 1920–1939

April 21, 1922 was one of the most important days in the development of pedagogical authority at the American Museum of Natural History. On that day, New York City's Board of Estimate and Apportionment—the governmental body that determined, among many things, the city budget and land use—unanimously approved $570,000 for the museum's new School Service Building.[1] The building was, as the name implied, designed to be a hub for all of the museum's school programs. The five-story School Service Building was to be equipped with new classrooms, an exhibit space, a lecture hall, special facilities for teachers to browse and select teaching resources and an area for the management and distributions of the various loan programs. "By this action the City authorities have expressed their appreciation of the service the Museum is rendering to the public schools," read the museum's 1922 Annual Report, "and their belief in the Museum's future usefulness."[2] The School Service Building represented new opportunities for the Department of Public Education's staff. The Annual Report bemoaned that the department had been dealing with "inadequate quarters and has been housed chiefly in corridors" without sufficient space or facilities to properly accommodate groups of students or teachers.[3] "The School Service Building will remedy these defects," the report continued, "and make possible the development of more effective instructional methods."[4]

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1. American Museum of Natural History, *Annual Report, 1922* (New York: American Museum of Natural History: 1923), 39.

2. Ibid.

3. Ibid.

4. Ibid.

New York City leaders' decision to approve funding for a new museum building designated for school programs was a pivotal moment—the culmination of four decades of educational partnerships and the beginning of a new phase of instructional innovation. This chapter describes the period, from 1920 to 1939, during which the department's staff codified the instructional methods that continue to define the museum's pedagogy to this day. The first step in this process was the staff's decision to reframe all of their programs under the rubric of "visual instruction" or "visual education"—the wide-ranging instructional philosophy based on the assumption that disciplined viewing of objects and images brought about the most efficient learning. The museum's educators adopted visual instruction as its organizing philosophy around 1920, just as the New York City Board of Education created its own department of visual instruction. This strategic collaboration gave museum educators a pedagogical and administrative pathway to promote all of the department's programs to all of the city's schools.

The education department staff used the new School Services Building as a catalyst to create new methods for using museum resources that they shared with classroom teachers. George Sherwood, head of the museum's education department, created what he called "intensive instruction"—immersive, small group learning experiences with artifacts in exhibit halls or the new building's well-appointed teaching spaces. Sherwood used intensive instruction to boost object-based visual instruction methods and as a response to teachers' growing reliance on lantern slide lectures and motion picture loans to teach large groups in overcrowded schools. Grace Fisher Ramsey, a former teacher and one of the department's most productive staff members, applied intensive instruction techniques in a new series of courses for pre- and in-service teachers. Ramsey used those courses and several others built around visual instruction to demonstrate that museum-based teaching methods could be used to train pre-service teachers and

improve the performance of in-service teachers. In doing so, Ramsey and the education department presented the museum's teaching strategies as best-methods for science instruction writ large. New York City's Board of Education and several regional college leaders agreed with Ramsey's assessment and offered credits to teachers who participated in the museum's courses. In doing so, New York City's educational leaders affirmed the museum staff's growing instructional expertise.

Visual Instruction in the Museum and Public Schools

The museum's education department staff described 1920 as one of the greatest years in its history, and much of the credit for that year went to a new office in the New York public schools that promoted visual instruction.[5] Teachers and students made greater use of all of the museum's educational programs in 1920, though the lantern slide loans saw the greatest jump. When compared to 1919, there were 87 percent more lantern slide loans to teachers in 1920 that went to 67 percent more schools.[6] The museum's staff attributed the increases to Ernest Crandall, New York City's new director of Lectures and Visual Instruction and head of the Board of Education's new Bureau of Visual Instruction. Crandall and the bureau's head of distribution, Rita Hochheimer, worked to install slide projectors in schools, which added to the number of teachers that could borrow the museum's slides. The museum's staff also acknowledged Crandall and Hochheimer's success in convincing teachers of "the real value of these methods of visual instruction."[7] Within the museum, slide librarian Grace Fisher added to the success of the

5. American Museum of Natural History, *Annual Report, 1920* (New York: American Museum of Natural History: 1921), 55.

6. Ibid.

7. Ibid., 56.

loans by preparing a new catalog and manuscripts that made it easier for teachers to borrow and use the slides.[8] The success of 1920 was the product of a concerted and coordinated effort.

The board of education's Bureau of Visual Instruction not only helped the museum reach more students, but it also provided an instructional framework that encompassed all of the museum's education programs. Broadly stated, visual instruction involved using objects and/or images to teach students and educators how to see and think. Crandall defined visual instruction as education "enriched at all points by the conscious dominance of visual appeal," adding that any medium could be included as long as it was "administered by a teacher who is genuinely aware of the value and importance of training the mind through the eye."[9] Crandall grouped "visual aids" into four classes, which he listed by order of use for both individual lessons and the developmental stage of students: 1) real objects, 2) loose pictures, 3) stereopticon views, and 4) motion pictures.[10] Teaching with "real objects" included nature hikes, museum trips, interacting with specimens like those in the loan collections, and experiments. The museum's lantern slides were becoming increasingly popular with teachers in 1920, thanks in part to Crandall's bureau. The only form of visual instruction the museum didn't offer at the time was film loans.

Motion pictures were one of the four major types of visual aids that Crandall saw as valuable for schools, and he worked with the museum's education department to build a film loan program. The museum first used films for educational programs in 1911 when lecturers played motion pictures taken on research expeditions during illustrated talks for students.[11]

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8. Ibid., 61.

9. Ernest L. Crandall, "'Thumb Nail Sketches' in Visual Instruction, No. 2 What Is Visual Instruction," *The Educational Screen* 2, no. 3 (March 1923): 119.

10. Ibid.

11. Grace Fisher Ramsey, "The Film Work of the American Museum of Natural History," *The Journal of Educational Sociology* 13, no. 5 (1940): 281.

Based in part on the museum's history of film-based instruction, in 1920 Crandall invited Clyde Fisher, associate curator of the museum's education department, to join a committee working to decide how teachers should use biology films in their classrooms.[12] Soon after, the museum's staff prioritized building a motion picture library. In 1922 they declared their intention to amass an "international depository for the very best nature films."[13] The announcement for the motion picture library coincided with the museum's first film loans to schools. For the first few years, the museum's staff noted that circulation was limited by the low number of schools with motion picture projectors. Crandall and his staff, meanwhile, were working to install movie projectors in schools and convincing teachers of the instructional value of films. The museum's staff continued to build their film library through purchases, donations, and recordings from scientific expeditions.[14] Of course, as the film library grew, so too did the need for space. It was a problem that New York City's Board of Estimate solved by funding the museum's School Service Building.

The School Service Building

The close collaboration between the museum's Department of Public Education and the city's Bureau of Visual Instruction developed just as the museum was pursuing public funds for a major expansion including a building for the school programs. The museum's president, Henry Osborn, introduced the idea for the School Service Building in 1920 as an addition to what had been a proposal for eight new museum "sections" or halls.[15] The eight original sections were

12. American Museum of Natural History, *Annual Report, 1922*, 47.

13. Ibid., 47.

14. Sherwood, "Story of the Museum's Service," 327—8.

15. American Museum of Natural History, *Annual Report, 1920*, 27.

planned for two new museum buildings that New York City's government approved in 1911, but were never completed due to funding shortfalls during World War I.[16] Osborn ranked the additions by order of importance, and he placed the School Service Building third, after Asiatic and Oceanic Halls, and ahead of two halls—a Memorial and African animal exhibit—dedicated to former president Theodore Roosevelt. Osborn seemed sure that the school building would be funded. In 1920, he reported that the initiative had "unanimous support" from the city's board of education.[17] "There is no doubt," Osborn pronounced, "that the Museum has never been so firmly established in the confidence and esteem of both the people and the government of the City of New York as at the present time."[18]

George Sherwood designed the School Service Building to help his staff deliver the department's established programs more efficiently and to stimulate ideas for new ways to support students and teachers.[19] On the first floor was Education Hall, which featured a 1,000-seat auditorium with stereopticon and movie projectors and a temporary exhibit space that was made available to the museum's partners. The second floor was the Reception Floor for welcoming visiting school groups, with several classrooms equipped with projectors, including an assembly room for up to 400 people. The second floor also featured a model nature room maintained by the School Nature League, an organization that worked with the education department to create spaces for plants and animals in schools throughout New York City.[20] The third floor held administrative offices and a college classroom, in addition to the Teachers'

16. Ibid., 19.

17. Ibid., 21

18. Ibid.

19. Ibid., 39–40.

20. Ibid.

Reference Library and Consulting Room. There were also light tables that teachers used to make selections from the lantern slide library, and an adjoining "sample projection room" where teachers could practice their slide-based lectures.[21] The fourth floor held the photographic studios and all image prints and negatives. Storage and distribution of the loan collections took place in the building's basement. Sherwood had considered the needs of each of the museum's programs, and created adaptable, resource-filled spaces that educators could use for inspirations and needs still to come.

Figure 5. Sorting boxes of lantern slides for delivery to public schools, 1926
Hugh S. Rice (photographer), AMNH Research Library | Digital Special Collections, accessed April 20, 2020, https://lbry-web-007.amnh.org/digital/items/show/22647

The School Service Building was completed in 1926, and the museum's staff immediately began using the facility to reach more students, accommodate more educators, and promote the programs and resources for teachers. In 1927, operating from the School Service

21. Sherwood, "Story of the Museum's Service," 336.

Building, the department of education's staff made roughly 9,900,000 contacts with school children—equivalent to each school-aged child in Greater New York City engaging some form of museum instruction nine times.[22] That same year, the museum hosted a conference for New York City museum educators in the School Service Building, and the attendees received a tour of the new facilities as an afternoon activity. In addition, the January and February 1927 meetings of the New York Association of Biology Teachers were held in the School Service Building's auditorium. Attendees viewed demonstrations of new "aids" for biology teachers, including small-insect habitat groups created by museum entomologist and outdoor education specialist Frank E. Lutz, and heard talks on hygiene and health. It was just the beginning.

The education department's staff also took advantage of the School Service Building's extended storage by accumulating films from a range of sources. For example, in 1927 the Canadian Government Motion Picture Bureau deposited ten reels of film and several lantern slide lecture sets that promoted Canada's "industries, agriculture, and scenic beauties."[23] That summer, museum trustee and chair of its Committee on Education, George D. Pratt, visited Sweden and Norway to take films and images for the school programs. Clyde Fisher took motion pictures of the Native people living on reservations in South Dakota; and Phillip Pratt, art teacher at the Pratt Institute, used funding from the American Export Steamship Corporation to visit and film France and several countries in the Mediterranean for the education department.[24] That same year, the education department also received four reels from the Consolidated Gas Company of New York covering the history, manufacture, and uses of gas, a film called *The Story of Copper*

22. American Museum of Natural History, *Annual Report, 1927* (New York: American Museum of Natural History: 1928), 91.

23. "Notes," *Natural History* 27, no. 2 (March–April 1927): 191.

24. "Notes," *Natural History* 27, no. 3 (May–June 1927): 296.

from the Kennecott Copper Corporation that showed methods of mining, milling, smelting, and refining the metal, and a three-reel film from the City of New York highlighting various municipal departments.[25] Using the space available in the School Service Building, the museum staff could take films from foreign, corporate, and civic entities hoping to get their messages into classrooms.

Figure 6. Inspecting film, Department of Education, Film Room, 1937
Bierwert, Thane L. (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/22517.

25. "Notes," *Natural History* 27, no. 4 (July–August 1927): 391.

Intensive Instruction —New Paradigms of Museum Pedagogy

As the museum's film and lantern slide loans reached more students, the education department's staff began navigating a growing tension between programs that offered personal interactions with objects and those used to efficiently teach large groups with images. In 1924, while the School Service Building was still under construction, Sherwood made an object-centered argument that the department's approach to education was derived from what he called "The Museum's Method: Exploration, Investigation, Publication, and Exhibition."[26] Sherwood then lamented that teachers were increasingly using the slide loans instead of the artifact collections even though visual instruction specialists had been arguing that objects were more valuable than images for student learning.[27] Still, according to the education department's staff, any shortcomings in the educational value of images were balanced by the fact that the slides—organized into themed sets with accompanying manuscripts—were easier for teachers to use.[28] Sherwood's argument resurfaced in the 1926 annual report which noted that "the most important aids in teaching are the real objects themselves" and that lantern slides were preferable only when school visits or loans were not feasible.[29] Fortunately, Sherwood and the education department were never forced to choose between the two approaches. The discussion, however, revealed Sherwood's interest in providing more immersive experiences for smaller groups of learners.

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26. American Museum of Natural History, *Annual Report, 1924* (New York: American Museum of Natural History:1925), 29.

27. Ibid., 133.

28. Ibid.

29. American Museum of Natural History, *Annual Report, 1926* (New York: American Museum of Natural History: 1927), 98–9.

In 1927, Sherwood presented intensive instruction as a new pedagogical paradigm to facilitate deeper engagement with the museum's artifacts. Intensive instruction was described as "a more thorough study of objective material," as opposed to "mass instruction" for large groups of students through lectures, slides, and films.[30] The education department staff first applied intensive instruction in what were called Exhibit Hall Talks for students. These talks started with students spending thirty minutes analyzing artifacts in a School Service Building classroom, before a museum instructor took the group to study related exhibits. "Thus a lesson in geography or history becomes a real thing," Sherwood declared, adding that "this type of instruction bids fair to become one of the permanent activities of the department."[31] Despite Sherwood's claims that the Exhibit Hall Talks were a novel creation couched in innovative teaching, they bore significant resemblance to the school tours developed by the museum's first instructor, Agnes Roesler, in 1908. [32] Roesler's tours similarly combined laboratory investigations of objects with related exhibit exploration—a method that had become a staple at the American Museum of Natural History and museums worldwide. Sherwood and Roesler were coworkers and collaborators, so there is reason to believe the Exhibit Hall Talks were at least inspired by Roesler's school tours.[33] Regardless, Sherwood argued assertively that such instruction held greater potential for student learning.

30. American Museum of Natural History, *Annual Report, 1927*, 93.

31. Ibid., 94.

32. Agnes Roesler, "The Work of an Instructor in the American Museum of Natural History (Read at the Ipswich Conference, 1908)," *The Museums Journal* 8, no. 9 (March 1909): 304–5.

33. Based on notes from Department of Public Education staff meetings, Sherwood and Roesler worked together in 1911 and 1912, during which time Roesler was in charge of both the Children's Room and special programs for blind visitors. See DR 055, American Museum of Natural History Department of Public Instruction outreach and communication, Departmental Records, American Museum of Natural History Library.

Sherwood developed the concept of intensive instruction, but the department's assistant curator, Grace Fisher Ramsey, was uniquely qualified to maximize its educational potential. Ramsey was born in Little Valley, New York, about fifty miles south of Buffalo, on Valentine's Day in 1887.[34] She graduated from the Buffalo State Normal School in 1906 and spent twelve years teaching high school science courses including biology, physics, chemistry, and physical geography. After briefly serving as a nurse in World War I, Ramsey began working at the museum in 1919 under her maiden name, Grace Fisher. She took over the lantern slide division soon after her hire and reorganized the collection. Ramsey then created themed slide sets with manuscripts that were aligned with the city school curriculum, which she listed in the promotional pamphlets that she designed, all in the interest of making the slides easier for teachers to use in classrooms. Under her watch, the number of slides loaned to schools ballooned from 80,000 in 1919 to more than one million in 1930. Ramsey was assigned to head the film loan division, where she performed many of the same tasks with similar results. Ramsey's experience in schools and with each of the education department's school programs gave her a rich, nuanced view of teacher needs and the museum's resources, both of which were integral to how she applied intensive instruction.

The Return of Museum Courses for Teachers

Grace Fisher Ramsey used intensive instruction as the pedagogical foundation of the department's first program that used museum-based teaching as training for classroom teaching. The program "Practice-Teaching by Pupil Teachers," was offered in 1927 and promoted as the

34. "Grace Fisher Ramsey Personnel Summary," Central Archives, Vertical Files, American Museum of Natural History Library.

museum's "second experiment" in intensive instruction.[35] As such, Ramsey designed "Practice Teaching" to be an immersive, small-group learning experience. The idea for "Practice Teaching" came from teachers in the New York City Training School for Teachers and the city's Committee on Visual Education. These educators wanted student teachers to learn how the museum's staff used "practical aids in teaching."[36] The five-week course brought five student teachers from Brooklyn's Maxwell Training School to learn at both the American Museum of Natural History and the Brooklyn Children's Museum. The student teachers studied exhibits, observed instruction in the museums, and explored each institution's educational resources. Most importantly, "Practice Teaching" participants instructed groups of students visiting the museums, thereby giving them, "practical experience in museum teaching.[37] 1927's version of "Practice Teaching" was only a pilot and not repeated the following year. But Ramsey would successfully offer similar programs for teachers in the years that followed.

Intensive instruction required great energy and focus from the museum's educators, and Sherwood looked to the public schools for more staff. In the museum's 1927 Annual Report, Sherwood warned that "Practice-Teaching" could not be repeated without the assistance of substitute teachers from the city's school system.[38] The board of education responded by assigning three substitute teachers to the museum even though "Practice Teaching" was not offered in 1928. Instead, one of the board's teachers worked with the School Nature League, and the other two supported the education staff with intensive instruction programs for high school

35. American Museum of Natural History, *Annual Report, 1927*, 94.

36. Ibid.

37. Grace Fisher Ramsey, *Educational Work in Museums of the United States; Development, Methods and Trends* (New York, NY: The H. W. Wilson Company, 1938), 64.

38. American Museum of Natural History, *Annual Report, 1927*, 94.

students.[39] One particular program, planned along with the Board of Education, brought "advanced" students to the museum each week for several hours of "quiet and deliberate observation, drawing and study" in exhibition halls that had been temporarily closed to the public.[40] As the department's staff noted in the 1928 annual report, the board's substitute teachers helped "extend our facilities to larger numbers of pupils than would otherwise be possible."[41]

Figure 7. "Staff of the Department of Public Education, December 1927," *Bottom row, fourth, fifth, and sixth from left:* Clyde Fisher, George Sherwood, and Grace Fisher Ramsey
Julius Kirschner (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/96255

39. American Museum of Natural History, *Annual Report, 1928* (New York: American Museum of Natural History: 1929), 3.

40. Ibid., 3.

41. Ibid, 58.

The museum's educational staff attempted to resume intensive instruction programs for teachers in 1929, but they were thwarted by an unexpectedly high turnout. That year, Grace Fisher Ramsey and the department's associate curator, Clyde Fisher, each directed a lecture and laboratory course for teachers. Ramsey's was a geography course for elementary teachers and Clyde Fisher offered a cultural course for high school and college teachers. Each consisted of thirty separate lectures followed by laboratory work among the exhibits.[42] The museum's staff elected to not place a limit on registrations, expecting only moderate interest. Fisher's course drew 236 teachers, while Ramsey's received 1,313 registrations. As a result, Ramsey explained, "all plans for conducting the course in a small classroom had to be abandoned."[43] Still, the board of education offered thirty credits to teachers who fulfilled the requirements of coming to the museum twice each week, once for the lecture and then for the "laboratory" of answering questions about related exhibits. More than 800 teachers earned credits. Ramsey reported positive teacher feedback for the course. One teacher learned "that the child must *feel*, *experience*, and *do* in order to be prepared for the outside world," and another claimed to have learned something in each lecture to "*apply* in my everyday teaching of nature."[44]

Teacher Credits for Museum Courses

Even without intensive instruction, the museum's 1929 teacher courses were significant as the first to be accredited by a partnering institution. The board of education's decision to give

42. American Museum of Natural History, *Annual Report, 1929* (New York: American Museum of Natural History: 1930), 81. Several members of the museum's staff, including scientists, delivered lectures for the courses.

43. Grace Fisher Ramsey, "Museum Courses for Teachers," *Museum News* 11 (1933): 7.

44. Ibid., 8.

participating teachers thirty credits for the museum courses was an important endorsement of the value of Ramsey and Fisher's instruction. The board of education continued to offer credits for museum-based teacher programs for decades thereafter. In addition, the Department of Public Education's staff laid early groundwork for pre- and in-service teachers to receive college credit for courses offered by the museum. The department's staff announced in 1929 that they had been meeting with representatives from Columbia University, New York University, Fordham University, the College of the City of New York, Hunter College, and Rutgers University, colleges that had been sending students to the Museum for "practical instruction."[45] The bulk of these conversations were focused on bringing college students to the museum for intensive instruction in the collections and exhibits. However, in 1929, seven different faculty members from Columbia University's Teachers College and one from Fordham University brought groups of students to the museum to study educational methods.[46] Over the next decade, several colleges would offer credits to students studying teaching at the museum.

Even while placing more emphasis on the concept of intensive instruction, the museum's educators continued to create learning opportunities built around visual instruction. Included in these was a 1930 course designed to help teachers use the approach in their classrooms.[47] The department of education staff presented three additional teacher courses in 1930, all of which were eligible for thirty board of education credits: the content-based geography and cultural courses and "Mechanics of Visual Instruction," which addressed the technical requirements for using slides and films in classrooms.[48] According to the annual report for 1930, all three courses

45. American Museum of Natural History, *Annual Report, 1929*, 81–2.

46. Ibid., 28.

47. Ibid., 81–2. The Cultural Courses for Teachers taught by Fisher and Ramsey were offered as well, but only a handful of the thirty sessions addressed how to use that new information in their classrooms.

either directly or indirectly promoted the use of museum resources. “Mechanics of Visual Instruction,” for example, was described as a “practical” course highlighting the visual instruction equipment available for use in classrooms and “indirectly aiding the teacher in using Museum aids.”[49] The report described the response to the “Mechanics” course as “enthusiastic” and pronounced that it was “filling a real need of teachers.”[50]

The museum’s education department offered a total of seven courses for teachers in 1931, including one that required Ramsey to join the faculty of a partnering college. The museum’s 1931 Annual Report pronounced that “the Museum courses for the training of teachers have passed the experimental stage” with “overwhelming registration.”[51] That year, the education department added “The Theory and Practice of Visual Instruction” to the established “Mechanics of Visual Instruction” course and five content-based classes for teachers. Ramsey directed both of the visual instruction courses, each of which earned thirty credits from the board of education and one college credit from the College of the City of New York. To make the arrangement work, Ramsey was appointed to the staff of the City College. It was an important acknowledgement of Ramsey’s instructional expertise, particularly for teaching the pedagogically centered “Theory and Practice of Visual Instruction” course. “Theory” opened with sessions on the “history and meaning” of visual instruction before Ramsey held weekly lessons on “Objects,” “Models,” “Specimens,” “Exhibits,” and “Film Strips and Film Slides.”[52]

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48. American Museum of Natural History, *Annual Report, 1930* (New York: American Museum of Natural History: 1931), 13.

49. Ibid.

50. Ibid.

51. American Museum of Natural History, *Annual Report, 1931* (New York: American Museum of Natural History: 1932), 50.

52. Ibid.

In the remaining sessions, Ramsey and guest speakers discussed how to use slides and movies to teach different school subjects. Ramsey's status as an authority on using museum resources for classroom teaching was evident in the courses she developed and the recognition she earned from both the board of education and the administration of the College of the City of New York.

Over the next several years, more colleges partnered with the museum to offer accredited courses. In 1931, members of the museum's department of education had discussions with representatives from Teachers College about offering credits for museum courses, but the proposal was described as still "under consideration."[53] The museum's conversations with faculty at New York University's School of Education were more fruitful. In 1931, the museum's education department announced that they were working with New York University to offer five courses for teachers in 1932, all of which were to be held at the museum and earn participants two credits at the university.[54] Two of the courses had a pedagogical focus—"The Museum in Elementary Education" and "Visual Aids in Science Teaching—each of which were to be taught college faculty.[55] However, the 1932 annual report noted that only four courses had been offered with New York University without specifying which of the announced courses had been eliminated.[56] In addition, Ramsey continued her "Mechanics" and "Theory" visual instruction courses and introduced the new "Foundations of Visual Instruction" that combined

53. Ibid.

54. Ibid. 49.

55. Ibid. The Museum in Elementary Education course was to be taught by Dr. Miriam Blanton Huber, described as "formerly instructor in English at Columbia University," and the Visual Aids in Science Teaching course was assigned to Dr. Charles J. Pieper, Associate Professor of Education at New York University.

56. American Museum of Natural History, *Annual Report, 1932* (New York: American Museum of Natural History: 1933), 66. Two of the four teacher courses offered in partnership with New York University were content-based courses led by museum scientist/educators: Clyde Fisher's "Astronomical Bodies and Their Movements," and "Earth Features and Their History," led by Sydney Heilprin, the museum's Assistant Curator of Geology. See, A. Katherine Berger, ed., "American Museum Expeditions and Notes," *Natural History* 32, no. 2 (1932): 215–24, 218.

elements of the other two courses.[57] The museum also debuted a nature study course for teachers in 1932 that featured "extensive field work."[58]

Over the next two years, the museum's educational staff delivered more teacher courses that earned credits from regional colleges. In 1933, the museum announced two courses with New York University: "Museum in Elementary Education" and "Astronomy for Teachers" which was led by Clyde Fisher.[59] The following year the museum and New York University added "Survey of Natural History for Teachers" and "Primitive Culture" to their collaborative courses.[60] Also in 1934, the museum presented five free courses for teachers along with the College of the City of New York, including "Nature Study for City Teachers."[61] The "Nature Study" course was designed for elementary biology teachers and teachers that had been named "nature curators" in their schools. The goal of the course was to help teachers "recognize specimens in the field or laboratory and to learn something of the interdependence and importance of nature."[62] The other teacher courses accredited by the City College were "Applied Physiology and Health," "The Museum in Elementary Social Studies," and both a preliminary and an advanced course in "The Mechanics of Visual Instruction."[63]

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57. American Museum of Natural History, *Annual Report, 1932*, 66.

58. Ibid., 67.

59. American Museum of Natural History, "Science in Field and Laboratory," *Natural History* 33, no. 6 (November-December 1933): 657. By 1933, Fisher had successfully established the museum's Department of Astronomy and the department's new building and planetarium were under construction.

60. American Museum of Natural History, "Science in the Field and in the Laboratory," *Natural History* 34, no. 5 (September 1934): 497.

61. A. Katherine Berger, "Science in the Field and in the Laboratory," *Natural History* 34, no. 7 (November 1934): 680.

62. Ibid., 680.

63. Ibid.

The museum's education department was able to create such a rich selection of courses in the midst of the Great Depression because of private gifts from corporations and trustees and aid from the Works Progress Administration. As Sherwood wrote in 1930, "the recent rapid growth of our educational service is one that Museum resources could not have accomplished unaided," and he acknowledged the support of the Carnegie Corporation, the Cleveland H. Dodge Foundation, and museum trustees Felix M. Warburg and George D. Pratt.[64] In addition, the contributions of teachers assigned to the museum by the New York office of the Works Progress Administration freed the education department staff to develop new programs. The department had been struggling to balance their interest in creating new programs with maintaining established programs for some time. In the 1927 annual report, the department's staff expressed disappointment that they could not try out new methods because "any activity with the schools, if it is found worthwhile, must be continued year after year, and cannot be dropped or discontinued."[65] In order to overcome "this handicap," the report continued, the department would need more personnel to develop new programs. In 1934, teachers from the Works Progress Administration taught the museum's Exhibition Hall Talks, which enabled the department's staff to work with colleges to create courses for classroom teachers.[66]

The credits that the city's board of education and regional colleges conferred to teachers participating in the museum's courses were significant additions to its pedagogical authority. From the board of education, the credits were less surprising given the museum's consistent efforts to support teachers in the New York City public schools. The museum's staff had proven

64. George H. Sherwood, "The Museum in Education," *Natural History* 30, no. 5 (October 1930): 504.

65. American Museum of Natural History, *Annual Report, 1927*, 93.

66. "Science in the Field and in the Laboratory," 1934, 498.

over several decades that the loan and lecture programs could help teachers in a myriad of ways. Still, the board's decision to give teachers credits for the museum's courses was an unprecedented recognition of the instructional competence of the education department's staff. The fact that faculty in New York University's School of Education and the College of the City of New York were willing to offer credits for museum courses was perhaps more important. The college credits represented a perception among faculty that the museum courses were equivalent in value and rigor to the learning experiences available in their own institutions.

It should be noted that the courses that were accredited by colleges and the board of education were those based on visual instruction and scientific content, even though Grace Fisher Ramsey reinstituted the museum's teacher programs using intensive instruction. In other words, the board and the colleges were conferring credits only for courses that employed museum practices and information that had been helping teachers for the better part of a decade. Small group-based intensive instruction, meanwhile, was still relatively new and likely seen as less practical for teachers in overcrowded city schools. However, in 1935, one year after being named acting curator of the department, Grace Fisher Ramsey offered a course similar to her 1927 intensive-instruction based "Practice Teaching by Pupil Teachers" with much greater long-term success. Ramsey's ability to use the museum as a training ground for classroom teaching was a major development toward the museum becoming a site of pedagogical authority.

Museum Instruction as Training for Student-Teachers

Grace Fisher Ramsey had already created courses for teachers that used museum resources as models for visual instruction, but in 1935 she led a new program that treated the exhibit halls as a laboratory school for teacher training. The idea for the course, "The American

Museum of Natural History as Laboratory School," came from Dean Pam Klapper of the College of the City of New York, which had to educate more teachers due to the Depression-era closing of the city's teacher training schools.[67] As Ramsey wrote in an essay about the program for the journal *School and Society*, "the museum felt that it would be helpful to offer some definite training in the techniques of museum teaching and an acquaintance with the educational possibilities of the institution," including exhibits.[68] Described as an experiment despite its similarity to the 1927 "Practice-Teaching" program, the 1935 iteration brought small groups of seniors and graduates from City College's School of Education to the museum for four weeks of "intensive training" on using the teaching materials, museum facilities, and studying the exhibits.[69] Most relevantly, participants observed museum instructors leading classes, and then taught their own groups of students visiting the museum.

When writing about the "Laboratory School" program, Ramsey articulated why, exactly, she viewed museums as appropriate spaces for training teachers. To illustrate her point, Ramsey posed and then answered the question at the heart of introducing teachers to museum-based instruction: "Are there any advantages in such student teaching over that carried on in the regular school classroom?"[70] Ramsey acknowledged that museums could not replicate the formality of the classroom, nor help teachers with the particulars of school administration. She then listed six museum-specific "advantages" for student teachers. Predictably, several of her points were related to objects, particularly that museums offered "unrivaled" number and variety of "concrete

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67. Grace Ramsey, "The American Museum of Natural History as a Laboratory School for Student Teachers," *School & Society* 43, no. 1109 (1936): 440.

68. Ibid.

69. American Museum of Natural History, *Annual Report, 1935* (New York: American Museum of Natural History: 1936), 17.

70. "The American Museum of Natural History as a Laboratory," 441–2.

materials" for teaching a number of subjects, and that teachers could learn how to carefully select among those materials for the most appropriate for their curriculum needs.[71] Ramsey's ideas about how teachers could learn from aspects of the museum not related to objects, however, were the most transformative.

In terms of building pedagogical authority, Ramsey's most important observations centered on how museums give student teachers access to diverse audiences. After making two points regarding museum objects, Ramsey's third turned to visiting schools, which gave pre-service teachers the opportunity to work with groups from "Grade 2-A in the elementary school through to and including senior students in college," as well as students from schools for the blind.[72] Next, Ramsey argued that museums allow pre-service teachers to experience the challenge of working with students from all types of schools. Teachers could then compare differences in student reactions based on the kind of instruction various groups experience at their schools.[73] Also, Ramsey continued, student teachers could compare students of similar age from different parts of the city. In her fifth point, Ramsey maintained that engaging disparate student groups led to, "the development of initiative on the part of the student teacher in adapting his instruction about the museum exhibits to the level of his special group, which may vary so widely in one day's teaching."[74] Ramsey closed by asserting that the greatest museum-based advantage was their capacity to enrich student teachers' background knowledge.

Overall, Ramsey's description of how museum experiences could prepare student teachers for classrooms was novel in highlighting the value of teaching in a museum. Prior to

71. Ibid.

72. Ibid.

73. Ibid.

74. Ibid.

this essay, exhibits and objects were more often presented as museums' primary learning resources. Ramsey certainly agreed and espoused the content knowledge teachers could gain in exhibit halls and from the museum's loan programs. But she expanded on this view by highlighting how student teachers in museums employed wide-ranging instructional strategies using an array of resources for varied student groups that had been trained to learn in different ways. No other space, Ramsey argued, could match museums in this regard, which made museums singularly useful sites for training skilled and adaptable classroom teachers. In this conception, the presence of school groups transformed the museum into a laboratory for effective teaching, and the professionals who worked in museums full time as possessing a malleable, and surprisingly broad, pedagogical authority all their own.

While Ramsey focused on promoting museum instruction, other members of the Department of Public Education used exhibit-design strategies to create a teacher course of classroom activities. "Crafts Course for Teachers," led by department educators John Orth and Agnes K. Saunders in 1936, showed teachers how to create miniature habitat groups that they could use for geography and social science classes.[75] Descriptions of the "Crafts Course" don't trace the origin of the concept, but crafting and "Miniature Group Making" were part of the aforementioned Exhibit Hall Talks led by teachers from the Works Progress Administration in 1934.[76] That same year, Ramsey wrote "Project Making in Elementary Science," a pamphlet that also presented miniature diorama building as a classroom teaching activity. Ramsey created "Project Making" in response to teacher requests from around the country, and credited the

75. American Museum of Natural History, *Annual Report, 1936* (New York: American Museum of Natural History: 1937), 46.

76. American Museum of Natural History, *Annual Report, 1934* (New York: American Museum of Natural History: 1935), 12.

techniques she described to Orth, who helped prepare the department's traveling loan collections.[77] Orth and Saunders "Crafts Course" was not credit bearing, but was still described as "eagerly sought" by teachers.[78]

Figure 8. Museum's course for teachers in crafts and techniques, 1937
Charles H. Coles (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/22104

The first iteration of the "Crafts Course" did not confer credits from colleges or the board of education, but several other courses were offered for credit, which was an added incentive for attending teachers. Ramsey co-led another "Museum as School Laboratory," or, as described in the annual report, "intensive training in museum materials and methods" course, with students

77. Grace Fisher Ramsey, *Project Making in Elementary Science* (New York: American Museum of Natural History, 1934).

78. American Museum of Natural History, *Annual Report, 1936*, 46.

from both the City College of New York and Columbia's New College.[79] "The students, without exception," read the annual report, "have felt that much more experience has been gained through their Museum assignment than could possibly have been secured through many weeks of work in a public school."[80] The museum's education department also delivered four lecture-based courses designed to highlight the museum's intellectual and material resources. A total 444 teachers enrolled in those courses, each of whom received credits from either the City College or Hunter College, and from the board of education.[81] Teachers not only gained instructional methods from the museum's courses, but career advancement as well.

Grace Fisher Ramsey and the State of Museum of Education

In addition to the college partnerships for the museum's teacher courses, Ramsey had been quietly pursuing her own education at New York University since 1931, culminating with her 1938 dissertation and resulting book, *Educational Work in Museums of the United States*. Ramsey's research was based on a national survey of education programs offered in museums of all kinds. It was the first comprehensive assessment of the field since Paul M. Rea's reports to the U.S. Commissioner of Education between 1913 and 1916.[82] Using personal connections made during her nineteen years at the museum, Ramsey interviewed museum directors and staff in charge of educational programming at more than 140 museums from 1936–1938.[83] In addition, Ramsey reviewed annual reports, conference proceedings, and field-specific

79. Ibid., 47.

80. Ibid.

81. Ibid., 46.

82. Ramsey, *Educational Work*, vii.

83. Ibid., viii.

publications. Ramsey organized the book around what she saw as the primary categories of museum education, including adult education through lectures, gallery talks, and classes; teacher training; work with organized school classes; work with disabled children; activities for individual children, such as clubs, after-school activities, and science fairs; and extension services to schools.[84] Ramsey concluded that "the pioneer period in museum educational work may now be considered as completed." Museums, she continued, "have provided an extensive educational program in an endeavor to have their exhibits fulfill the greatest educational possibilities."[85]

Educational Work also carried a promising report on the state of teacher training in museums in the United States, with the American Museum of Natural History depicted as a leader in the field. Per Ramsey, teacher training was being conducted in "a considerable number" of the country's larger museums and had become "a rather prominent feature" in those institutions.[86] By the late 1930s, more museum-based educators were applying museum techniques and materials to courses for teachers, as opposed to the content focus of earlier versions. In those cases, as Ramsey explained, "the teachers have been given the advantages of working with original objects and gaining inspiration through personal contact with the expert."[87] In addition, more museums had been working to raise the "academic level" of their teacher programs, from lectures to courses, in order to gain accreditation from a college or university.[88] Yet, even with the increased academic rigor in accredited museum courses for

84. Ramsey, *Educational Work*, xi–xiv

85. Ibid., 252.

86. Ibid., 67-8.

87. Ibid., 67.

88. Ibid., 68.

teachers, only two institutions had developed what Ramsey saw as "intensive museum training."[89]

In documenting the growth of museum courses for teachers, Ramsey expanded on her previous arguments about the value of such programs for student teachers by discussing possible benefits for museums and the staff needed to realize that potential. In *Educational Work*, Ramsey listed several reasons that museums should offer in-service programs for teachers, arguing that students benefited most from teachers familiar with the museum and its resources; that teachers helped museums broaden their influence; that regular teacher-training courses could not prepare teachers to instruct using exhibits; and that teachers trained thusly were "museum-minded," and able to show students how to do "direct observational work"—an essential component of visual instruction.[90] But, to effectively train teachers, Ramsey asserted, museums needed appropriate staff. In a stark turn from programs that had previously relied on content experts, Ramsey argued for professionals with educational experience. "It is one thing for an individual to be a curator in a museum and devote hour after hour, day after day, to painstaking research work," Ramsey wrote. "It is quite another matter for that individual to have a pedagogical point of view and know just what the needs of progressive classes may be and how to present subject matter about the museum collections in such a way that teachers will recognize the practical value."[91] Ramsey finished by underscoring the importance of working with colleges to raise the rigor of teacher courses, including participant credits.

89. Ibid.

90. Ibid., 62.

91. Ibid., 57.

In many ways, *Educational Work* was a benchmark document for pedagogical authority at the American Museum of Natural History and museums in general. Museum-based teacher training programs best illustrate how museums have been positioned as instructional experts relative to teachers, and Ramsey used *Educational Work* to argue for their relevance. She outlined the surprisingly broad history of teacher training in museums, showing that the programs of the 1930s were just the most recent manifestation of practices that had been developed since Bickmore's pioneering work in the 1880s. In addition, Ramsey surveyed the many ways museum professionals have supported teachers with a range of programmatic outcomes, including improving content knowledge, supplying classroom teaching materials, exposing them to scientific research practices, and exploring multiple modes of instruction. Moreover, Ramsey gave museum leaders and educators detailed methods for how to create and sustain teacher programs, particularly by creating an infrastructure of educationally trained staff and partnerships with teacher training colleges to ensure value for participants. In sum, Ramsey made an empirically sound argument that museums had both a proven track record and still untapped potential as authorities in teaching.

As much as *Educational Work* pointed to museums taking a more prominent role in the training of teachers in the future, Ramsey's achievements also reflected the dramatic changes in the museum since its 1920 collaborations with Crandall's Bureau of Visual Instruction. Much of the Department of Public Education's growth in the 1920s was attributable to the Bureau's success in increasing the number of schools that could utilize the museum's resources. In turn, by adopting visual instruction as a framework for its school programs, the department was able to present the museum's instructional resources as both products and process—sources of content and tools that could facilitate deeper learning. The museum's leadership used the

Department of Public Education's increasing reach in schools to successfully petition the city for new facilities, including the School Service Building. Ramsey then used the School Service Building as a space for pedagogical innovation and teacher training, which led to substantive partnerships with regional teacher colleges and universities. Ramsey then combined that experience with empirical research, which led her to important insights about the educational role of museums.

Despite Ramsey's high-profile accomplishments in 1938, that year she was denied the permanent position as curator of the Department of Public Education. What might have been viewed as a disappointment ended up freeing her from having to guide the department during a period of painful transitions. The department suffered two major losses in 1937 with the deaths for former leader George Sherwood and longtime benefactor Felix W. Warburg.[92] Warburg's generosity not only sustained the education department during the Great Depression but allowed it to flourish, even as whole sections of the museum's exhibit halls had to be closed, field expeditions were canceled, and research findings went unpublished because the museum's trustees and the city could not bear the costs.[93] Warburg's death plunged the education department into the museum's grim reality: the Great Depression was finally felt in the School Service Building.

After nearly twenty years of unfettered growth, the Department of Public Education's new curator, Charles Russell, was forced to reduce the department's costs. Russell came to the museum in 1938 after earning his Ph.D. at Columbia University's Teachers College and working

92. "Warburg Funeral to be Held Today," *New York Times,* Oct 22, 1937, 19.

93. See American Museum of Natural History, *Annual Report, 1931* through *Annual Report, 1936*.

in teacher education. In better economic times, he would likely have been expanding the department's work with school educators.[94] Unfortunately, without the late Felix Warburg's direct support for education programs, Russell spent 1938 studying how to streamline the department's offerings. Russell's solution was to eliminate services "unrelated to Museum content."[95] In addition, the department trimmed its visual media library by removing 30,000 slides, 700 motion picture reels, and 350 collections of pictures. Teacher courses were scaled back to "materials not easily developed elsewhere."[96] "The number of persons affected by these materials dropped, as expected," read the 1939 annual report, "but the changes resulted in a significant improvement."[97] Yet, Russell's success in trimming the department may ultimately have been fortuitous; in 1940, the Department of Public Education's staff would be challenged to create a set of new programs for emergent needs associated with a growing world war.

While Russell was busy restructuring the department, Grace Fisher Ramsey embarked on a research trip to collect images, artifacts, and information for a new free teacher course, thereby continuing one of the oldest and least-heralded aspects of educational programs at the museum. In the fall of 1938, the department debuted "Primitive Peoples and Their Cultures" in cooperation with the City College of New York and Hunter College.[98] Ramsey gathered the content for that course when she drove that summer, at her own cost, to the archaeological ruins

94. Committee on Public Press Information, "Press Release: Charles Russell appointment to Curator of Education," Jan 4, 1938, Central Archives, Vertical Files, American Museum of Natural History Library.

95. American Museum of Natural History, *Annual Report, 1938* (New York: American Museum of Natural History: 1939), 29.

96. Ibid.

97. American Museum of Natural History, *Annual Report, 1939* (New York: American Museum of Natural History: 1940), 23.

98. American Museum of Natural History, "Science in the Field and in the Laboratory," *Natural History* 42, no. 3 (October 1938): 233.

in Yucatan, Mitla, and Monte Alban, Mexico. Museum educators had been taking their own research exhibitions for material to use in teaching programs since Albert Bickmore's lectures in the 1880s.[99] In 1927, for example, Clyde Fisher took film of the Sioux on the Standing Rock Reservation in North Dakota and of pueblos in New Mexico, plus hundreds of photographs of the Petrified Forests, the Painted Desert, and the Grand Canyon.[100] Six years later, while still an assistant curator in the Department of Public Education, Dorothy Bennett made her own research trip to New Mexico.[101] In the Cold War years after World War II, museum educators with scientific training would turn research trips into programs for teachers, making one of the department's oldest practices a new method for supporting classroom instruction. Indeed, during the years encompassing World War II and the Cold War, the department's staff would find new ways to put what would be the finishing touches on the museum's pedagogical authority.

99. See chapter 2.

100. "Notes," *Natural History* 27, no. 4 (July–August 1927): 392.

101. "Science in Field and Laboratory," *Natural History* 33, no. 6 (December 1933): 658.

Chapter 5

The Educational Museum in Wartime, 1940–1962

In assessing the contributions of the American Museum of Natural History's staff during World War II, its director, Albert E. Parr, offered a clear-eyed and revealing summary in 1943. "By comparison with many other branches of learning, such as physics, chemistry, or medicine, the subjects of natural history have relatively little direct application to the waging of war," Parr wrote, "and our contributions must of necessity remain modest when measured against the contributions of these sciences."[1] Still, Parr argued, members of the museum's scientific and education departments were "able to assist the war effort in more numerous, more significant, and more successful ways than we had at first dared to hope."[2] Many of the museum staff's war-related projects remained classified as of Parr's writing, but he noted that museum scientists had helped write field guides for deployed servicemen; museum explorers described foreign locales for military leaders; and museum educators hosted landfall workshops to show Army servicemen how to transition from boat to land upon their arrival in Europe.

In terms of building the museum's pedagogical authority, two of the museum's wartime educational programs were most impactful: the portable exhibits that the education department's staff developed for the Army and the celestial navigation courses for the Navy delivered by the lecturers in the Hayden Planetarium. In each case, museum staff adapted their standard programs to meet urgent needs brought on by World War II. Moreover, when Army and Navy leaders chose to partner with the museum to teach enlistees scientific information that would literally

1. American Museum of Natural History, *Annual Report, 1943* (New York: American Museum of Natural History, 1944), 7.

2. Ibid.

help win the war, they conferred a new, powerful type of authority to its educators. By earning the trust of military leaders, the museum's staff simultaneously gained recognition for the importance of the museum's research to national security and the effectiveness of their instructional strategies. The trust that the museum's staff had earned during World War II would prove pivotal during the Cold War, when a group of scientifically trained educators taught research methods as a way to help classroom teachers address growing public concerns about America's scientific workforce.

This chapter tells two interconnected stories about the final major development in the museum's pedagogical authority. From World War II through the Cold War, military and federal agencies utilized and supported instructional methods developed by staff in both the museum's education department and the Hayden Planetarium. Each story—one based in the education department and the other in the planetarium—is divided into three periods: World War II programs for the military, from 1940 to 1944; Post-War teacher courses, from 1945 to 1957; and the Post-*Sputnik* era of federal investment in teacher training, from 1957 to 1962. As we'll see, the work of educators in the museum's education department and the Hayden Planetarium was defined by how they balanced their ability to communicate science content with teachers' needs for instructional guidance. Over this period, staff in the education department began emphasizing scientific knowledge over pedagogy, while the Hayden Planetarium's educators took on the challenge of helping to define astronomy education once the space age commenced in the 1950s. Critically, both of these approaches met the needs of the teachers and appealed to scientists leading federal initiatives to improve American science education.

The Department of Education in Wartime

Even before America was drawn into World War II by the bombing of Pearl Harbor in December 1941, the museum's leadership was thinking about the educational role of museums during wartime. In the president's essay that opened the museum's 1940 annual report, F. Trubee Davison wrote that the ideological and physical battles between European democracies and dictatorships were, at their core, conflicts about citizens having the freedom to think. Davison argued that "the real work of the museum is to help people to think in terms of realities and not theories"[3] Davison was confident in the museum's capacity to assume intellectual leadership, buoyed by recent fundraising success and rising attendance, membership, and magazine subscriptions. "Our chief concern," he continued, "is to meet the needs of a changing and chaotic world in what we teach and how we teach it."[4] To that end, even as fear of air raids grew, the museum's trustees pledged to keep the museum open and all exhibits intact, even though they moved some of the rarest artifacts offsite to ensure their safety. "The Museum is a house of refuge from the stress of wartime existence," Davison wrote, "and as such will continue to provide relaxation, enjoyment and inspiration for an ever-increasing number of people."[5]

The Department of Education staff were tasked with carrying out many of the wartime goals expressed by Davison, which achieved by prioritizing efficiency. The head of the department, Charles Russell, had been streamlining their services since 1938. By 1940, the department was dependent on "self-sustaining or self-liquidating activities" that could be maintained through "small service fees."[6] The following year, museum educators explored

3. American Museum of Natural History, *Annual Report, 1940* (New York: American Museum of Natural History: 1941), 2.

4. Ibid.

5. Ibid.

methods to mechanize departmental processes, aiming to minimize the effort needed to maintain their established programs.

As a result of their efficiency-based preparation, the department was able to "swing without interruption" into wartime programming after the attack on Pearl Harbor in 1941.[7] Within the museum, the education staff created a new all-day school tour called "The Platoon Program," where instructors rotated student groups through exhibits and activities.[8] The museum's Platoon Program shared its name with the school management system popularized in the early twentieth century that similarly rotated groups of students between classrooms and activities in the name of efficiency.[9] The museum's educational staff also used existing museum materials to create a series of "Geography of War" programs that discussed the natural resources, populations, cultures, and political structures of various war-related locales around the world.[10] Outside of the museum, the department installed over two hundred "Community Museums" for citizens unable or reluctant to travel to the museum out of fear of air raids.[11]

One of the department's efficiency-driven school programs, the portable exhibits that museum's educational staff developed for New York City schools, would turn out to be surprisingly important. After the New York City board of education restricted school field trips

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6. Ibid, 25.

7. American Museum of Natural History, *Annual Report, 1941* (New York: American Museum of Natural History, 1942), 25.

8. American Museum of Natural History, *Annual Report, 1942* (New York: American Museum of Natural History, 1943), 6.

9. Herbert M. Kliebard, *The Struggle for the American Curriculum, 1893-1958* (New York, NY: RoutledgeFalmer, 2004), 83–4.

10. "Museum Planning Wider Services: Natural History Trustees Act to Meet Increased Interest That Is Laid to War," *New York Times*, 1942, 21.

11. American Museum of Natural History, *Annual Report, 1941*, 2.

to civic institutions during the war, a group consisting of members of the American Museum of Natural History's education staff, the board of education, and the city's other publicly funded museums, designed special exhibits that could be quickly and easily installed in empty classrooms.[12] Whereas the museum's previous traveling exhibits relied heavily on teacher interaction, the wartime versions featured "a pre-arrangement of material that shortened the time of explanation by the teacher, and in the absence of the teacher made possible a coordinated or directed study by the pupil himself."[13] By 1942, the department had condensed and reorganized materials that were already being distributed to schools into thirty portable school "museums" or exhibits.[14] According to Kenneth Addicott, a former teacher from California who worked at the museum while pursuing his Ph.D. in adult education at Columbia University's Teachers College, the success of those school exhibits convinced the department's staff that a similar approach might be effective for training military enlistees.[15]

From Supporting Schools to Training the Army

The process by which the museum staff adapted portable exhibits for schools into special versions for the Army was detailed by Kenneth Addicott in his 1944 doctoral dissertation. According to Addicott, the new exhibits were seen as a solution to the growing challenge of delivering science content to the Army.[16] The museum's education department had been

12. Kenneth Klein Addicott, "Museums for the Army" (Ph.D. Thesis, Teachers College, Columbia University, 1944), 17. For more on Addicott's career before coming the American Museum of Natural History, see Colin B. Burke, *America's Information Wars: The Untold Story of Information Systems in America's Conflicts and Politics from World War II to the Internet Age* (Lanham, Maryland: Rowman & Littlefield, 2018), 78.

13. Addicott, "Museums for the Army," 17.

14. American Museum of Natural History, *Annual Report, 1942*, 6.

15. Addicott, "Museums for the Army," 17.

struggling to respond to the deluge of information requests from the Army, which came as appeals for "printed instructions" and what Addicott described as "very specific needs—reptile or plant identification, sanitation measures, edible fruits on a particular island, and the like."[17] Museum educators thought that the portable exhibits, particularly those that featured real artifacts, could be far more effective in teaching concepts to enlistees than printed materials. For example, as Addicott explained, an exhibit could bring a soldier "safely face-to-face with a rattlesnake, so that he could study it," and "determine how to deal with or avoid it, and if bitten, how to take care of the wound before the poison could permeate his system with fatal results."[18]

In January 1942, the department introduced a prototype portable exhibit at the United Service Organizations (USO) conference where Army leaders gave feedback that would shape the subsequent versions. The first portable museum was designed to educate soldiers about "natural dangers in woods and fields near the camps." Based on feedback from the Army, the museum's staff updated the form and content of the exhibit. The updated version entitled "Take Good Care of Yourself—You Belong to the U.S." was displayed at USO Recreation Centers near Army training facilities, forts, and Navy yards in the New York City area.[19] The comments the department received about the updated exhibit helped convince the museum's staff that, unlike the recreational materials developed for enlistees during World War I, the new approaches held real educational value.

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16. Addicott does not explicitly describe his level of involvement in the Army exhibits program. However, he does use "us" in describing the how the museum's education department staff came to the idea for program. See Kenneth Addicott, "Chip Off the Old Block," *Adult Education Journal* 2, no. 1 (January 1943): 54.

17. Addicott, "Museums for the Army," 14.

18. Ibid., 18

19. Ibid., 19.

Photograph of the Poisonous Plants, Reptiles, Insects,
and Disease Carriers Exhibit

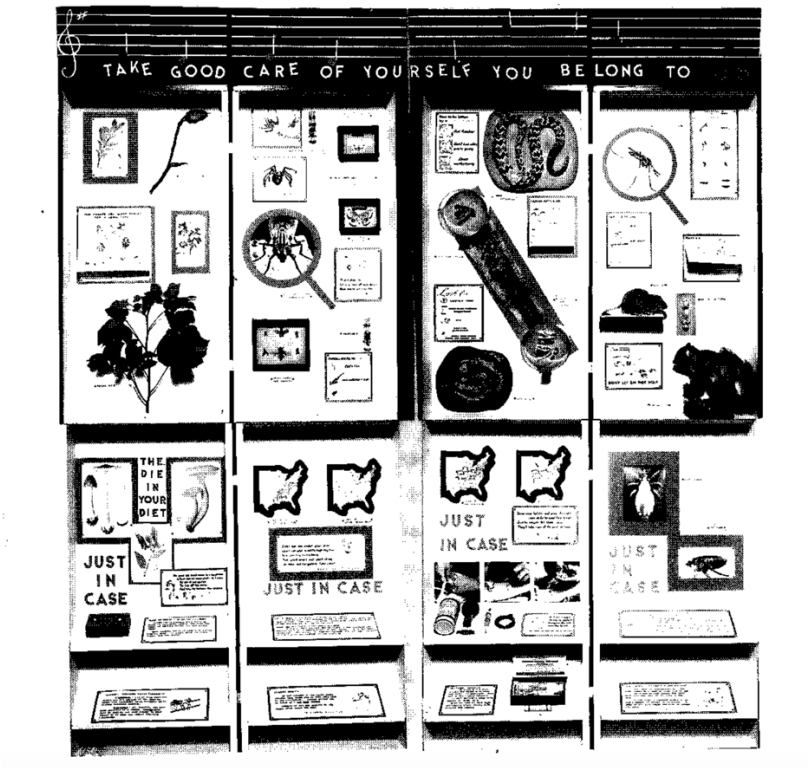

Figure 9. "Take Good Care of Yourself" Army exhibit
Image from Addicott, "Museums for the Army," 45

Convinced of the instructional potential of the new portable exhibits, the museum's educators submitted a proposal to the Army Special Service Branch's Educational Division. Members of the department's staff presented several ideas for portable exhibits at a special conference in Washington D.C. on July 23, 1942 that included representatives from the Special Services Education Branch, the National Park Service, the USO, and the Joint Army-Navy Committee on Welfare and Recreation.[20] Addicott used the length of the meeting as evidence of

20. The Joint Army-Navy Committee on Welfare and Recreation was created in 1941 by the Secretary of War and the President as a group responsible for coordinating "welfare" programs for the Army, the Navy, the Office of Defense Health and Welfare services. See United States Joint Army and Navy Committee on Welfare and Recreation, *Report of the Joint Army and Navy Committee on Welfare and Recreation* 1942. 1–2.

its success, noting that what had been scheduled for fifteen minutes lasted more than two hours.[21] An agreement was made to test a series of portable exhibits at Fort Meade, starting at the Training School for Special Service Officers before taking the exhibits to the service clubs. The museum would construct the exhibits over the next seven weeks at the Army's cost, deliver them to the Army Education Branch in Washington for approval, then move them to Fort Meade.

The six portable exhibits the museum created used the design methods that the department of education co-developed for schools along with visual instruction techniques the department had been cultivating for years. Per Addicott, three "fundamental principles" guided the department's design process. First, the department had to ensure "the detail and exactness of the scientific information," which was accomplished by consulting with the museum's scientific staff.[22] Second, the exhibit topics had to be related to natural history. Lastly, the end products had to use methods "recognized for visual education materials."[23] To that end, the exhibits that the department delivered during the summer of 1942—"Poisonous Plants," "Defense," "Superstitions," "Camouflage," "Flight," and "Strategic Minerals"—utilized objects as both representative examples and to communicate ideas and principles. As Addicott explained:

> The material available in the American Museum of Natural History was found to be highly adaptable. Mounted birds and bird skeletons were used in demonstrating principles of flight, mechanical techniques of flight, examples of bird defense, effective coloring camouflage; mounted snakes, snake skulls and snake skins were used for correcting erroneous ideas resulting in superstitions, and in showing the desirability of knowing certain preventative as well as curative measures in dealing with such creatures.[24]

21. Addicott, "Museums for the Army," 22–23.

22. Ibid., 32.

23. Ibid.

24. Ibid., 33.

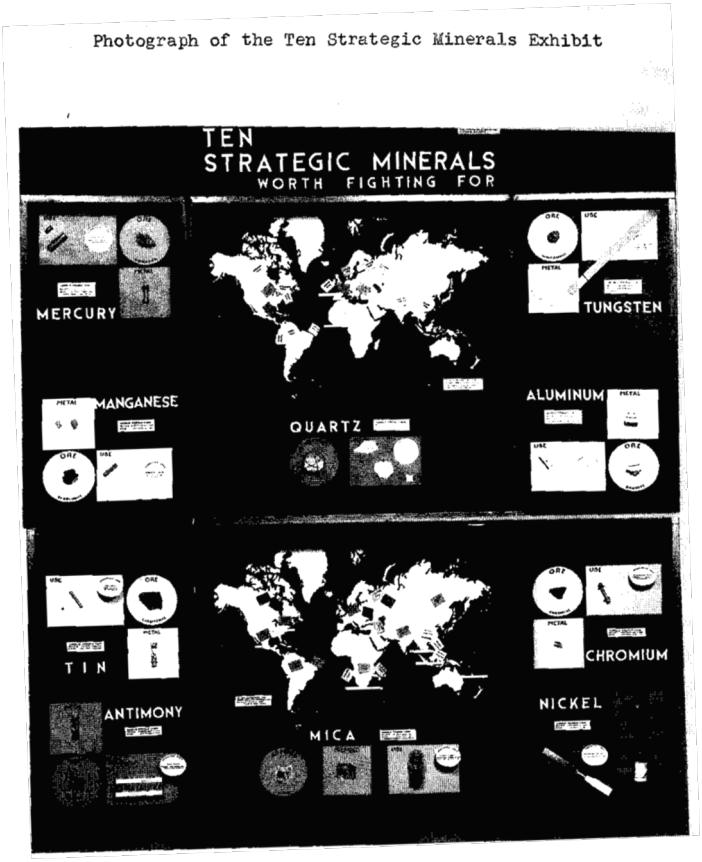

Figure 10. "Ten Strategic Materials" Army exhibit
Image from Addicott, "Museums for the Army" 57

Within the Army, the museum's portable exhibits didn't appear to have had any long-term impact, though Addicott saw far broader applications. Army representatives from around the country sent requests for duplicates of the exhibits, but Addicott didn't describe any follow-up beyond forwarding them to Washington with recommendations for production centers. Military leaders also asked the museum's educators for exhibits describing "the characteristics of peoples, their distinguishable points, and their likenesses, psychological and sociological" for several war theaters around the world."[25] The department delivered 162 "racial identification" exhibits to the Army's Training Division in 1943, though none were mentioned in the years

25. Addicott, "Chip Off the Old Block," 57.

following.[26] For Addicott, the exhibits represented a major innovation in adult education, particularly through the use of cutting-edge techniques in visual instruction. "Visual aids will sell themselves purely on a basis of efficiency if correctly presented," Addicott proclaimed.[27] Despite his confidence in the instructional potential of the Army portable museums, Addicott's time as an educator ended after he finished his dissertation. He was drafted into the Army in 1944 and went on to a career in national security.[28]

Naval Navigation by the Stars

By the time America entered World War II, the museum's Hayden Planetarium and Department of Astronomy were well established with educational facilities that proved to be valuable during the conflict. The Hayden Planetarium opened in October 1935 as just the third projection planetarium in the country. It was housed on the second floor of a building specially constructed for the museum's Department of Astronomy. The facility was named after Boston-based banker and philanthropist Charles Hayden, who paid for the facility's centerpiece: a Zeiss projector that, as described by the planetarium's Marian Lockwood, "throws upon the white background of the dome – as upon an artificial sky – the images of the stars and other heavenly bodies.[29] The Planetarium's dome was made from perforated stainless steel that was suspended above a 742-seat, circular projection chamber, 75 feet in diameter.[30] The Copernican Planetarium, a moving model of Earth's solar system, was located on the building's first floor.

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26. American Museum of Natural History, *Annual Report, 1943*, 11.

27. Addicott, "Museums for the Army," 100.

28. Burke, *America's Information Wars*, 79.

29. Marian Lockwood, "The Hayden Planetarium," *Natural History* 36, no. 3 (October 1935): 188.

30. Ibid.

The Planetarium building also featured a display area with a large collection of meteorites that had been in the museum's department of Geology; a mural of Native American astronomical mythology; renderings of the twelve signs of the zodiac including the corresponding stars; photographs of observatories; and glass cases with replicas of Galileo's telescopes and other related artifacts.

The Hayden Planetarium's value during World War II owed much to its diverse staff of educators, astronomers, and astronomy enthusiasts. The individual arguably who was most responsible for the Planetarium was Clyde Fisher, the former associate curator of the museum's Department of Public Education. Museum president Henry Osborn assigned Fisher the job of creating a Department of Astronomy in 1924, while he was still working full time in the education department. For several years, Fisher's astronomy department was little more than him giving speeches, studying other planetariums, fundraising, and helping lead the Amateur Astronomers Association. Fisher hired Marian Lockwood, a former student at Wesleyan College, as his executive secretary in 1930.[31] Lockwood worked closely with Fisher and she grew into one of the Hayden's preeminent lecturers, authors, and, for a short time, was its acting curator. Fisher was named the full-time curator of astronomy in 1934, as final preparations were being made for the official opening of the Hayden Planetarium. The following year, Dorothy Bennett, an instructor and assistant curator in the museum's education department, joined the planetarium and took over the Junior Astronomy Club.[32] Arthur Draper, a graduate of Cornell University's astronomy program, joined the Hayden in 1935 as well.[33] The most impactful member of the

31. Joan Gardner, "Sea and Skyfaring Service Men Learn from Woman How to Travel by Stars," *The Indianapolis Star*, November 7, 1943.

32. American Museum of Natural History, *Annual Report, 1935*, 19.

33. Jordan Marché, *Theaters of Time and Space: American Planetaria, 1930–1970* (New Brunswick, NJ: Rutgers University Press, 2005).

Hayden Planetarium during the war, however, was an engineer with a deep passion for astronomy and military service, William Barton.

Figure 11. Staff of Planetarium lecturers. *Left to right*: Clyde Fisher, Dorothy A. Bennett, Arthur L. Draper, Marion Lockwood, and William H. Barton, Jr., October 1, 1935
Thane L. Bierwert (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/85865

The most significant of the Hayden Planetarium's World War II programs were celestial navigation courses for the Navy, which were largely the product of lecturer and curator William Barton. Indeed, Barton was the first lecturer to lead navigation courses at the planetarium, which he introduced soon after his arrival in 1935.[34] The need for such courses increased dramatically during World War II as America's combat strategies were making greater use of boats and airplanes. Barton, like many planetarium educators and leaders around the country, devoted the

34. Wayne M. Faunce, "Interpreter of the Heavens," *Sky and Telescope* 3, no. 11 (September 1944): 6.

Hayden's resources to meeting this new national need. Over the course of the war, he taught navigation methods to roughly 30,000 naval officers.[35] In doing so, Barton set the Hayden on a new path of large-scale educational programming, an approach the planetarium staff applied to teacher courses after the war. Barton's efforts also demonstrated that the planetarium could be used to train a critical workforce during a time of national need – a capacity that undergirded the planetarium's federally-funded teacher courses during the Cold War.

For Barton, service to the military was a personal priority that he nurtured alongside his interest in astronomy throughout his professional life. Even as he worked toward degrees in civil engineering at the University of Pennsylvania between 1917 and 1923, Barton pursued various opportunities with the armed forces.[36] In 1917, as he neared his bachelor's degree, Barton passed the exam to become a computer and tabulate data sets for the United States Naval Observatory, but he chose to continue his studies. Over the next two years, Barton worked on Army Sanitation Corps drainage and construction projects, leaving with a rank of sergeant. After teaching civil engineering at the University of Pennsylvania for ten years, Barton became head of the civil engineering department at the Pennsylvania Military College in 1930. Still, Barton managed to find time for astronomy. He co-authored a constellation guide in 1928 and provided technical support for an eclipse expedition led by members of Philadelphia's Franklin Institute in 1932. Barton was also an instructor for The Franklin Institute's Fels Planetarium when it opened in December 1933. As a result, when Barton joined the Hayden in 1935, he was the only staff member with experience teaching in a planetarium.

35. Ibid., 5.

36. Ibid.

Barton's experience and connections with the military, astronomy research, and planetarium presentation led him an early understanding that the Hayden could help fill the emerging need for Naval navigation training. Barton taught his first navigation courses for the United States Naval Academy at the Hayden in 1935, well before American entered World War II. By 1940, the Hayden staff were delivering special lectures for the navigation-focused 'N' Club of the United States Power Squadron.[37] In addition, the school of the Weems System of Navigation, the independent institution created by former Naval officer Phillip Van Horn Weems, who pioneered new techniques for navigation during the 1920s, hosted courses at the Hayden for the U. S. Naval Reserve Midshipmen's School in 1940.[38] As the prospect of American involvement in World War II grew, so too did the number of organizations that wanted to use planetariums for navigation training.

Barton led the vast majority of the Hayden's navigation and star identification courses by 1942, when he was named planetarium chair. That year, Barton secured a new contract with the Navy to educate 10,000 students of the Midshipman's School.[39] He took on those obligations in addition to giving public lectures on celestial navigation and star identification that were heavily attended by military enlistees. In 1943 alone, Barton oversaw 51 lectures that educated over 13,000 members of the United States Navy, including students from the Naval Training School of Indoctrination at Fort Schuyler.[40] Lockwood, meanwhile, taught voluntary star identification

37. American Museum of Natural History, *Annual Report, 1940*, 7. For more on the U. S. Power Squadron, a private organization that grew out of east coast yacht clubs in the early twentieth century, see "Early History," accessed April 8, 2020, https://www.usps.org/index.php/2015-02-25-21-23-02/2015-02-22-21-03-25.

38. Ibid., 7. For more on Phillip Van Horn Weems and his innovative approaches to navigation, see G. D. Dunlap, "Captain P. V. H. Weems and the Transition from Marine to Air Navigation," *Navigation* 40, no. 1 (March 1, 1993): 1–8.

39. American Museum of Natural History, *Annual Report, 1942*, 6–7.

40. American Museum of Natural History, *Annual Report, 1943*, 10.

courses for military enlistees and civilians two nights a week over five-week sessions.[41] The Hayden staff also supported some of the war-related education initiatives taking place in the public schools. In 1943 the staff made a special arrangement with the board of education to train high-school teachers to deliver pre-flight aviation courses for their students.[42]

Figure 12. Navigation class at Hayden Planetarium, 1943
Thane L. Bierwert (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/19075

Barton's ever-increasing course load at the Hayden was only part of his wartime work, all of which took a heavy toll on his health. In addition to the Hayden, Barton taught celestial navigation courses at Queens College. He also wrote what was described by museum director Albert Parr as the only celestial navigation book "entirely illustrated with three-dimensional

41. Gardner, "Sea and Skyfaring."

42. Ibid.

pictures, using two colors" and a set of instructions for how to navigate in emergency situations without instruments. [43] When he was not actively teaching, Barton consulted on the manufacture of war-related equipment and served as volunteer civilian intercept officer for New York's Fighter Wing air-raid detection headquarters.[44] Ultimately, Barton's workload proved unsustainable. On his fifty-first birthday, July 7, 1944, Barton suffered a heart attack and died. The museum's vice president Wayne Faunce wrote that Barton's failing health was due, in part, to "his consuming desire to give his all to the war effort."[45] Many at the museum considered Barton's death, Faunce continued, "as truly a war casualty as any soldier killed in action."[46]

Figure 13. Professor William H. Barton at the control panel in the Hayden Planetarium, 1944
Lee Boltin (photographer), AMNH Research Library | Digital Special Collections, accessed April 19, 2020, https://images.library.amnh.org/digital/index.php/items/show/45071

43. "Museum Lists Aid to Army and Navy: Preparation of Books, Exhibits and Other Data Revealed by Natural History Director," *New York Times*, February 1, 1944, 24.

44. Faunce, "Interpreter of the Heavens," 7.

45. Ibid., 6.

46. Ibid.

Immediately after the war, even without Barton and Addicott, the museum's two educational hubs were well positioned for the near future. The military celestial navigation courses ended in 1945 and the following year, new Hayden curator (and Navy veteran) Gordon Atwater introduced a series of public lectures and a thirty-week course for science teachers.[47] Meanwhile, the education department's staff used the portable exhibit techniques they developed during the war for temporary displays inside the museum, aiming to create the adaptable learning space the museum's leaders thought would be necessary for a world still in flux.[48] Based on the number of staff members listed in the annual reports, the educational staff had more than doubled from its pre-war low of nine back up to twenty-two. Department staff continued the full-day Platoon Program for school groups in collaboration with the New York City Board of Education, who provided funds and curricular guidance. Lastly, the education department resumed several of the programs that were suspended during the war, including the school loans and teacher workshops. But even as the museum's staff attempted to return to programmatic normalcy, they did so with a new understanding of their educational capacity. Museum educators had proven they could mold their programs to meet national needs—an ability they would have to apply again, sooner than they might have expected.

Visual Instruction in the Early Cold War

One of the museum's most accomplished educators, Grace Fisher Ramsey, emerged from the war years with a new program to promote visual instruction for teachers on a much broader scale than she'd attempted before. In 1945, Ramsey and the museum's supervisor of guest

47. "Planetarium Course to Begin," *New York Times*, September 18, 1945, 40.

48. American Museum of Natural History, *Annual Report, 1945* (New York: American Museum of Natural History, 1946), 11–12.

services, Irene Cypher, introduced the first of eight annual audiovisual institutes for teachers at the museum. Cypher and Ramsey created the institutes to be showcases for materials and methods for visual instruction. Teachers who attended the institutes experienced educational film screenings, cutting-edge classroom projection equipment, and demonstrations of new teaching materials and methods. For example, the first institute featured a large exhibit hall with forty-nine separate exhibitors including museums, school systems, and commercial agencies, all displaying visual materials for teachers to "examine and study."[49] At the second institute, Ramsey and Cypher debuted the museum's new Audio Visual Aids Information Center—a clearinghouse for teachers, students, and researchers that featured "catalogs, bulletins, pamphlets and samples of these many types of teaching aids."[50] And invited speakers introduced new technologies such as James MacAndrew, coordinator of radio station WNYE, who led a discussion with junior high students after a sample broadcast at the 1949 institute.[51]

The audiovisual institutes that Ramsey hosted at the museum with her collaborator Irene Cypher also allowed educators to share and learn methods for using visual instruction in their classrooms. Panel discussants and audiences at the first institute were an intentional mix of elementary and secondary teachers who engaged in collective discussions about various visual aids and how best to use them.[52] According to Cypher and Ramsey, the institute's participants largely agreed that careful selection and "wise integration of all forms" was critical for

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49. Grace F. Ramsey and Irene F. Cypher, "A Museum Inaugurates a 'Visual Aids Institute,'" *The Educational Screen* 24, no. 2 (February 1945): 60.

50. Grace F. Ramsey and Irene F. Cypher, "A Museum Continues Its Visual Aids Institute," *The Educational Screen* 25, no. 2 (February 1946): 86.

51. "Fifth Annual Audio-Visual Aids Institute," *The Educational Screen* 28, no. 3 (March 1949): 118.

52. "A Museum Inaugurates," 60.

success."[53] Teachers' showed their growing agency with assessing the value of the films in the 1947 institute, according to Cypher. She reported that the teacher comments after educational film screenings demonstrated that they had been applying "more critical standards."[54] But, at the 1952 institute, Cypher criticized teachers while tamping down excitement about new television technologies. In her estimation, teachers were dismayingly neglectful when using radio with their students and she saw no reason that television would fare better. The problem, Cypher opined, was the "teacher who teaches little children just as she was taught as a child."[55] At the same institute, Teachers College professor Paul W. F. Dewitt added, "we must work for the development of imaginative and resourceful teachers who are willing to try something different."[56]

Given the long and important history of visual instruction in the museum's education department, Cypher and Ramsey's audio-visual institutes held a curiously low status within the museum. None of the eight institutes were mentioned in any of the museum's annual reports for the years they were offered. In addition, the institutes were not featured or discussed in museum's publications like the member magazine *Natural History*. As a result, there are no details regarding how many teachers attended the institutes or how the events were received. The lack of attention given to the institutes may been due to Cypher and Ramsey's increasingly tenuous connection with the museum. Cypher, a native New Yorker who had earned her Ph.D. at New York University studying the development of dioramas in American museums, was

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53. Ibid.

54. Grace F. Ramsey and Irene F. Cypher, "Third Annual Museum Audio-Visual Aids Institute," *The Educational Screen* 26, no. 2 (February 1947): 95.

55. "State Use of Video in Education Seen: Dr. L. A. Wilson Tells of Plan for Chain of 11 Stations to Reach 97% of People," *New York Times*, January 15, 1952, 71.

56. Ibid.

employed at the American Museum of Natural History for only the first two institutes.[57] She co-coordinated the last six as professor of education at New York University. Ramsey retired in early 1952, not long after the last institute, and her departure may well have been expected for some time. The institutes, then, appear to reflect a department in flux, moving away from visual instruction and seeking a new instructional paradigm for the country and culture that was still taking shape after the war. Regardless, it was an oddly uneventful end to Ramsey's career, during which she adeptly maintained the department's position as an international leader in museum education.

The New Department of Public Instruction

The same year that Ramsey retired, the museum's leaders gave the Department of Education a dramatic facelift that effectively removed visual instruction as a framing pedagogy. The museum's administration reorganized several departments in 1952 based on an institutional efficiency study conducted by the management firm of Cresap, McCormick and Paget.[58] As part of the reorganization, the visual instruction programs on which Ramsey had built her career – the films, lantern slides, photos, and production of teaching materials – were divided between the Department of Exhibition and the manager of Special Activities.[59] John R. Saunders, a former geologist who had been working in the museum's education department since 1929, was appointed chairman of the renamed Department of Public Instruction. With the audiovisual materials moved elsewhere, Saunders and his staff were left to focus on "direct teaching of

57. Irene Fletcher Cypher, "The Development of the Diorama in the Museums of the United States" (Ph.D., New York, New York University, 1942).

58. American Museum of Natural History, *Annual Report, 1951* (New York: American Museum of Natural History: 1952), 3–4.

59. Ibid., 31–2.

classes and other organized groups."[60] That same year the department offered five in-service teacher courses, all approved by the New York City Deputy Superintendent of Schools, some earning credits from Hunter College and the City College of New York.[61] The department's programs were so popular that the museum had to secure grants from the city to hire enough instructors. Clearly the museum's educational status was unchanged, but the word "visual" wouldn't be used in internal references to the department's programs for the next twelve years.[62]

Figure 14. John Saunders speaks to Curriculum Committee of the New York Board of Education, 1952
Robert Elwood Logan and Alex J. Rota (photographers), AMNH Research Library | Digital Special Collections, accessed April 26, 2020, https://images.library.amnh.org/digital/index.php/item

The changes in the museum's education department mirrored broader changes in American science education, particularly a shift away from progressive teaching methods, such

60. Ibid., 31–2. Saunders resumed supervision of the media libraries in 1958.

61. American Museum of Natural History, *Annual Report, 1952* (New York: American Museum of Natural History: 1953), 17.

62. American Museum of Natural History, *Annual Report, 1964* (New York: American Museum of Natural History: 1965), 19. That year Peter Greenleaf was named Associate in Visual Education and worked in the museum's media libraries.

as visual instruction, and back to the rigor of academic subjects.[63] The educational movements that the museum's staff had used as guidelines for their school programs—nature study and visual instruction—were driven by progressive ideals like creating child-centered learning experiences to prepare students for everyday life and democratic citizenship.[64] These approaches were a rejoinder to rote memorization of facts in well-defined academic disciplines.[65] A new group of education reformers like historian Arthur Bestor emerged in the early 1950s, just as America's cold war with Russia was taking shape as a global contest between capitalist democracy and communism.[66] Bestor and his contemporaries argued that in order to win this new ideological battle, schools needed to teach with a renewed focus on traditional academic disciplines and that science instruction needed more direction from scientists. In other words, in order for America and democracy to win over communism, academic specialists needed to replace the professional educators who had been shaping classroom teaching since the 1930s and take control over the content of school curriculums.

The museum and its staff straddled the growing division between progressivism and traditionalism, setting the stage for an important institutional pivot. Beginning with George Sherwood's first collection loans for nature study teachers in 1903, the museum's staff and leadership openly aligned their work with educational progressives. Museum president and

63. For progressivism in American society and in schools, see William J. Reese, "The Origins of Progressive Education," *History of Education Quarterly* 41, no. 1 (2001): 1–24.

64. For more progressivism and nature-study, see Kohlstedt, Teaching Children Science. For progressivism and visual instruction, see Elizabeth Ann Wiatr, "Seeing American: Visual Education and the Making of Modern Observers, 1900–1935" (Ph.D., California, University of California, Irvine, 2003).

65. For more on the connections between American museums and the Progressive movement, see George E. Hein, *Progressive Museum Practice: John Dewey and Democracy* (Walnut Creek, Calif: Left Coast Press, 2012).

66. For more on Bestor and the 1950s shift in American science education, see John L Rudolph, *Scientists in the Classroom: The Cold War Reconstruction of American Science Education* (New York: Palgave, 2002).

vertebrate paleontologist Henry Osborn, for example, wrote in 1914 that "the museum is not a conservative but a progressive educational force, that it has a teaching quality or value peculiar to itself."[67] Writing in 1933, Grace Fisher Ramsey, argued for pedagogical training for museum educators because "the needs of progressive teachers must be understood."[68] Yet, the museum was also a preeminent scientific research institution, which its staff often argued was the foundation of the value of their educational programs. Moreover, beginning with Albert Bickmore in 1880, scientists were the first museum staff members to offer support programs for schools and continued to do so to varying degrees in the years since. In short, the museum had the internal expertise and resources to shift its instructional approach toward programs constructed around traditionalist interpretations of academic disciplines.

In one of the first moves away from instructional progressivism, Saunders reorganized the education department in 1954 and brought in staff who would lead museum programs built around scholarly research. Saunders reclassified the department's teacher courses as adult education programs and placed them under the supervision of C. Bruce Hunter. Little is known about Hunter's background other than he hailed from Nova Scotia and joined the museum's staff as an instructor in 1952, presumably based on his training as an archaeologist. Hunter's biggest contribution to the department was creating the museum's first travel tours for adults in 1956. In addition to the eleven courses for teachers offered that year, Hunter introduced a five-week trip for adults to explore the history and culture of Mexico and Central America, including Guatemala, Honduras, and the Yucatan.[69] Hunter also made arrangements with the board of

67. George Herbert Sherwood, *The Public Schools and the American Museum of Natural History: History and Present Status of Museum Instruction and the Proposed Extension to the Schools of Greater New York in the Years 1914 and 1915* (New York: American Museum of Natural History, 1914), 2.

68. Grace Fisher Ramsey, "Museum Courses for Teachers," *Museum News* 11 (1933): 6.

69. "Museum Sets Guided Tour," *Daily News (New York)*, June 3, 1956, 522.

education for teachers who joined the trip to earn six in-service credits.[70] That same year, Hunter led trips for the department staff to two of the museum's field stations to see if they could be used for education projects with New York City teachers.[71] Hunter would soon debut a transformative new program.

Post-War Teacher Education in the Hayden Planetarium

While the museum's educational staff experienced several major transitions after World War II, those working in the Hayden Planetarium weathered only leadership changes and shifts in priorities for astronomy teacher courses. The Hayden's new curator, Gordon Atwater, announced a new series of teacher astronomy courses in 1945 soon after he was hired, though his overarching goals reflected his military background.[72] Navy Lieutenant Commander Atwater had been the head of navigation at the Advanced Naval Training School at Fort Schuyler and worked closely with the late William Barton to refine the instructional strategies used in the Hayden courses for enlistees.[73] Atwater's plan for the planetarium's programs, according to the museum's president A. Perry Osborn, was an "expansion of navigation training and piloting classes for special groups."[74] Public navigation lectures were expected to continue, Osborn continued, "as will the close association with the New York City school system."[75]

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70. Ibid.

71. American Museum of Natural History, *Annual Report, 1956* (New York: American Museum of Natural History: 1957), 40.

72. "Museum of Natural History Here Will Be Modernized After the War," *New York Times*, 1943, 25; The only Hayden Planetarium course for teachers during the war was a 1943 navigation class for 250 high school teachers doing pre-flight training for students. See American Museum of Natural History, *Annual Report, 1943*, 10.

73 "Atwater, Navy Man, to Head Planetarium," *New York Times*, August 28, 1945, 17.

74. Ibid.

75. Ibid.

Under former Naval officer Gordon Atwater, the astronomy courses for New York City teachers were, based on the programs' assessments, almost exclusively devoted to astronomy content knowledge. The first fifteen-week teacher courses offered after Atwater joined the planetarium covered constellations and descriptive astronomy, two themes that recurred often in the Hayden's programs. Based on quizzes and exams for the course from subsequent years, participants weren't expected to have learned any methods for teaching astronomy in their classrooms. A multiple choice quiz on Stars and Constellations from May 2, 1946, for example, featured questions on the causes of sunspots and how to determine the "proper motion" of a star, with no questions asking teachers to explain how they might broach these topics with their students.[76] Similarly, the final exam for the 1947 astronomy course for high school teachers was exclusively fill-in questions such as, "What is the Moon's diameter"; "Of what is a Comet composed? (Describe briefly)"; and to identify the constellation to which certain stars belong.[77]

The strong emphasis on astronomy content in the Hayden teacher courses persisted through the early 1950s, even though more experienced educators assumed larger roles in the planetarium. In 1952, the museum announced a 30-session Descriptive Astronomy class, described as "an excellent refresher course for junior high school science teachers."[78] The Hayden's chairman and curator at the time was Robert R. Coles who had replaced Gordan

76. "Hayden Planetarium Stars and Constellations Class Quiz," American Museum-Hayden Planetarium, May 2, 1946, Central Archives, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Lectures, Astronomy Courses, American Museum of Natural History Library.

77. "Hayden Planetarium New York City Teachers' Astronomy Course Final Examination," American Museum-Hayden Planetarium, May 28, 1947, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Lectures, Astronomy Courses, Central Archives, American Museum of Natural History Library.

78. "Press Release: Descriptive Astronomy Course for Teachers Offered by Hayden Planetarium," American Museum of Natural History, September 30, 1952, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Lectures, Astronomy Courses, Central Archives, American Museum of Natural History Library.

Atwater in 1950.[79] The instructor of the course was assistant curator Catherine E. Barry. Both Coles and Barry started their careers at the museum as instructors in the education department around 1930. During the war, Coles left to serve in the Air Force and returned as the planetarium's chairman.[80] Barry, meanwhile, who studied astronomy as an undergraduate and attended Columbia University's Teachers College, worked as a classroom teacher before joining the museum's education department and was one of the planetarium's first lecturers.[81] Despite Barry and Coles' educational pedigrees, the Descriptive Astronomy course announcement made no mention of instructional methods. Instead, the course featured "a detailed study of the constellations seen from the northern and southern latitudes, with illustrative material and assigned reading on special types of astronomical objects such as nebulae, galaxies, star clusters and variable stars."[82]

There wouldn't be any pedagogically focused astronomy programs for teachers at the Hayden until Franklyn Branley was hired as associate astronomer and director of education services in 1956. Branley arrived at the planetarium as arguably the most accomplished professional educator in the museum's history.[83] In 1936, at the age of 20, Branley earned a lifetime teaching license from the New Paltz Normal School in New Paltz, New York, and

79. Atwater was fired in 1950 for his support of *Worlds Collide*, Immanuel Velikovsky's pseudo-scientific book about cataclysmic events in human history. For more see Ralph E. Juergens, "Minds in Chaos: A Recital of the Velikovsky Story," *American Behavioral Scientist* 7, no. 1 (September 1, 1963): 4–18.

80. "Robert Coles, L.I. Historian and Ex-Chief of Planetarium," *New York Times*, April 23, 1985, D27, sec. Business Day.

81. Vera Connolly, "Dorothy Bennett - Girl of the Month, She Hitched Her Ambition to the Stars," *Good Housekeeping*, July 1937.

82. "Press Release: Descriptive Anatomy," 1952.

83. "Franklyn M. Branley Personnel Summary," American Museum of Natural History, n.d., Central Archives, Vertical Files, American Museum of Natural History Library.

started teaching fourth grade. Six years later, Branley earned a B.S. in elementary school administration from New York University and began teaching in junior and senior high schools. Branley then attended Teachers College, where he received a master's degree and an Ed.D., both in science education.[84] Branley was hired as an associate professor at the Jersey State Teachers College will still working on his doctorate.[85] Prior to joining the Hayden staff, Branley had also established himself as a prolific writer, having authored several books on science education, including "Mars" and "Experiments in Science Travel" in 1955 alone.[86] Branley had been a teacher, teacher educator, education researcher, and an author of educational texts. He immediately began applying his background and skills to lead the Hayden Planetarium toward instruction-based courses for teachers.

Branley's intention to create Hayden astronomy courses for teachers that featured instructional methods was evident in his efforts to find programmatic partners. In November 1956, Branley began writing to deans and heads of regional colleges and teacher training institutions with proposals for collaborative astronomy courses for teachers. Included among his correspondents were the dean of Teachers College, the acting director of the Bureau of Inservice Training at the board of education in Brooklyn, and the dean of C.W. Post University in Long Island.[87] The Hayden, Branley argued in several letters, was "well fitted to do this because of our

84. Ibid.

85. Ibid.

86. "Press Release: Branley and Franklin Appointed to Planetarium Staff," American Museum of Natural History, September 23, 1956, Central Archives, Vertical Files, American Museum of Natural History Library.

87. Branley to Dr. Stephen M. Corey, November 8, 1956, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library; Branley to Dr. Fritz A. H. Leuchs, November 13, 1956, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library; Branley to Dr. R. G. Hoxie, November 14, 1956, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library.

unique facilities, and also because our staff includes both professional educators and professional astronomers."[88] Characterized in this way, Branley communicated that the Hayden was a source of astronomy content knowledge and expertise in presenting that information to students.

The courses Branley envisioned were implemented in short order, and his continued correspondence with the regional teacher education community reflected his dedication to giving classroom educators tools for instruction. Writing to Professor Forrest Irwin of Fairleigh-Dickinson's education department in November 1956, Branley announced a new course for astronomy teachers starting in fall of 1957 that would "include both descriptive astronomy and methods of presentation in the elementary and junior high school classroom."[89] A month later, Branley wrote to inform Dr. Fritz A. H. Leuchs, acting director of Brooklyn's Bureau of Inservice Training, about a proposed astronomy course for elementary teachers described as "a non-mathematical survey of the planets and stars, the sun and moon, the Milky Way galaxy and related topics with specific applications to the elementary school classroom."[90] The course announcement, which was released in April 1957, noted that "through use of materials readily available in home and classroom, teachers will develop techniques which will prove of immediate value in their work with children."[91] To that end, in 1957, Branley wrote to film production companies, telescope manufacturers, and book stores to build a list of recommended

88. F. M. Branley to Dr. Stephen M. Corey, Nov. 8, 1956.

89. Branley to Forrest Irwin, November 29, 1956, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library.

90. Branley to Dr. Fritz A. H. Leuchs, December 14, 1956, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library.

91. Franklyn M. Branley, "Astronomy for Elementary School Teachers (An In-Service Course)," American Museum-Hayden Planetarium, April 2, 1957, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library.

teaching materials.[92] Branley's methods proved to be invaluable in the years that followed, after the world was introduced to the Space Age in terrifying fashion with lasting implications for science teaching.

The Sputnik Effect(s): Educating for the Future Scientific Workforce

The museum staff newsletter, *The Grapevine*, described in detail the wide-ranging responses the Hayden Planetarium's staff had to the October 4, 1957, launch of the Russian satellite *Sputnik*.[93] That first weekend the entire staff worked around the clock answering phones and contributing to newspaper stories. In the week after the launch, Hayden staff appeared on five television and twelve radio broadcasts. A radio receiver tuned to the frequency of *Sputnik*'s broadcasts was placed in an exhibit hall and produced audible signals whenever the satellite was in range. A new exhibit on the planetarium's second floor showed the orbital characteristics and internal instruments of satellites and a map depicting *Sputnik*'s orbit and visibility from New York. Lastly, the staff created a new five-week course, "Artificial Earth Satellites."[94] Public response to the course was described as "tremendous."[95]

92. Branley to Frank A. Meyers, January 25, 1957, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library; Branley to Blackhawk Films, January 25, 1957, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library; Branley to Book Shop, Adler Planetarium, January 25, 1957, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Special Astronomy Courses with universities for Elementary School Teachers, Central Archives, American Museum of Natural History Library.

93. "Busy, Busy, Busy," *The Grapevine* 15, no. 2 (November 1, 1957): 1.

94. American Museum of Natural History, *Annual Report, 1957*, 42.

95. "Busy, Busy, Busy," 1.

Figure 15. Visitors at the Hayden Planetarium waiting for lecture after *Sputnik 1*, 1957
Boltin, Lee (photographer), AMNH Research Library | Digital Special Collections, accessed April 26, 2020, https://images.library.amnh.org/digital/index.php/items/show/45077

The way that the museum's teacher educators responded to *Sputnik* was largely defined by how America's federal and scientific leaders changed science education nationwide. In many ways, *Sputnik* simply added political urgency and public support to several science education initiatives that had been slowly gaining steam in the 1950s. Those initiatives were spearheaded by what historian John Rudolph described as "a unique collaborative effort" wherein "the United States Congress appropriated funds, the National Science Foundation provided guidance, and scientists of various sorts worked together to realize their vision of what science education could be."[96] But it wasn't until *Sputnik* that the federal government overturned decades of precedent to invest in public education through the 1958 National Defense Education Act.[97] The National Science Foundation was tasked with determining how that investment took shape in science

96. Rudolph, *Scientists in the Classroom*, 2.

97. See Barbara Barksdale Clowse, *Brainpower for the Cold War: The Sputnik Crisis and National Defense Education Act of 1958* (Westport, CT: Greenwood Press, 1981); Wayne J. Urban, *More than Science and Sputnik: The National Defense Education Act of 1958* (Tuscaloosa: University of Alabama Press, 2010).

classrooms. In this new era, scientists argued that teachers needed to strengthen their content knowledge and familiarity with scientific processes, which, it was hoped, would boost public support for the sciences and interest in scientific careers among talented students. In addition, *Sputnik* marked the dawn of the Space Age, giving astronomy new importance as a classroom subject.

Scientists took the lead in reframing American science education after *Sputnik*, but professional educators in New York City set the agenda for how the museum's staff would apply those changes to its teacher courses. During the 1950s, scientists had assumed a greater role in the museum's education department, and they were asked by the city's board of education to create courses that embraced the content-first ideals permeating science education. In a 1959 annual report, the chair of the education department, John Saunders, recorded sixteen teachers courses had been offered in the last year, all filled to capacity.[98] Only two of those courses "were planned to emphasize method," Saunders explained, while the rest were, "content courses designed to enrich the background of teachers . . . at the special request of the Board of Education."[99]

The national drive toward content-focused courses for science teachers provided a new purpose for the teacher institutes that had been developed by several of America's corporate and academic leaders and adopted by the National Science Foundation. The teacher institute model was introduced in 1944 when General Electric Company's A. D. Marshall initiated plans for a summer gathering of science teachers designed to improve classroom instruction and promote

98. "Annual Report of the Department of Public Instruction for the period July 1, 1958 to June 30, 1959," June 1, 1959, 7, Departmental Records, DR 048, American Museum of Natural History Library.

99. Ibid., 7.

the company to educators who could recruit young talent.[100] The Westinghouse Corporation and the Massachusetts Institute of Technology collaborated on a similar program in 1949 as did several other companies and universities in the 1950s. The National Science Foundation piloted its own institutes in the summer of 1953 at the Universities of Minnesota and Colorado. By 1959, the National Science Foundation's teacher institute programs were well established as content-focused events hosted by faculty members at colleges and universities. "The general object of the Institutes Section," read the 1959 *National Science Foundation Programs for Education in the Sciences* booklet, "is to make it possible for in-service teachers in elementary schools, secondary schools, and colleges to obtain additional instruction and to become acquainted with new developments in science and mathematics."[101]

The National Science Foundation's content-first aims for the teacher institutes were well aligned with the staff and ideologies of the museum's education department in the late 1950s. When John Saunders moved the teacher courses under adult programs in 1956, he also removed the pedagogical content from several so they could be marketed to the broader public. Saunders also hired staff with less teaching experience and more scientific training. In 1958, C. Bruce Hunter, supervisor of adult programs, described the qualifications needed to teach in the department. "Today," according to Hunter, "a minimum degree of bachelor of arts or science is required, in addition to training in some area of museum specialization."[102] Hunter, for example, held the concurrent position of adjunct professor of archeology at New York University. Kenneth

100. Hillier Krieghbaum and Hugh Rawson, *An Investment in Knowledge* (New York: New York University Press, 1969), 68.

101. National Science Foundation and Harry C. Kelly, *National Science Foundation Programs for Education in the Sciences* (Washington: U.S. Government Printing Office, 1959), 10.

102. C. Bruce Hunter, "Museum Courses as a Service to the Community," *Curator: The Museum Journal* 1, no. 2 (March 1, 1958): 55.

A. Chambers, one of the department's primary lecturers in the 1950s, earned degrees in wildlife management and adult education but had no formal training in K–12 education. Similarly, Christopher Schuberth had a master's in geology from New York University.[103] All three led museum field-study trips for adults and wrote related guidebooks that had no specific resources or activities for teachers. Even when Chambers wrote about teaching, he did so to argue that field research was essential to effective instruction.[104]

The First Museum-Based Teacher Institute

The museum's education department successfully applied for a National Science Foundation grant to offer a teacher institute in 1959 based on guidance from educators and a program to introduce teachers to scientific research. In announcing the grant, department chair Saunders noted that staff members had visited several of the museum's field stations to "survey these areas as possible work areas for educational projects in natural science that might be directed to natural science teachers in the New York City schools."[105] To ensure that their institute would be aligned with the changing priorities for training science teachers, Saunders and his staff consulted leading educators with the City College of New York School of Education, the board of education's supervisor of high school sciences, and its director of In-Service Training.[106] The program that resulted from these surveys and consultations was called "The Use

103. See C. Bruce Hunter, *A Guide to Ancient Maya Ruins* (1974); Kenneth A. Chambers, *A Country-Lover's Guide to Wildlife: Mammals, Amphibians, and Reptiles of the Northeastern United States* (1979); Roy A. Gallant, Christopher J. Schuberth, and American Museum of Natural History. *Discovering Rocks and Minerals; a Nature and Science Guide to Their Collection and Identification* (1967).

104. Kenneth A. Chambers, "Field-Work in Relation to Museum Classroom Teaching," *Curator: The Museum Journal* 1, no. 3 (June 1, 1958)

105. American Museum of Natural History, *Annual Report, 1956*, 40.

106. "Annual Report of the Department, 1958," 7.

of the Museum Field Station for Supplementing the Training of New York City Science Teachers in Techniques in Field Study."[107]

In the summer of 1959, the museum hosted the National Science Foundation-funded Summer Institute in Field Biology for New York high school teachers at its Archbold Biological Station in Lake Placid, Florida. At the time, Archbold was one of the museum's four research field stations with a 1,060-acre facility that was used by scientists from around the world. The teachers that were selected for the institute were given a research-based experience. As Hunter explained earlier that year, teachers "will gain valuable experience in field work and in the latest scientific methods through direct participation at a research station and in laboratories and by direct observation of the work of scientists."[108] The lead instructors from the museum's education department were self-identified zoologist Kenneth Chambers and self-identified botanist Robert A. Hellmann, who "provided high school teachers with much needed experiences in field study and research in zoology and botany."[109] There was no mention of activities designed to help teachers translate those experiences into classroom instruction.

107. Ibid.

108. "Museum Given School Grant," *Daily News (New York)*, January 11, 1959, 84.

109. American Museum of Natural History, *Annual Report, 1959*, 52. Both Chambers and Hellmann earned graduate degrees in adult education at Teachers College but had no extended experience with K–12 education.

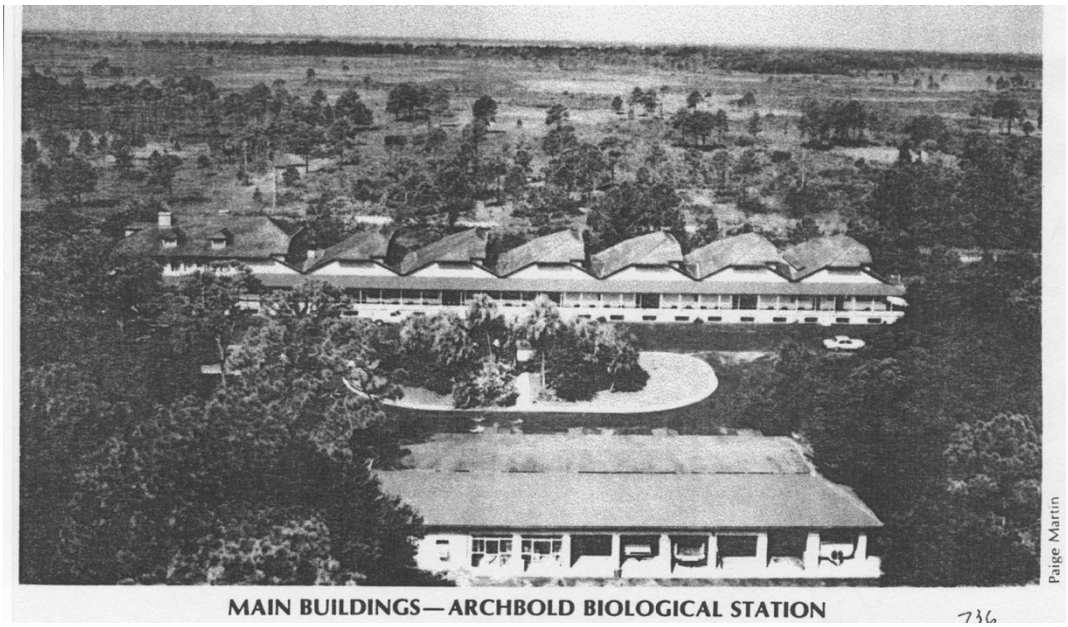

Figure 16. The museum's Archbold Research Station in Lake Placid, Florida, site of the museum's first Teacher Institute. Paige Martin (photographer), from Maria Minno and Ronald Myers, "Archbold Biological Station: Its History and Its Biology," The Palmetto 6, no. 4 (Winter 1986): 1.

The National Science Foundation renewed its grant to the museum's education department for teacher institutes in 1960 and 1961. The department held the 1960 institute at the museum's Southwestern Research Station near Portal, Arizona, on the eastern slope of the Chiricahua mountains. C. Bruce Hunter expanded the pool of applicants to include high school biology and earth-science teachers from around the nation.[110] Chambers returned as the zoology instructor and was joined by museum instructor/geologist Christopher Schuberth, whose area of specialization was an ideal fit for the station's arid climate. The museum itself was the site in 1961 for what was described as an "intensive" six-week institute in field geology and zoology for thirty high school science and biology teachers.[111]

110. "Teaching Session Slated at Portal," *Tucson Daily Citizen*, December 28, 1959. C. Bruce Hunter was the "principal investigator" for each of the Department of Public Instruction's teacher institutes between 1959 and 1961. See *National Science Foundation FY 1959 Annual Report*, accessed October 13, 2019; "National Science Foundation FY 1961 Annual Report," accessed April 18, 2020.

111. "Field Trips for Teachers," *Daily News (New York)*, January 8, 1961.

The education department's success in becoming the first American museum to receive National Science Foundation support for a teacher institute was a revealing landmark. In the estimation of the National Science Foundation, the museum had established itself as an institution capable of helping teachers at a level on par with colleges and universities. It seems clear that the department's longstanding history of teacher education, recent turn toward scientific staff, and the guidance of regional educators created a unique and compelling argument for the museum's worthiness. Indeed, after the American Museum of Natural History's education department, the next museum-based teacher institute was hosted by Franklyn Branley of the museum's Hayden Planetarium.

Teacher Institutes for Astronomy Instruction

While the museum's educational staff was busy establishing the first museum-based National Science Foundation teacher institutes, their counterparts at the Hayden Planetarium—led by educator Franklyn Branley—were building foundations for even greater success with the model. In 1959, the Hayden staff celebrated the Planetarium's twenty-fifth anniversary with a new Zeiss projector to modernize its presentations. Branley also introduced a new, National Science Foundation–funded "intensive training program in astronomy and space" for 200 high school students with guest lecturers from industry, academia, and the federal government.[112] The planetarium's staff also taught thirteen astronomy courses. While no comprehensive list of courses is available for 1959, Branley's summary for 1958 included two courses for teachers accredited by the New York City Board of Superintendents and regional colleges.[113] In just three

112. American Museum of Natural History, *Annual Report, 1959*, 42.

113. Franklyn M. Branley, "Formalized Planetarium Courses," *Curator: The Museum Journal* 1, no. 2 (March 1, 1958): 74.

years at the museum, Branley had built the planetarium into a diverse educational space capable of administering an education program funded by the National Science Foundation, which had yet to support a teacher institute focused on astronomy.

One of the more notable aspects of Branley's successful application to host a teacher institute was that he did little to mask his intention to foreground pedagogy even though the National Science Foundation was explicit in its preference for content-focused programming. Branley's files, which contain both the calls for teacher institute proposals and his own proposal drafts, appear to paint a picture of incongruent ideologies. For example, the National Science Foundation's 1960 proposal guide for In-Service Institutes for Elementary School Teachers states that they should broaden teachers' background knowledge and "emphasize instruction in the subject matter of mathematics and science rather than in methods of teaching them."[114] Branley's proposal draft, however, held as a core aim to "develop devices and procedures useful in the elementary school classroom."[115] Similarly, whereas the National Science Foundation call asserted that institutes were to be staffed by mathematicians and scientists that were competent in their fields and in "subject-matter presentation," the Hayden draft clarified that Branley would be the course director, citing his "20 years teaching experience at all levels of private and public education—elementary school through teachers college" as his primary qualification.[116] Branley

114. "In-Service Institutes for Elementary School Teachers and Supervisors of Mathematics and Science." National Science Foundation, January 1960, 1, Central Archives, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Astronomy and Space Science Summer Institutes In-Service for teachers and supervisors, American Museum of Natural History Library.

115. Franklyn M. Branley, "Draft of Narrative Portion of a Proposal for an InService Institute for Elementary School Teachers on Astronomy and Space Science," 1960, 2, Central Archives, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Astronomy and Space Science Summer Institutes In Service for teachers and supervisors, American Museum of Natural History Library.

116. "In-Service Institutes for Elementary, 1960," 1.; Branley, "Draft of Narrative Portion," 1960, 4.

also pointed to the planetarium's "considerable prestige in professional fields, as well as in the field of science education."[117]

Branley's report to the National Science Foundation after the 1961–1962 "Astronomy in the Space Age in-service institute for elementary teachers confirmed that his interest in teaching methods was not limited to proposal drafts. First, Branley explained that the institute was not a comprehensive survey course, but a "detailed treatment of certain selected topics in astronomy and space science."[118] Branley then listed the subjects covered over the course of the summer and added that "each topic was broadened by the presentation of approaches that were reasonable to both the lower and upper age levels of elementary school children."[119]

Figure 17. Pamphlet for Hayden Planetarium Teacher Institute, *Astronomy in the Space Age*, 1961
Central Archives, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Astronomy and Space Science Summer Institutes in Service for teachers and supervisors, American Museum of Natural History Library.

117. Branley, "Draft of Narrative Portion," 1960, 5.

118. Franklyn M. Branley, "Report on 1961–1962 In-Service Institute for Elementary School Science Teachers," 1962, 2, Central Archives, Hayden Planetarium 1:2 Lectures, Courses, Symposia, Astronomy and Space Science Summer Institutes in Service for teachers and supervisors, American Museum of Natural History Library.

119. Ibid., 2.

Branley's insistence on infusing pedagogy into the Hayden's in-service institutes for teachers speaks to both the importance he placed on instruction and the developmental phase that astronomy was in as a school subject. For Branley, the planetarium and the Department of Astronomy were fundamentally different than the museum's other research-based units. As Branley wrote in 1972: "Education is our reason for being. We are an educational institution that serves as a liaison between the professional astronomer and the lay audience."[120] Moreover, Branley thought teachers were particularly effective in getting information to the broader public. "Through the teachers," Branley argued, "you reach the vast audience of young people and their families."[121] But astronomy had been largely missing from school curriculums for decades before the launch of *Sputnik*.[122] Teachers that were being asked to deliver new astronomy units had no reliable methods for doing so. The National Science Foundation's program directors certainly recognized the pedagogical vacuum that astronomy teachers were entering, and by giving the Hayden Planetarium the first grant for an astronomy-focused teacher institute, they were effectively trusting Branley's vision for filling that void.

The National Science Foundation–funded teacher institutes at the museum were an important acknowledgement of the museum's accomplishments as an educational institution. For several years, the American Museum of Natural History was the only civic museum not associated with a university to host an institute. By contrast, during World War II museums around the country offered programs for military and public audiences similar to those at the American Museum of Natural History. Certainly, the urgency of each time period was different,

120. Franklyn M. Branley, "Education in Major Planetariums," *Annals of the New York Academy of Sciences* 198, no. 1 (1972): 193.

121. "Museum Personalities," n.d., Central Archives, Vertical Files, Franklyn Branley Biographical Folder, American Museum of Natural History Library.

122. Marché, *Theaters of Time and Space.*

but the national fervor around science education in the wake of *Sputnik* didn't seem to spur an analogous wave of teacher education programs in American science museums. The National Science Foundation wouldn't fund a teacher institute at another museum until 1965.[123]

The American Museum of Natural History's long history of educational programs likely factored in the funding decisions made by the National Science Foundation's program directors, because each group of educators at the museum staff proposed institutes based on new methods. Prior to submitting their proposals, both the museum's education department and the Hayden Planetarium made major shifts to their teacher-training models, muting and amplifying instructional methods, respectively. The museum's educators were changing their methods to meet teachers' changing needs at a pivotal historical moment, which, along with roughly eighty years of institutional experience using the museum's resources to support classroom educators, seems a compelling argument to receive funding from the National Science Foundation. In that sense, the final stage in the development of pedagogical authority at the museum was federal recognition that the museum's staff could tailor their programs to virtually any need, even when the country's needs were greatest.

In 1964 the New York State Department of Education funded the Hayden Planetarium to deliver astronomy workshops for teachers statewide.[124] The new partnership came roughly sixty years after the state ended its teacher lecture program with the museum after Albert Bickmore retired. In addition, the State Department of Education approved funding for the museum to host an earth-science teacher institute for the fall and spring of 1965–1966.[125] It is fitting that, with

123. Field Museum of Natural History. and Field Museum of Natural History, *Annual Report Field Museum of Natural History* vol. 1965 (Chicago: The Museum, 1965), 7; *National Science Foundation FY 1958–1965*.

124. American Museum of Natural History, *Annual Report, 1964* (New York: American Museum of Natural History, 1965), 12.

the museum nationally recognized as a leader in teacher education, its staff reengaged with the office that started the institution's journey toward pedagogical authority. The first contract New York's state school administrators signed with the museum was driven by concerns about preserving American identity in the face of immigration. The astronomy programs of the mid-1960s were driven by concerns about preserving American democracy under the specter of a possible war with Russia. The historical and cultural contexts of each program were dramatically different, but educators' trust in the instructional value of the museum's staff and resources, even eighty years later, was unchanged.

125. American Museum of Natural History, *Annual Report, 1965* (New York: American Museum of Natural History, 1966), 31.

Conclusion

Over the roughly fifty years between the American Museum of Natural History's National Science Foundation–funded teacher institutes in the late 1950s and the first cohort of the Master of Arts in Teaching program to certify classroom teachers in 2011, the museum's programs were largely variations on familiar themes. The museum's staff continued partnering with city and state school systems, just as the museum's scientists had done to create some of the first teacher-support programs in the late-nineteenth and early-twentieth centuries. In 1997 the museum's staff worked with the New York City Board of Education on an earth-science "variance," or alternate approach to instruction, in collaboration with faculty and staff from area colleges, universities, and research centers.[1] The resulting program, "Planet Earth," was hands-on, inquiry-based, and used technology and museum resources as learning tools. The Hayden Planetarium staff also continued to use strategic partnerships and federal funding to reach teachers. In 1992, the planetarium hosted a series of workshops with Columbia University's Astronomy Department using funds from the federal Elementary and Secondary Education Act's Title II Staff Development Program. Teachers attended lectures, conducted demonstrations, and learned about audiovisual materials for teaching space science to students.[2]

Within the museum, the education staff created new programs based on its longstanding philosophy that showing teachers how to use museum resources was a form of professional development for classroom practice. The museum's Teachers Associates Program in the early

1. American Museum of Natural History, *Annual Report, 1977–1978* (New York: American Museum of Natural History, 1978), 34.

2. American Museum of Natural History, *Annual Report, 1991–1992* (New York: American Museum of Natural History, 1992), 18.

1990s supported forty-three elementary and secondary math, science, and special-education teachers who worked with museum educators and scientists to establish "new collaborative networks to improve teachers' utilization of the museum's vast educational resources."[3] One of the program's goals was to prepare participants for taking on advocacy and leadership roles within their own educational communities. This included creating workshop and course materials "to enhance local and national curriculum reform guidelines" while also performing in-services for staff in their own schools.[4]

The museum's staff has also made regular upgrades to the teaching and learning facilities similar to the late-nineteenth-century auditorium improvements and the School Service Building in the mid-1920s. In 1973 the education department debuted the Alexander M. White Natural Science Center, the result of a major redesign of the education building's Natural Science Center and the entire second floor.[5] The following year, the museum opened a new Environmental Information Center with staff to answer questions from the public, stimulate environmental programs in schools, and help train teachers.[6] In 1997 the museum launched the National Center for Science Literacy, Education, and Technology, funded by NASA.[7] The Center was described as a nationwide teacher professional-development initiative built around "content, teaching, and learning strategies, and integrating technology into the curriculum."[8]

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3. American Museum of Natural History, *Annual Report, 1992–1993* (New York: American Museum of Natural History, 1993), 68.

4. Ibid.

5. American Museum of Natural History, *Annual Report, 1973–1974* (New York: American Museum of Natural History, 1974), 31.

6. American Museum of Natural History, *Annual Report, 1974–1975* (New York: American Museum of Natural History: 1975), 23.

7. American Museum of Natural History, *Annual Report, 1977–1978*, 6.

8. Ibid.

The teaching facilities and exhibits in the Hayden Planetarium have also been upgraded several times over the last fifty years. In 1972 the museum introduced the privately funded Guggenheim Space Theater, created from what had been the Copernican Planetarium. The museum also received funding for building an addition with an astronomy library and a gift shop.[9] The most radical change to the Hayden Planetarium was the Rose Center for Earth and Space that opened in 2000.[10] The 120-foot high, 333,500-square-foot facility for exhibition, research, and education envelops the planetarium dome. In 1999, "in anticipation" of the Rose Center, the museum's leadership established a department of astrophysics and recruited world-renowned scientists, including Neil deGrasse Tyson, who helped guide the creation of new exhibits and performed data analysis to create digital models of the Milky Way galaxy.[11] The educational outreach plan for the Rose Center naturally included teacher institutes, curricula, and teachers' guides.

Unlike with the previous museum expansions and upgrades, the museum's staff didn't radically change their educational approaches. Instead, the newer staff largely reapplied methods that had yielded past success. The education department summarized their work for teachers in 2003, showing the resilience of the museum's curricular partnerships and the resonance of Cold War–era thinking that teachers need to engage scientific research in order to maximize their performance. The museum's staff served more than 5,700 educators in the 2002–2003 school year through professional development programs, the museum's instructional resources, and "linking teachers to current scientific practice to help them translate science into effective

9. American Museum of Natural History, *Annual Report, 1972–1973* (New York: American Museum of Natural History), 1973, 17.

10. American Museum of Natural History, *Annual Report, 2000* (American Museum of Natural History, 2001), 6.

11. Ibid., 17–18.

teaching."[12] To deliver these programs, the department partnered with the New York City Department of Education and the United Federation of Teachers. The department staff also collaborated with the City University of New York, New York University, Teachers College at Columbia University, Bank Street College of Education, and Pace University. "The Museum's programs for educators match its unparalleled scientific and exhibition resources with content standards and curricula in schools," read the 2003 annual report, with programs "designed to meet the need for well-prepared, certified science teachers."[13]

The museum's Master of Arts in Teaching program was groundbreaking as the first teacher certification program offered by a civic research museum, but it too reframed methods that the museum's staff had been using for decades. Organizationally, the Master of Arts in Teaching is a collaboration between the museum and New York State—an arrangement almost as old as the museum's teacher programs.[14] The program was approved by New York State's Board of Regents, with the first two pilot years paid for through federal "Race to the Top" funding to improve America's schools. The program's curriculum, like many of the teacher courses offered at the museum, features both graduate-level science content and best methods for teaching those concepts, all guided by New York State's subject matter requirements for schools. The process by which teams of scientists and educators create the courses is central to the program's design. "The educators add a pedagogical perspective to teaching science," wrote

12. American Museum of Natural History, *Annual Report, 2001-2003* (New York: American Museum of Natural History, 2003), 22–3.

13. Ibid.

14. The first few years of the Albert Bickmore's teacher lectures were limited to teachers in New York City. Bickmore officially entered into a contract with New York State in 1884. For more, see chapter 2.

Patricia Nadeau and several of the program's other founders, "that will ultimately benefit both the Master of Arts in Teaching candidates and their future students."[15]

My goal is to understand how the museum has come to be seen as a legitimate site for teacher certification and how narrowing this analysis to teacher-support programs has brought the transformative contributions of professional educators into focus. In many cases, the influence of educators on the museum's programs for teachers was direct and overt. For example, the Committee on Advice comprised of New York State school superintendents dictated topics for Albert Bickmore's nineteenth-century lectures. In the early twentieth century, classroom teachers asked museum scientist George Sherwood for artifacts to teach nature study. Within the museum, former teacher Grace Fisher Ramsey reintroduced museum courses for teachers and articulated how museum experiences can make for better classroom educators. Franklyn Branley, the former teacher who led educational programs for the Hayden Planetarium, folded instructional methods into the previously content-heavy astronomy programs for teachers. In each instance, educators were clear about their goals, and then either personally created or directed museum staff to create solutions. In other instances, the influence of educators was passive or indirect. Museum staff used school curriculums as guideposts to create useful resources for teachers. The board of education was instrumental in encouraging the City of New York to approve funds for building improvements and expansions that the museum's staff used to create new programs. In short, educators set the museum's agenda for working with teachers.

Of course, the American Museum of Natural History has not operated in a vacuum and was far from the only museum that offered teacher-support programs. In the late 1870s, former teacher Lucretia Crocker and zoologist and curator of the Boston Society of Natural History,

15. Patricia A. Nadeau et al., "Pilot Program for Teaching Earth Science in New York," *Eos, Transactions American Geophysical Union* 94, no. 23 (June 4, 2013): 205–6.

Alpheus Hyatt, created the Teachers' School of Science that awarded certificates to participants several years before Bickmore's first lectures.[16] The director of the Brooklyn Children's Museum, Anna Billings Gallup, instituted a School of Pedagogy in 1904 to help teachers prepare their students for museum visits.[17] William Wheeler, director of the Milwaukee Public Museum (a hybrid institution with natural history and city history collections) established an artifact loan program for schools in 1888, fifteen years before Sherwood did the same at the American Museum of Natural History.[18] The City of Milwaukee even helped subsidize a building annex for the public museum's educational programs in 1926—the same year that the School Service Building at the American Museum of Natural History was completed.[19] Indeed, as Ramsey showed in her 1938 study of educational programs in American museums, the American Museum of Natural History was only one among dozens of museums that supported teachers' work in classrooms, and that number has only grown in the years since.[20]

What distinguishes the teacher programming offered at the American Museum of Natural History are the significance, scale, and consistency of such offerings. Albert Bickmore's teacher lectures were not the first in the nation, but they shaped classroom instruction throughout New York State and were the means by which New York State school superintendents created the

16. Sally Gregory Kohlstedt, "Innovative Niche Scientists: Women's Role in Reframing North American Museums, 1880–1930," *Centaurus* 55, no. 2 (May 1, 2013): 157.

17. Ibid., 159.

18. Nancy Oestreich Lurie, *A Special Style: The Milwaukee Public Museum, 1882-1982* (Milwaukee, WI: Milwaukee Public Museum, 1983), 19. Wheeler's official title was "custodian" which was given to the de facto director of the Milwaukee Public Museum.

19. Ibid., 61.

20. Grace Fisher Ramsey, *Educational Work in Museums of the United States; Development, Methods and Trends* (New York, NY: The H. W. Wilson Company, 1938). For more information on modern teacher-support programs in museums, see Michelle Phillips, Doreen Finkelstein, and Saundra Wever-Frerichs, "School Site to Museum Floor: How Informal Science Institutions Work with Schools," *International Journal of Science Education* 29, no. 12 (October 2007): 1489–1507.

country's first administrative unit for visual instruction.[21] Sherwood was not the first museum scientist to create artifact collections for loan to schools, though the program he started was quickly accepted throughout the city and grew large enough to justify a major building expansion explicitly for educational programs. Similarly, the School Service Building was not the first facility constructed specifically for museum-based educational programs. However, the School Service Building was a critical resource in Grace Fisher Ramsey's efforts to validate the museums' role in training classroom teachers. The museum's educational staff was, however, the first to receive funding from the National Science Foundation to offer teacher institutes, which set a precedent for federal support of museum educational work that continues nationwide. Staff members at the museum have offered some type of teacher support or training each year since Bickmore's first lecture in 1880—a powerful affirmation of the institutional priority the museum's leaders have placed on helping classroom educators.

The reasons why the museum's staff has been so effective for so long at offering teacher programs are deeply interconnected, but they can be parsed into public financial support, institutional motivation, and the presence of educators. To illustrate the importance of each of these factors, I'll compare the development of teacher programs at the American Museum of Natural History with its closest institutional peer, Chicago's Field Museum. The Field Museum's staff offered a relatively sparse selection of teacher education programs over the same period. The similarities between the Field Museum and the American Museum of Natural History allow us to draw some preliminary conclusions from their programmatic differences. Both are large, research-based natural history museums in well-populated, economically and culturally significant American cities. Both museums' scientific staff conduct world-class research across

21. Kohlstedt, "Innovative Niche Scientists."

the natural sciences and anthropology, and each has well-regarded exhibit halls that have drawn large numbers of school groups since their respective openings. All museums, however, are unique institutions and products of their cultural contexts. Still, the differences between the history of educational programs at the Field Museum and at the American Museum of Natural History are revealing.

For the American Museum of Natural History, it is almost impossible to fully separate the municipal support from its institutional motivation to provide educational services, and the subsequent collaborations with and hiring of professional educators. When the American Museum was established in 1869, the City of New York donated the land and paid for the construction of a new building, and then promised to subsidize the museum's maintenance costs in perpetuity. Because of the city's support, the museum's leaders have consistently prioritized delivering services for the public, primarily through education. In many cases, the museum's staff worked with school administrators to create programs, particularly for teachers, as a form of return on public investment. In order to meet the needs of teachers and students, the museum's education curator George Sherwood hired staff with teaching experience. Staff educators used the museum's resources to develop new approaches and build educational partnerships to better support teachers. In many ways, they used their collective pedagogical expertise to extract instructional value from the museum's exhibits, collections, and facilities, while constantly exploring methods for teaching science. As a result, museum educators were able to quickly and adeptly tailor their methods to train critical workforces during times of national urgency.

Compared to the American Museum of Natural History, the Field Museum in Chicago received little public support. The Field Museum is named after department store magnate Marshall Field, who donated $1 million in 1893 to create a new natural history museum using

leftovers from that year's Chicago Columbian Exposition.[22] Chicago's South Park commissioners did agree to give the new museum an annual allotment of $15,000, but that contribution would ultimately cover only a fraction of its yearly operating expenses.[23] The Field Museum opened in 1894 in the Exposition's Fine Arts Building—a temporary facility expected to be razed after the event. The museum's leaders didn't have the means to follow through on their plans to construct a new building until Marshall Field died in 1906 and left the institution another eight million dollars in his will.[24] The museum's permanent building opened to the public fifteen years later.[25]

Without substantive investment from the City of Chicago, it took private funding for the Field Museum staff to realize their goals for partnerships with schools. An early challenge for the Field Museum was that the location of its original facility made school field trips impractical.[26] In other instances, school educators simply chose to partner with the smaller, more educationally focused Chicago Academy of Sciences.[27] The Field Museum staff didn't have a clearly defined educational program until 1911, when banker Norman Wait Harris endowed an exhibit loan

22. Oliver C. Farrington, "A Brief History of Field Museum from 1893 to 1930," *Field Museum News* 1, no. 1 (January 1930): 1,3.

23 . Oliver C. Farrington, "A Brief History of Field Museum," *Field Museum News* 1, no. 4 (April 1930): 5; The city of Chicago gives the Field Museum a yearly payment based on city tax revenue. Based on financial statements in the Field Museum's annual reports, the city's contribution was often less than half of the museum's general costs.

24. Oliver C. Farrington, "History of Field Museum," *Field Museum News* 1, no. 7 (July 1930): 4.

25. Oliver C. Farrington, "History of Field Museum," *Field Museum News* 1, no. 10 (October 1930): 4.

26. Jessica J. Wood, "An Emergent Museum-School Partnership: The Field Columbian Museum and Chicago Public Schools at the Turn of the Nineteenth Century" (University of Wisconsin-Madison, 2007).

27. Ibid., 25. For more on the educational programs at the Chicago Academy of Sciences, see Edward Timothy Klunk, "The Chicago Academy of Sciences: The Development and Method of Educational Work in Natural History" (Ph.D., Loyola University Chicago, 1995). The Chicago Academy of Science was founded in 1857 and nearly a world-class natural history museum until it was destroyed in the Great Chicago Fire of 1871. It was reopened in 1893 with a more regional and educational focus.

program for schools.[28] In 1925, Anna Louise Raymond, widow of a Chicago-area manufacturer, funded a museum guide/lecture program (often called the Raymond Foundation) that entrenched professional educators in the museum for the first time.[29]

Some of the Field Museum's educators did occasionally work with teachers, though their goal was to improve student learning in the museum. For example, not long after the Raymond lecture program was established, its staff partnered with the Chicago Board of Education to connect the museum's exhibits with school curriculums, including an "Index to Visual Aids" for teachers.[30] Raymond Foundation educators led the museum's first course for science teachers in 1939, though it was designed to maximize student learning among the exhibits, not classrooms.[31] Based on a survey of Field Museum annual reports, a National Science Foundation-funded six-day course for elementary earth science teachers in the summer of 1965 was the first program to help teachers with classroom instruction.[32] Unlike the American Museum staff, Field Museum educators did not see their institution as a laboratory for classroom instruction. This perspective was articulated by Miriam Wood, who was a Field Museum educator from 1929 to 1969, named chief of the Raymond Foundation in 1940, and earned a master's degree in education from Northwestern University. [33] In 1968 Wood argued that the scope of museum education should be

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28. Stephen C. Simms, *Field Museum and the Child. An Outline of the Work Carried on by the Field Museum of Natural History among School Children of Chicago* (Chicago: Field Museum of Natural History, 1928.

29. Ibid. According to Simms, a designated lecturer was first hired at the Field Museum in 1922, as school and scientific work increased.

30. Ibid., 22.

31. "Raymond Foundation Assists Teachers of Science," *Field Museum News* v. 11, no. 4 (April 1940): 3. The Field Museum also partnered with the Art Institute of Chicago to offer a teacher training course during the 1930s for drawing museum artifacts and specimens. For more, see Field Museum of Natural History, *Annual Report of the Director to the Board of Trustees for the Year 1931* (Chicago: Field Museum of Natural History, 1931), 175.

32. Field Museum of Natural History, *Annual Report Field Museum of Natural History 1965* (Chicago: Field Museum of Natural History, 1965), 7.

limited to facilities and science: "the important thing for us to remember is that we must confine our plans to conform to our unique contributions—our collections, exhibits and knowledge. We must never attempt to do in a museum that which the teacher can do better in a classroom."[34]

This comparative summary isn't an attempt to make definitive claims of causality, but to underscore that the staff of the American Museum of Natural History enjoyed support and creative liberties that aren't evident in the history of programs at the Field Museum. This distinction calls attention to factors that may well facilitate, or limit, the development of pedagogical authority. For example, few would question the importance of funding to museum staff supporting schools, but less clear is how funding sources shape the nature of the resulting programs. The staff of the American Museum of Natural History were clearly motivated by public money to create new ways to support teachers. But did the limited funding from the City of Chicago and the lukewarm response of the public schools dull the Field Museum staff's interest in cultivating educational partnerships? Were the Field Museum's educators confined to the goals set by their programs' benefactors? It is important to note that these historical differences were not prescriptive. The Field Museum now offers a robust suite of educational programs, including several for teachers.[35] Having said that, it is reasonable to question if any school administrators would deem the Field Museum an appropriate institution to certify classroom teachers given the relative lack of explicitly pedagogical work in its history.

33. "Miriam Wood," *Chicago Tribune*, May 15, 1988, 36; Northwestern University, *Annual Commencement* (Evanston, IL: The University, 1943), 23.

34. Miriam Wood, "A Museum's Contribution to Curriculum," *Museum News* 45, no. 6 (1967): 36–37.

35. "Teacher Professional Development," Field Museum of Natural History, April 30, 2018, https://www.fieldmuseum.org/teacher-professional-development.

Ultimately, the beneficiaries of the unique circumstances at the American Museum of Natural History were the professional educators who were among the first external actors to recognize that museum programs could be used to amplify their own interests. These educators were followed by government agencies, like the New York City Department of Public Health that created collection loans; foreign governments and corporations that donated promotional films to the museum's school media library; and the American military that used portable exhibits and the planetarium to train enlistees. Each of these instances warrant closer study to better understand why those outside entities wanted to work through the museum's programs. Museum leaders, meanwhile, made strategic partnerships that let outside interests utilize the museum's cultural authority to access to audiences in exchange for funds, content, and the added prestige that powerful collaborators provided. Moreover, this was not an isolated or historically contingent phenomenon. For example, professional scientists and engineers created recruitment programs at Philadelphia's Franklin Institute Science Museum during the Cold War.[36] Historians have identified and criticized outside influence—particularly from corporations—on museum exhibits.[37] This study adds to the growing body of evidence showing that museum programs have been stages for outside agendas as well.

Not all educators were the same or had similar interests, however. In particular, teasing apart the education administrators and teachers that I collapsed into one broad category of professional educators reveals that each subgroup had different goals. Education administrators

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36. See D. O. McCullough, "The Franklin Institute Science Museum's Cold War Consortium for Science Recruitment, 1955-1960," *American Educational History Journal* 46, no. 1 (January 2019): 107–23.

37. See Victoria Cain, "'Attraction, Attention, and Desire': Consumer Culture as Pedagogical Paradigm in Museums in the United States, 1900-1930," *Paedagogica Historica* 48, no. 5 (October 2012): 745–69, https://doi.org/10.1080/00309230.2012.667422; Russell Douglass Jones, "Engineering History: The Foundation of Industrial Museums in the United States" (Ph.D., Cleveland, OH, Case Western Reserve University, 2001); Steven Conn, *Do Museums Still Need Objects?* (Philadelphia: University of Pennsylvania Press, 2010).

at both state and city levels partnered with the American Museum in the late nineteenth century to help socialize immigrant students and for both financial and instructional efficiency. Those administrators saw museum lectures as an ideal way to teach the English language and what were deemed to be American values. Members of the New York City Board of Education in the 1920s were less transparent in their interests, though historians have shown that the visual instruction movement of that period was used to inculcate new Americans with conservative views on citizenship.[38] City administrators, meanwhile, used the museum's media resources as a method for teaching large groups of students in overcrowded schools. Administrators in the city's school board and regional teacher training institutions were similarly driven by efficiency. Once the museum's staff had shown their ability to educate pre-service teachers on how to use artifacts and images with students, teacher-training organizations opted to offer credits for museum courses instead of bearing the costs of delivering their own versions.

While school administrators were largely driven by concerns about socializing immigrants and efficiency, classroom educators were more interested in improving student learning. The teachers who spurred the museum's early-twentieth-century loan collection program by requesting artifacts wanted the resources to effectively teach the new nature-study curriculum. For the same reason, school educators also requested that the museum create a nature-study focused lecture program for students. Teachers' prevailing interest in instruction was also evident in their evaluations and reflections on Sherwood's collection loans, Ramsey's teacher courses in the 1930s, and the post-World War II visual instruction institutes. Many teachers shared administrators' interests in in socializing students, but these concerns were

38. See Elizabeth Ann Wiatr, "Seeing American: Visual Education and the Making of Modern Observers, 1900–1935" (Ph.D., University of California, Irvine, 2003); Victoria E. M. Cain, "Seeing the World: Media and Vision in US Geography Classrooms, 1890–1930," *Early Popular Visual Culture* 13, no. 4 (November 2015): 276–92.

largely secondary to meeting curricular outcomes for student performance. Museum educators proved adept at meeting these ends as well.

Part of educators' success in creating instructional value from the museum was their ability to function as content generalists. The museum's first educator, scientist Albert Bickmore, was both a naturalist and an ethnologist, capable of building a wide range of illustrated lectures. Clyde Fisher, the first trained educator hired to work on the museum's school programs was a former teacher, botanist, a birder, and later successfully built the museum's astronomy department. Grace Fisher Ramsey's work in visual instruction meant her primary focus was on how to teach, though she also led discipline-specific courses and conducted ethnology research. Even the scientist-educators of the 1950s taught museum programs on topics outside of their area of expertise. The museum's educators were not limited to a content specialization, and therefore could mine all of the institution's resources to support an array of teachers. Their work across multiple academic disciplines for disparate audiences emphasized the effectiveness of the methods they were using; approaches that remain the substance of museum pedagogy.

Museum educators were also surprisingly self-sufficient, which calls into question previous scholars' assertion that museum education has negatively impacted science research. To be fair, there were certainly periods in the museum's history when its trustees had to subsidize school programs, perhaps using money that might have otherwise been allocated to research projects. However, many of the museum's programs were almost fully funded by public money, (such as Bickmore's lectures—though Bickmore himself paid for his research trips), private benefactors like Felix Warburg who kept the education department afloat during the Great Depression, or even federal funding in the years after *Sputnik*. In addition, the museum's educators proved to be proficient explorers in their own right, and following Bickmore's

example, often went on self-funded expeditions to collect artifacts and create films for school programs. Moreover, the museum's educational programs weighed heavily in funding decisions made by the city of New York to build out and upgrade the museum's facilities. These decisions often directly benefitted the museum's scientists, showing that there have been occasions when the museum's educators have helped support researchers. In sum, the institutional impact of museum educational programs is multifaceted, and more research is needed to understand how those dynamics have shaped individual organizations and the field as a whole.

Still, many questions about the museum's educators and their relationships with school administrators and teachers remain. For example, the historical records reviewed for this study featured almost no discussions of diversity or equity (with the exception of the museum's longstanding programs for blind learners) which limits our ability to determine if teachers from certain areas or of different student demographics were privileged or excluded by these collaborative programs. The museum itself may well have been discriminatory. The writings of Henry Osborn, the museum's president during the early twentieth century, are peppered with racist arguments informed by his obsession with the pseudo-science of eugenics, which was part of his interest in education. He was convinced that the museum's resources might redeem students that immigrated from undesirable European countries. Osborn also infused his exhibits with baseless theories despite protests of scientists in his own museum.[39] As a result, students and teachers that visited those displays were bombarded with images and language that fed into cultural and racial oppression and exclusion.[40] The legacy of these ideologies (which by no

39. Victoria E. M. Cain, "'The Direct Medium of the Vision': Visual Education, Virtual Witnessing and the Prehistoric Past at the American Museum of Natural History, 1890-1923," *Journal of Visual Culture* 9, no. 3 (December 1, 2010): 292.

40. Jennifer Adams framed her study of the American Museum of Natural History's educational history with a powerful and instructive reflection on how the museum's racist imagery impacted her as a person of color when she

means were exclusive to the American Museum of Natural History) are still subtly evident in museum exhibits and teaching, based in part on the continuing struggle of modern museum leaders to enact their stated goals for institutional equity.[41] A dedicated historical investigation into how museum programs for teachers and students have reproduced racist and exclusionary practices would be useful to museum practitioners working to create inclusive learning spaces today.

This project also raises important questions about women's historical roles in museums, particularly as educators. Historians who have studied how aspiring women scientists navigated institutional sexism in American science museums have argued they made their mark through educational programs.[42] Some of those women helped develop museum education in the early twentieth century as leaders of smaller institutions, such as Anna Billings Gallup at the Brooklyn Children's Museum. This narrative is complicated by the story of teacher-support programs at the American Museum of Natural History in two ways. First, the educational programs at the American Museum were led by men with scientific training until World War II. The leadership of male scientists was likely a symptom of institutional sexism in a large research museum, the importance of education to the museum's leadership, the absence of professional educators in the museum, or some combination of all three. Second, there is little evidence that the women who made significant contributions to educational programs at the American Museum did so after

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came with school groups as a child. See Jennifer D. Adams, "The Historical Context of Science and Education at the American Museum of Natural History," *Cultural Studies of Science Education* 2, no. 2 (July 25, 2007): 393–440.

41. For more on museums and equity, see Noah Weeth Feinstein and David Meshoulam, "Science for What Public? Addressing Equity in American Science Museums and Science Centers," *Journal of Research in Science Teaching* 51, no. 3 (March 1, 2014): 368–94; Noah Weeth Feinstein, "Equity and the Meaning of Science Learning: A Defining Challenge for Science Museums," *Science Education* 101, no. 4 (July 2017): 533–38.

42. See Kohlstedt, "Innovative Niche Scientists"; Leslie Madsen-Brooks, "To Study, to Control, and to Love: Women Scientists in American Natural History Institutions, 1880–1950" (University of California, Davis, 2006).

being excluded from careers in science. That lack of evidence can be attributed to the marginalization of women's stories (even within museum education), the growing professionalism of trained educators, the emergence of museum education as a viable field to which young women might aspire, or all of the above. More scholarship is needed to further illuminate how women scientists and educators worked in and through museums.

Turning back to present day museum education, it is natural to ask, now with a better understanding of the role educators have played in the development of the museum's pedagogical authority, how this study should inform current practices for teacher-support programs in museums. The short answer is that these findings suggest that educators, be they school- or museum-based, should remain central figures in defining the goals and methods for such programs. The larger picture, however, is more complex. My goal with this project was to understand how we have come to the perception that museums are appropriate spaces to train classroom science teachers, which is a very different project than trying to ascertain if museums should be viewed in this way or how effective museum staff have been in doing this work.

I would argue, however, that understanding *why* we think of museums as spaces for training teachers is critical for maximizing the potential of those efforts. If one presumes that the value of museums for teachers comes from scientific research, then support programs should naturally be "top-down" with museum staff distributing knowledge to classroom educators. Instead, this project shows that classroom teachers and museum educators have been partners in finding new and creative ways to support science learners, operating as a de-facto think-tank for best methods in science teaching. Strengthening the longstanding collaborative relationship between school and museum educators—and taking guidance from the fruits of their labors—

seems the most effective way to improve science teaching in institutions of all kinds. That said, based on a 2007 survey, 75 percent of the staff delivering teacher professional development programs in informal science institutions like museums held a teaching certificate themselves.[43] Indeed, teaching in museums may not be so "distinct from the school experience" after all.

43. Phillips, "School Site to Museum," 1503.

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