

History as an Educational Tool: The Educational Turn of the Bakken Museum

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Abstract

The history of the Bakken Museum, the Museum of Electricity in Life, is useful to understand the universality and particularity of a local science museum. Beginning with the small collections at the medical device company, the Bakken Museum has expanded its scope and facilities by reidentifying its mission from research institute to educational center. The educational turn of the Bakken Museum has been completed with two remarkable events: the launch of the Summer Institute in 1984 and the construction of the new education facility, New Wing, in 1999. During this change, the museum staff developed unique strategies for public engagement, using the history of science and technology as an educational tool. The shift of the Bakken Museum's mission provides an excellent example of how a local museum could meet the social needs for museums to be educational centers by utilizing its history and collections.

Keywords: *The Bakken Museum, Science Museum, Science Education, History of Electricity in Life, Educational Turn of Museums in the 1980s*

1. INTRODUCTION

The Bakken Museum in Minnesota, USA, has a unique history. Starting with the small collections of an entrepreneur in 1969, the collection becomes a library and museum with one of the most extraordinary collections in the history of electricity in life[1]. During the 50 years since its establishment, the small museum for a few employees of Medtronic, Inc. has expanded its collections as well as its space with 2,500 artifacts and 11,000 books and journals in 25,000 square feet of a Gothic-style mansion. The place for limited visitors and scholars is now filled with annual visitors of more than 76,000 of students, parents, teachers, and adults[2]. This dramatic change was at its peak during the 1980s and 1990s when the Bakken Museum switched its identity from research institute to educational center.

The story started from the curiosity of Earl E. Bakken (1924-2018, Figure 1). Known as the founder of Medtronic, the world's largest medical device company by 2017 revenues, Earl Bakken was born in 1924 to Florence and Osva Bakken of Minneapolis. Many biographical articles on Earl Bakken point out 1932 as a significant year for his career in electricity, when he watched the film *Frankenstein* in his age of eight [3]. From his early years, Bakken continuously fiddled with electrical equipment such as batteries, wires, and buzzers. Fascinated by electricity in medical use, he received B.S and Master's degree in electrical engineering from the University of Minnesota. Beginning by providing ad hoc medical equipment repairs as a graduate student, Bakken co-founded Medtronic in 1949 with his brother-in-law, Palmer Hermundslie [4]. After being

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famous by inventing the first wearable, external, battery-powered cardiac pacemaker in 1958s, he broadened his interest to include the history of electricity for medical purposes. His collection of electricity in history began when Bakken asked Dennis Stillings, a technical librarian at Medtronic, to find “a few old medical electrical machines” in 1969[5].



Figure 1. Earl E. Bakken with his first pacemaker

The gradual opening of the museum’s door to the larger public is the most remarkable feature in the history of the Bakken Museum. Since 1969, not only has the number of artifacts in the collection dramatically multiplied, but its accessibility also increased. While the Medtronic Museum of Electricity in Life, where housed Earl Bakken’s collection, was opened at its St. Anthony headquarters of Medtronic and then moved to a Medtronic branch in Brooklyn Park during the early 1970s, the library was restricted to the employees of the company. Ever since the collection found a new place at West Winds[6], the current location of The Bakken Museum, the collection has become more accessible to diverse people. This increase of accessibility was the result of “educational turn” of the museum’s mission during the 1980s and 1990s.

This study aims to analyze the educational turn of the Bakken Museum in two contexts, social and institutional. First, the transition of the museum’s function from a private collection to an educational institution will be investigated in social and educational circumstances. By focusing on the two significant years of educational turn, 1984, the year when the first educational program started, and 1999, the year when the renovation to attach the New Wing began, this paper shows how the Bakken Museum had modified its mission and identity to meet contemporary social needs. Second, the specific strategies of the Bakken Museum to attract more people during the educational turn will be examined. For this, this study explores how the Bakken Museum utilized its collection by hiring historians of science and medicine and by developing narratives of two historical figures, Benjamin Franklin and Frankenstein. The history of the Bakken Museum is meaningful to understand the universality and particularity of a local science museum, which requires meeting social needs as an education center and devising unique exhibitions and programs based on its collections. The Bakken’s strategies to transform its mission according to social and institutional needs will provide fresh insight to local museums around the world.

2. WINDS OF CHANGE: CHRONOLOGY OF THE BAKKEN MUSEUM

Before examining two specific years of the educational turn of the Bakken Museum, tracing the whole history of the museum focusing on its accessibility will be useful to understand the change of the museum's mission. The history of increasing public accessibility of the Bakken Museum can be divided into three periods: a period as a hidden vault (1977-1983), a growing local institution (1984-1998), and a platform of science education (1999 to the present).

A Hidden Vault (1977 – 1983)

When it settled at *West Winds* in 1977, Earl Bakken's collection was renamed the Bakken Museum of Electricity in Life. Although the collection had the name "museum," the books and instruments were not accessible to anyone who visited the museum. Not only there was no open hours for the general public but the collections were also restricted to a few pre-booked researchers. The location of *West Winds*, located in a quiet residential district, was also far from the accessibility.

From 1979 to 1980, the Bakken Museum launched two programs to improve their accessibility: the publication of the newsletter and concert series of the chamber orchestra. The first newsletter of the Bakken Museum, *Electric Quarterly*, was published in the Summer of 1979. On the front page, the publisher admitted the limited facilities for public opening but its aspiration to be more accessible, saying,

Since we have neither adequate staff nor the facilities required to be open to visitors on a daily basis, our efforts at publicity must necessarily be limited ... [however,] we very much do want to become better-known as a historical resource and as a comfortable and congenial setting for a variety of science- and arts-related meetings, receptions, film showings, concerts, etc. [7].

This statement shows the museum's ambition to be a cultural hub rather than an educational center. During the 1970s, the Bakken Museum had little intention to use its collection for educational purpose.

In 1981, the Bakken Museum started to offer two research fellowships funded by the Minneapolis Foundation: Grants-in-aid of research and fellowship for graduate students, junior and senior scholars. Although the museum had been used for several meetings and lectures, these fellowships were the first research-related programs that the museum initiated. Geoffrey Sutton, from Princeton University, was the first recipient of the junior fellowship. Right after receiving his doctorate, Sutton started two research projects at the Bakken Museum on electricity in the 18th century and the role of the University of Heidelberg in the 19th century[8]. While visiting, Sutton gave several lectures at the Bakken Museum and the University of Minnesota.

As the Bakken Museum began to provide research opportunities for scholars, the mission of the museum was also revised. Most strikingly, in 1981, the museum changed its name from the Bakken "Museum" of Electricity in Life to the Bakken "Library" of Electricity in Life. This change, from museum to library, shows that the educational mission for the general public was yet to be refined. Objectives of the library, revised on August 25, 1982, also focused on its collection as a historical resource for scholars:

"[1] To collect, preserve and make accessible documents and objects pertaining to the medical and biological applications of electricity, [2] to promote the use of these materials in the documentation of historical fact and the generating of historical commentary... [3] to promote the understanding of electricity not only as a natural force but a culture force..., [4] by examining the context of scientific and technological change, to promote a broader perspective *among historians and research scientists*... [emphasized by author][9].

In sum, until 1982, the Bakken Museum self-defined its function as a vault of resources for historians and scientists.

A Growing Local Institution (1984 – 1998)

In 1984, the Bakken Museum (the Bakken Library back then) held the first educational program for high school physics teachers, Summer Institute. As we shall see later, the Summer Institute was a turning point in the Bakken Museum's mission transition from a research institute for scholars to the education center for the general public. Since 1984, the Bakken Museum has gradually increased its public education programs and broadened its target audiences.

In 1986, the Bakken Museum changed its name, again, "a Library and Museum" of Electricity in Life. By adding the term "museum," the Bakken Museum revealed its new mission to be a public space. The changed mission statement apparently shows the museum's interest in education, "The Bakken Library and Museum is a center for education and learning that furthers the understanding of the history, cultural context, and applications of electricity and magnetism in the life sciences and their benefits to contemporary society"[10]. Moreover, for the purpose of fundraising, the membership program began in 1986. From the individual/family member of \$35 to the Bakken Guild of \$5,000, the Bakken Museum set various levels of voluntary.

In addition to the Summer Institute, the Bakken Museum also launched new educational programs for broader audiences, especially teachers and students, during this period. The Bakken Museum and the University of Minnesota jointly offered a course, "Physics 5940: Physics for High School Teacher: Experimental Foundation of Electricity," in Fall 1988. Based on the Summer Institute, the course aimed to improve high school teachers' understanding of physics by conducting historical experiments[11]. Moreover, in 1989, funded by the National Science Foundation, the Bakken Museum developed the eighteenth-century Electricity Kits, marketed to junior high schools. The kit contained historical detail and instruction materials for classroom teachers, including manuals and videotapes of an electrostatic generator, a Leyden jar, an electrophorus and an electrometer [12]. Finally, the Bakken Museum broadened its audience to elementary school students by collaborating with the Pavek Museum, the nearby museum of broadcasting[13]. The joint program of the Bakken Museum and the Pavek Museum offered the workshop on static electricity and electronic communication.

The Bakken Museum also gradually opened its door to the general public by extending public hours on the weekends. Even though concerts has been hosting at the Bakken Museum, the collections and exhibitions had not been opened to the public during the 1980s. In 1991, three Saturdays on April 13, May 18, and June 1, were planned for the museum opening days to the general public and the opening hours were only four hours from 10:00 a.m. to 2:00 p.m. The Bakken Museum promoted their public hours through various media: local newspapers, magazines, and journals of medicine and history[14]. Finally, in 1993, the doors opened to the public every Saturday. As an opening ceremony, the Bakken Museum curated the special exhibition, "Treasures of The Bakken." On September 25, 1993, the museum displayed its featured selection of rare books, manuscripts, and instruments with hands-on exhibits and the opening exhibition attracted about 600 people on the first day. Moreover, during 1993, 1994, and 1995, the Bakken Museum had eagerly publicized their exhibitions and public programs through the local newspapers [15]. The Bakken Museum was experiencing the dramatic changes in this period, which will be covered in the next section.

A Platform of Science Education (1999 to the present)

The decisive change occurred in 1999 when the New Wing was built. At the Grand Re-opening on June 19, 1999, more than 1,500 visitors, the largest audience ever, attended. By adding 13,000 square feet, almost doubling the museum's size, the Bakken Museum completed its transition to an educational institution.

Educational programs have also been enriched and systematized. Special programs were offered for the museum's three target audiences: students, teachers, and the general public, including parents and adults. For students, mentoring programs and field trips were launched. In particular, Earl Bakken strongly suggested "The Earl Bakken Mentoring Program" for different age groups: age 9 to 11, age 12 -14, and high school students. By pairing students and scientists or engineers, science-oriented and gifted students could have opportunities to learn science in depth. For elementary and middle school students, field trip programs were offered [16]. The Teacher-In-Residence program and teacher training programs were initiated for teachers, and for the general public, the Family Science Saturday and public lectures were devised. Now children and youth became the main audience, while K-12 teachers, parents, scholars, and scientists are the secondary [17].

3. TWO MILESTONES: THE SUMMER INSTITUTE AND THE NEW WING

The three periods of the gradual opening of the Bakken Museum are divided by two significant events: the inception of the Summer Institute in 1984 and the renovation of the building in 1999. The Summer Institute, a workshop for physics teachers, became the foundation for future educational programs that combined history and hands-on experiments in the science curriculum. Construction of the New Wing was the realization and culmination of the educational mission by providing opportunities for the systematization of educational programs. This section examines these two turning points in terms of the Bakken Museums' adaptation to the social and cultural needs to change its identity to an educational institution.

1984, the Summer Institute

It is not clear when and why the plan for educational programs for physics teachers was suggested. One clue can be found in its mission statement in 1984. As pointed out in the previous section, until 1982, the main goal of the Bakken Museum was the collection and preservation of historical resources. However, in the revised objectives of January 1984, the educational purpose was included in the sixth, the last, clause: "6. To establish the BLEL [Bakken Library of Electricity in Life] as a center of learning – a permanent center for public exhibition of objects illustrating the history and role of electromagnetism in life processes" [18]. Although the objectives in 1984 added the education-related term, the content was ambiguous in terms of the vague connection between "center of learning" and "exhibition of objects." Moreover, the sixth objective focused on exhibition rather than educational programs such as teachers' workshops or field trips.

The Summer Institute in 1984 began from this abstract goal. The workshop was mainly prepared by Samuel Devons (1914-2006), who was a guest lecturer in the Fall 1983 Lecture Series. Devons was an Emeritus Professor in the Physics department at Columbia University. As a physicist and historian of science, he researched on the experiments of Isaac Newton, Benjamin Franklin, and J.J. Thomson, who was Devons' advisor at Cambridge University. Devons was also a director of the History of Physics Laboratory at Barnard College and emphasized history and experiments in teaching physics. During the 1980s, he organized the Joseph Priestley Society at Columbia University, promoting interaction among university faculty, science teachers, and science museums [19]. For Devons, the Bakken Museum, with abundant historical instruments in electricity, was the perfect place to realize his educational ideas (Figure 2).

Co-sponsored by the Department of Physics at the University of Minnesota, the first Summer Institute was held from June 18 to July 13, 1984 with fifteen teachers from throughout Minnesota. Entitled "History and Development of Physics: The Art of Experiment," the workshop focused on recreating historical instruments in physics, including those of Franklin, Cavendish, Volta, and Faraday. The workshop was divided into three parts: lectures, reading and discussion; laboratory work; and individual presentations. During the morning, lectures on topics in physics were given. The lecture topics covered electricity and magnetism from the 17th

century to the 19th century: theories of Poisson and Gauss on magnetic units, Galvanism and animal electricity, Volta cell, Ampère's electrodynamics, and Ohm's law[20]. In addition to the lectures, related books and artifacts in the Bakken Museum's collection were introduced to enhance understanding historical context and to apply them to physics curriculum. After the lecture, laboratory work for the participants proceeded during the afternoon. With reference to the morning lecture, laboratory work was organized to recreate the historical experiment with cheap gadgets. For example, on June 25, when the physics teachers learned about Franklin's electricity and the Leyden jar, they experimented with the conservation of electricity, spark and slow discharge, and atmospheric electricity by replicating the Leyden jar from a fruit juice jar, aluminum foil, and copper wire (Figure 3, 4). On the last Wednesday, July 11, every participant had a twenty-minute presentation on their own individual project based on the lectures and workshops.

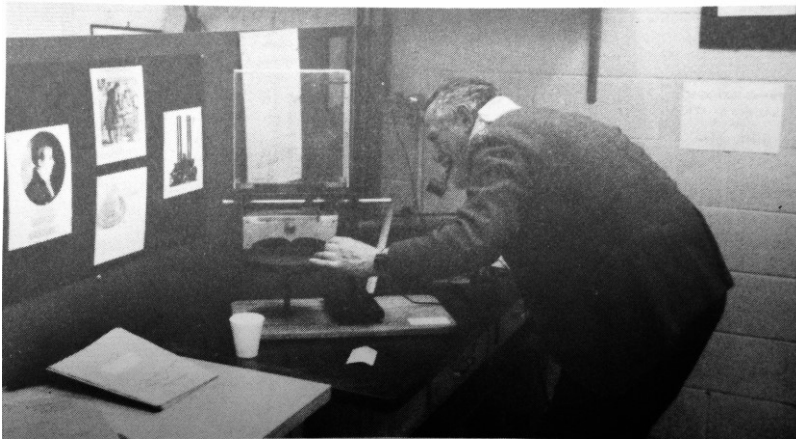


Figure 2. Samuel Devons preparing the Biot-Savart Law apparatus.
[Merriley Borell, "Recurrents," *Electric Quarterly*, Vol. 6, No. 2, p. 5, Spring 1984.]



Figure 3. Sparking Leyden Jar,
catalogue # 74.013.059-51
[The Bakken Museum Artifact Collection,
<http://oldsite.thebakken.org/artifacts/sparking-Leyden.htm>]

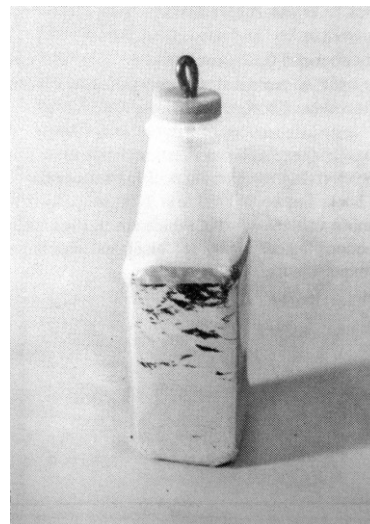


Figure 4. Leyden jar designed by Samuel Devons
["Recurrents," *Electric Quarterly*,
Vol. 6, No. 4, p. 4, Fall 1984.]

The Summer Institute became the cornerstone of future educational programs in the Bakken Museum. Right after the first Summer Institute in 1984, a long list of educational programs was developed, and the museum staff was reallocated for this purpose. Two-thirds of the list directly resulted from the Devons' workshop, i.e., the Summer Institute in 1984[21]. After all, the Bakken Museum built a unique educational philosophy based on the history of electrical experiments, which was perfect to utilize its collection. This philosophy, which originated from Devons, was inherited by the museum's next educator, Nahum Kipnis. After receiving his doctorate from the History of Science and Technology Program at the University of Minnesota, Kipnis was selected as a recipient of the fellowship program of the Bakken Museum, succeeding Sutton in 1984[22]. As a newly appointed fellow, Kipnis assisted Devons in reconstructing Galvani-Volta experiments in the Summer Institute in 1984. Devons and Kipnis shared similar philosophy in physics education. For example, in 1970, Devons stressed the importance of reproducing historically significant physics experiments in physics education[23]. He emphasized that the historical and experimental approach to physics helped students better understand physics and human endeavor. Kipnis also pointed out that the historical-investigative approach in physics education could inspire new teaching techniques that encourage students' creativity, curiosity, and initiative[24]. Two years later, Kipnis took the lead in the second Summer Institute in 1986, "Experimental Foundations of Optics," based on his dissertation on the history of optics[25].

The Summer Institute offered not only the educational philosophy of the Bakken Museum but also the justification of funding from various institutions. By developing educational programs, the Bakken Museum widened its opportunities for grant applications. The first Summer Institute was supported by the Teacher Improvement Project Grant from the Minnesota Department of Education. It was perfect timing to launch a new educational program for teachers. In 1983, the Minnesota Department of Education enacted the Teacher Training and Experience Funding[26]. The funding was designed to encourage teachers to have more opportunities to broaden their experience from educational training. The Bakken Museum was one of the recipients of this brand-new fund[27]. Moreover, the Bakken Museum began to seek other funding sources after the success of the Summer Institute in 1984. In January 1985, the Board of Directors of the Bakken Museum decided to balance the budgets between acquisitions of collections and educational programs by expanding the educational mission[28]. In early 1986, John Senior, a director of the Bakken Museum from 1982 to 1991, met the National Science Foundation (NSF) representatives and applied for a three-year grant for the museum's educational programs. After the meeting, the director concluded that the museum had to widen the topics to cover all physics subjects beyond the current focus on electromagnetism in life[29]. After all, the Bakken Museum clarified its mission to "a center for education and learning" with various efforts to expand its scope and funding sources.

1999, the New Wing

From the initial planning, the New Wing was devoted to the accomplishment of the Bakken Museum's new educational mission. The strategic plan for the New Wing was approved by the Board of Directors in December 1994, and in June 1995, three competitive architectural firms Meyer, Scherer, & Rockcastle, Ltd (MS&R) made a contract for the construction. In the letter to Earl Bakken, David Rhees, the Executive Director since 1992, clarified the rationale for the renovation, saying, "enhancing our educational programs for students and teachers"[30]. Moreover, the blueprint in 1996 shows that MS&R and leaders of the Bakken Museum concurred, "The primary function of the [N]ew [W]ing ... is to increase the quantity and especially the quality of educational programs available at The Bakken"[31]. In Spring 1997, in announcing the construction in its newsletter, the staff of the Bakken Museum also elaborated that the new building will "enhance its ability to provide in-depth educational programs and materials for students, teachers, scholars, and the general public"[32]. The educational function of the New Wing was spread out to various stakeholders of the Bakken

Museum in multiple forms.

The floor plan of the New Wing also reveals that the expansion of educational facilities was the most crucial goal of the renovation. The two biggest spaces in the newly attached building were allocated for the classroom and laboratory for educational programs (Figure 5). The adjacent supply storage and lab preparation room were planned to facilitate demonstrations, lectures, and workshops more effectively. Furthermore, a small education workshop area, with a maximum capacity of six, was devoted to gifted and talented students to realize Earl Bakken's long-term aspiration [33]. Other strategies to increase the accessibility of the Bakken Museum were to build a new entrance and parking area. Before the New Wing, the entrance of the Bakken Museum was hard to spot because of its isolated location. The parking area was also too limited to accommodate many students who participated in the field trips. By opening up the entrance to West 36th Street, a more accessible road than the avenue where the existing entrance was, and broadening parking space for school buses, the Bakken Museum built infrastructures for future extensive educational programs.

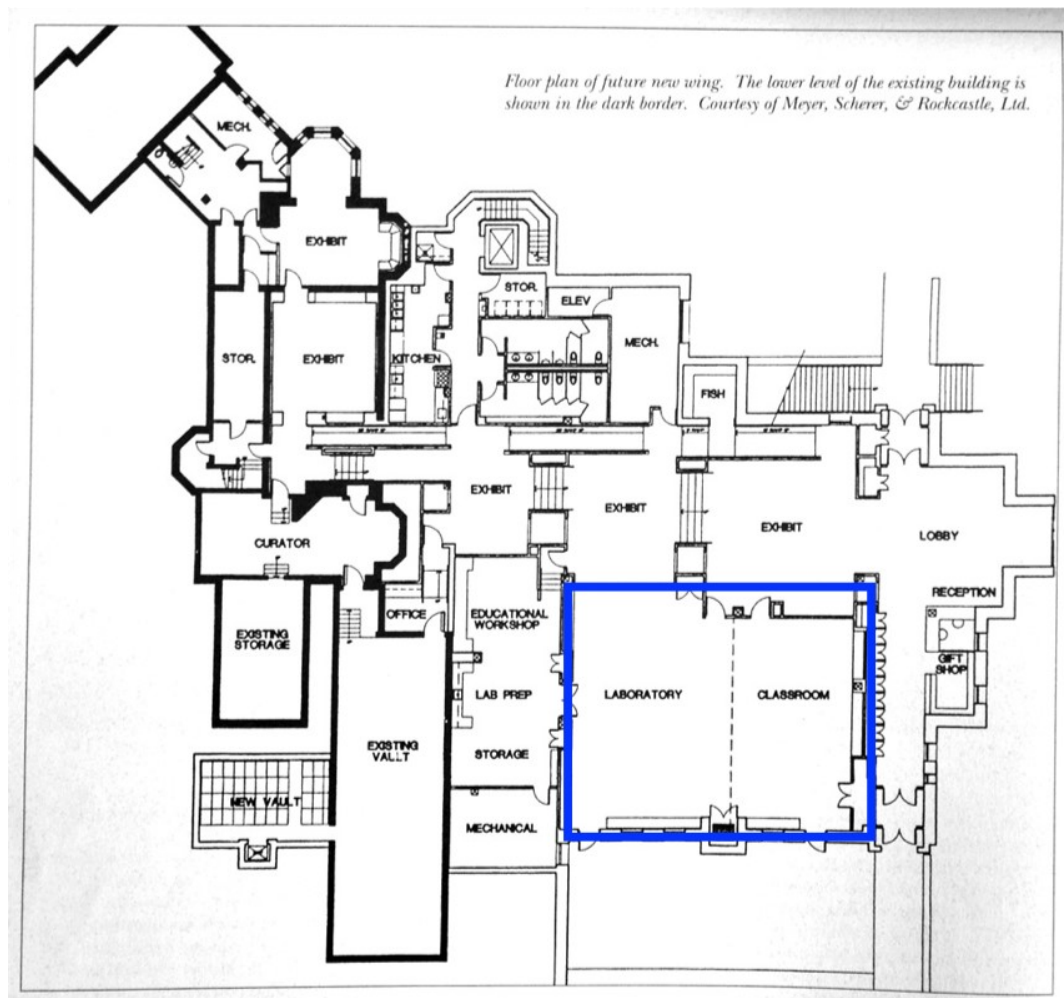


Figure 5. The floor plan of the lower level of the New Wing. The existing building was drawn in the thicker border. Two biggest rooms for educational purpose in the blue border[added by the author], laboratory and classroom, are distinct. Courtesy of Meyer, Scherer, & Rockcastle, Ltd. [“New Wing to Be Built,” *The Bakken Library & Museum*, Vol. 19, No. 1, p. 2, Spring 1997.]

For the renovation, the Bakken Museum needed to find new funding sources. Earl Bakken subsidized \$4 million of the estimated construction cost of \$4.5 million, and the museum still had to raise \$500,000. For the fundraising, the museum leaders used personal networks. Earl Bakken and Beth Bennett, the chair of the fundraising and finance committee, coordinated a series of the banquet with major contributors of the Bakken Museum, that is, the possible donors of capital gifts[34]. David Rhees gave short speeches about fundraising to the groups, visited the Bakken Museum such as the Hennepin County Medical Center, the James Ford Bell Library, the Institute of Electrical and Electronics Engineers (IEEE) Instrumentation group, and the Minnesota State Board of Invention[35]. He also sent fundraising letters to influential individuals, especially those who had relationships with Medtronic Inc., such as Dr. C. Walton Lillehei (1918-1999), a surgeon who contributed to the invention of Earl Bakken's pacemaker, and Winston Wallin (1926-2010), the CEO of Medtronic from 1985 to 1991.

In the fundraising efforts through the network of the Bakken Museum, the New Wing's educational mission was strategically used. Most of all, the Bakken Museum changed its status from a non-profit private organization to a private operating foundation for the public charity, which provides educational programs, to apply a broader range of funding foundations[36]. The emphasis on the educational mission was also used for philanthropic individuals. In the letter to Walton Lillehei, Rhees listed the achievements of the Bakken Museum in 1996, activities such as the Elementary Science Workshop, Hands-On Science Saturdays, and the development of History of Science Curriculum Modules[37]. In another letter to Mr. and Mrs. Winston Wallin, Rhees also delineated the rationale of renovation, "the new wing and enhancements to our building *West Winds* will help realize The Bakken's educational mission..."[38]. Building the New Wing not only realized the museum's mission to education by expanding its facilities but also broadened its opportunities to raise funds by clarifying its identity as an educational center.

4. THE STRATEGIES FOR PUBLIC ENGAGEMENT: HISTORY AS AN EDUCATIONAL TOOL

Although the initial motivation was obscure, the assets of the Bakken Museum have turned out to be valid. From Earl Bakken's initial casual instruction to find "a few old medical electrical machines,"[39] the Bakken Museum has accumulated sufficient artifacts and library materials to be called a unique collection of the history of electricity. The books and instruments that filled the museum's vault were used for the Summer Institute, field trips, public lectures, and special exhibitions. Furthermore, this distinctive historical approach to science education became a winning strategy of the Bakken Museum for its fundraising and marketing.

First of all, as the Bakken Museum emphasized the history of electricity, the museum's staff members were filled with historians of science and medicine. The first director of the Bakken Museum was Dennis Stillings, a librarian at Medtronic[40]. Credited to collect the massive volume of curiosity, Stillings ran the museum after moving to West Winds. The successor of Stillings was John Senior, who had been a curator of the Museum of the History of Medicine in Toronto. His academic background includes medical technology degree from the Royal College of Surgeons and Westminster Medical School and a history of science degree from the Institute for the History and Philosophy of Science and Technology at the University of Toronto. During his tenure, he gave presentations and lectures at the meetings of the History of Science Society, the Society for History of Technology, the American Association of the History of Medicine, and IEEE, broadening the networks of the museum in communities of the history of science, technology, and medicine.

David Rhees, a successor of Senior, was also a historian of science. After obtaining a doctoral degree from the University of Pennsylvania in the Department of History and Sociology of Science, Rhees had served as an Assistant Librarian for the Research and Programs of the American Philosophical Society in Philadelphia

and a researcher of the Association of Science and Technology Center before arriving the Bakken Museum. He also had curated several exhibits on the history of science at the Center for the History of Chemistry and the American Physical Society, such as an exhibit on Joseph Priestley, *Designing a Nation: Science, Technology and the Constitution*. As he had worked closely with science museums, Rhees noticed the circumstances surrounding science museums during the 1980s and 1990s, in which more and more science museums were expanding educational programs[41]. The year after his employment, the Bakken museum regularly opened its door to the general public every Saturday. In addition, a new Guiding Principles, which emphasized the museum's educational mission, was developed in the same year. As a historian of science and museum expert, Rhees knew how the Bakken Museum could utilize its historical sources according to contemporary needs[42].

Historians of science and medicine were preferred not only as directors but also as educators and board members. As a Science Educator, Nahum Kipnis has worked since 1986, designing most of the educational programs. Before the expansion of 1999, the Bakken Museum recruited two more educators in 1998, Patricia J. Hoben, an Assistant Director for Education who held a Ph.D. in molecular biophysics and biochemistry from Yale University, and Tania Munz, an Education Assistant who earned her bachelor's degree from the University of Chicago in History, Philosophy, and Social Studies of Science and Medicine. Unlike other science museums, which usually employ science educators or scholars with science and engineering degrees, two-thirds of the Bakken educators had a history degree. Moreover, Roger Steuwer and Robert Seidel, professors of the History of Science and Technology Program at the University of Minnesota, played a significant role as board members since the early 1980s and 1995. By selecting the recipients of fellowships and taking charge of the chairperson for the education and outreach committee, they had contributed to the museum's decision concerning employment and educational programs.



Figure 6. Demonstration of Thunder House from Benjamin Franklin.
[“Public, Enjoys, Exhibit, Open House,” *The Bakken Library & Museum*,
Vol. 15, No. 2, p. 8, Fall 1993.]

Another strategy was to put forward the historical figures and characters in the discovery of electricity who are familiar to the public, Benjamin Franklin and Frankenstein. Benjamin Franklin is one of the beloved figures in American history due to his utilitarian passion for electricity in everyday life. The Bakken Museum utilized this popular figure for arousing public attention. For the first public exhibition in 1993, the Bakken Museum publicized its opening by using the demonstration by an actor dressed as Benjamin Franklin through newsletters and local magazines. The actor reenacted Franklin's famous experiments, such as the thunder house demonstration and the kite experiment (Figure 6). Glass harmonica, the musical instrument designed by Benjamin Franklin, was one of the representative artifacts of the Bakken Museum frequently referred to in media reports and newsletters for the public. The strategy of connecting to Benjamin Franklin's historical works has continued by celebrating his birthday and naming an exhibition space "Franklin's Room."

Frankenstein at the Bakken Museum had a more dramatic story. The anecdote of Earl Bakken and the film *Frankenstein*, which had a decisive influence on his future career as an engineer of electro-medicine, was fascinating enough to young students. Earl Bakken himself also pointed out the first edition of *Frankenstein: The Modern Prometheus* is one of the treasures in the Bakken Museum. In addition to screening the film *Frankenstein* (1931), the replica of Victor Frankenstein's thrilling laboratory attracted young audiences (Figure 7)[43]. Moreover, the Bakken Museum has held several events related to the concepts of the Frankenstein story, such as Halloween parties and the Frankenstein costume contest. Although the scientific background of the Frankenstein exhibition was unclear, the fascinating story of the novel and Earl Bakken's tale were intertwined, arousing the visitors' curiosity.

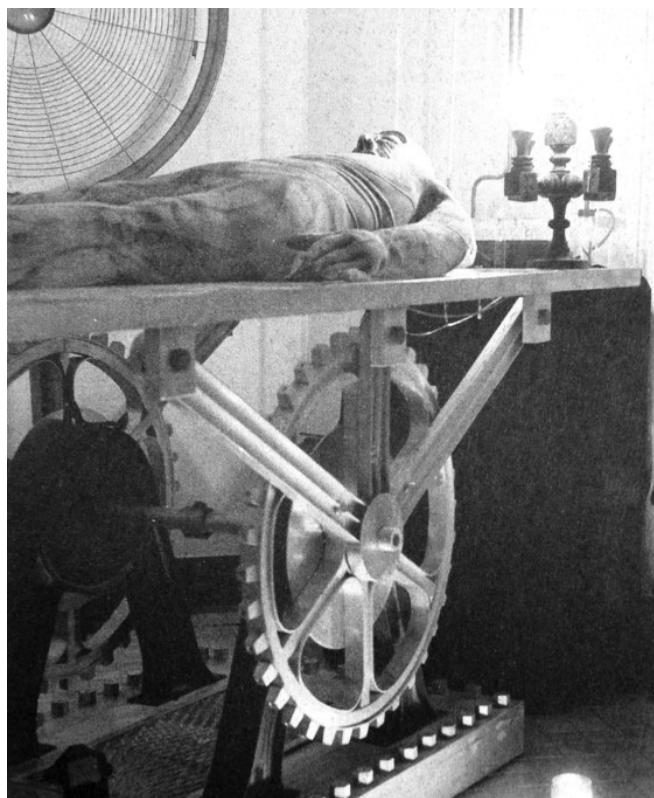


Figure 7. Replica of Victor Frankenstein's laboratory of "It's Alive! The Science and Myth of Frankenstein" ["Frankenstein Exhibit Opens," *The Bakken Library & Museum*, Vol. 17. No. 2, p. 1, Winter 1995.]

The stories of two figures, Benjamin Franklin and Frankenstein, have a lot in common. First of all, historically, the works of both Benjamin Franklin and *Frankenstein* novel were the culmination of Enlightenment electricity. During the eighteenth century, research and practices of electricity were extremely popular with the public. From animal electricity and mesmerism to electrical demonstrations in the public realm, experiments on electricity were good resources to attract more gentlemen, arousing the curiosity and wonder of nature. The strategies of the Bakken Museum resemble those of Enlightenment electricity. With shocks, sparks, spectacles, and marvels, the museum tries to gather more and more people. Second, the physical appearances of the two figures are very well known to the public. Anyone can imagine the face of Benjamin Franklin on a \$100 bill and the haunted appearance of Frankenstein's monster. As icons, the images of Benjamin Franklin and the creature of Victor Frankenstein promoted the Bakken Museum's new mission to an educational center for the general public. Lastly, the dramatic elements of the two stories, hovering between life and death, were also attractive sources for publicity. The kite experiment of Benjamin Franklin was not only visually spectacular but also curious, considering the victims who died while conducting the same experiment during the eighteenth century. The analogy between Victor Frankenstein and Earl Bakken is another intriguing factor. The Bakken Museum uses the compelling comparison that as Frankenstein was eager to animate life using electricity, Earl Bakken dedicated his life to save lives with his cardiac pacemaker. The educational programs of the Bakken Museum were the result of the effort to harmonize between science and history and history and fiction.

5. CONCLUSION

The gradual transformation of the Bakken Museum's mission from a library for researchers to an education center for young students reveals both the universality and particularity of a local science museum. In a broader context, the Bakken Museum's mission shift turned out to be a successful adaptation to contemporary social and cultural needs. In the 1980s, the active discussion on the role of museums, including art museums, history museums, and science museums, emerged, especially in the U.S. In *Museums for a New Century*, published in 1984, the American Alliance of Museums (AAM) declared that the primary purpose of museums is education[44]. According to C. G. Screven, a veteran museum evaluator, after the mid-1980s, the major mission of American museums has been changed to educate and inform the public, and education staff started to play a crucial role in museums[45]. Moreover, in 1992, AAM defined a museum as an institution with a moral function, which embraced diversity and public service, which refers to public education[46]. The Bakken Museum's educational turn can be interpreted in this societal influence in the broader context.

Meanwhile, the Bakken Museum differentiated itself from other science museums, burgeoned during the 1980s, with its unique collections and staff. Most of all, the Bakken Museum had a particular theme of the collection, the history of electricity in life. Even though this theme has been broadened to the history of electricity or the history of physics in general, the Bakken Museum has constantly stressed the historical approach since the beginning of educational programs for the public. Both the expansion of subjects and emphasis on historical perspective were successful strategies for fundraising, too. By including various topics of science and medicine, the Bakken Museum increased funding opportunities. Moreover, the historical approach of education justified their programs, continuing the network with historical societies. The history of the Bakken Museum shows how the philanthropic will of an entrepreneur has managed to survive in changing social circumstances by redefining its identity and expanding the scope of collections. The Bakken's case of developing a new strategy to use history in science education can be applied to other local museums, where are struggling with funding or needing breakthrough in their programs.

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- [1] In May 1996, in a speech to the American Association of Museums, the Minneapolis Mayor, Sharon Sayles Belton, said that “Minneapolis is... a city that cherishes its traditions of art and culture. We are proud of our museums – from the Minneapolis Institute of Arts, to the Walker Art Center, to The Bakken Museum.” [David Rhees to Dr. C. Walton Lillehei, December 12, 1996, Director’s folder, The Bakken Museum, Minneapolis, MN 55416.] Both the Minneapolis Institute of Arts and the Walker Art Center are representative art institutes, which attract more than a half million people per year.
- [2] The Bakken Museum, 2019 Annual Report, https://static1.squarespace.com/static/60909f71a674926a39e73461/t/609de75983b92135ee256cbf/1620961117086/2019_Bakken-Museum-Annual-Report.pdf
- [3] After his death in 2018, many obituaries pointed out the same anecdote of *Frankenstein*. The details of Earl E. Bakken’s life can be found his autobiography, E.E. Bakken, *One Man’s Full Life*, Medtronic, Inc., 1999. On the timeline of Earl Bakken’s official homepage, he recollected his fascination for *Frankenstein*, saying, "What intrigued me the most, as I sat through the movie again and again, was the creative spark of Dr. *Frankenstein*’s electricity. Through the power of his wildly flashing laboratory apparatus, the doctor restored life to the unliving." Earl E. Bakken, *Inspiration*, <https://earlbakken.com/home.html#>
- [4] Palmer Hermundslie ran a lumber business before Medtronic. As a medical electronic equipment company, the first month’s income of Medtronic was eight dollars. [Earl E. Bakken, *Timeline*, <https://earlbakken.com/content/timeline/timeline.html>]
- [5] Dennis Stillings, “The Bakken: A Library and Museum of Electricity in Life,” *Journal of Scientific Exploration*, Vol. 15, No. 2, pp. 255-266, 2001.
- [6] Earl Bakken purchased the mansion of William E. Goodfellow, the founder of Target Corporation, for a new place for his massive volume of collection in 1976. Architect Carl A. Gage built the mansion between 1928 and 1930 with the 16th century Tudor and Gothic Revival style. Goodfellow named the mansion West Winds, which is located on the west shore of Bde Maka Ska. [The Bakken Museum of Electricity in Life, *West Winds: The Building of a Dream, The Bakken Museum of Electricity in Life*, 1980; D.A. Wood, "West Winds: An Historic Look At the Gran Residence & Its Unique Occupants," *Lake Area*, 1B, 7B, August 1984.]
- [7] “Opening Notes,” *Electric Quarterly*, Vol. 1, No. 1, p.1, Summer 1979.
- [8] Sutton’s research at the Bakken Museum became the foundation of a chapter in his book, G.V. Sutton, *Science for a Polite Society: Gender, Culture, and the Demonstration of Enlightenment*, Westview Press, 1995. All illustrations of chapter 8, “Electricity in the Eighteenth Century,” were originated from the Bakken Museum.
- [9] “Library Objective (revision),” August 25, 1982, Bakken History folder, The Bakken Museum, Minneapolis, MN 55416.
- [10] “Continuity and Change,” n.d., Director’s folder, The Bakken Museum, Minneapolis, MN 55416.
- [11] The instructor for this course was Naum Kipnis, who hosted Summer Institute as an educator of the Bakken Museum. The target attendees of the course, 4 degree credit and limited to 15 students, were science teachers of grades 9-12.
- [12] The price of the 18th century Electricity Kit was \$195.99. Contrary to expectation, the kit did not sell well. The board member thought the price might be the obstacle to buy for schools. [“Minutes of Annual Meeting of Board of Directors of the Bakken,” December 14, 1991, 1986-1994 folder, The Bakken Museum, Minneapolis, MN 55416.]
- [13] The Pavek Museum is the museum of the history of broadcasting, especially in Minnesota, which is located close to the Bakken Museum. [Current webpage: <https://pavekmuseum.org/>]

- [14] The media included History of Science Society Newsletter, Minnesota Parents, Star Tribune, Southwest Journal, Minnesota Monthly, Minnesota MedFax, and Franklin Gazette.
- [15] J. Dawson, "A More Open Glow: Electricity Museum Now Admits the General Public," *Star Tribune*, September 25, 1993; J. Dawson, "Exhibit Explores Creative Spark of 'Frankenstein'," *Star Tribune*, September 9, 1994; A. Brataas, "Nuts and Bolts," *Saint Paul Pioneer Press*, October 31, 1995. Moreover, the Bakken Museum tried to be included in the attraction list of the American Automobile Association's TourBooks. [Peggy Cole to Dorina Morawetz, June 25, 1993, Publicity-1993 folder, The Bakken Museum, Minneapolis, MN 55416.]
- [16] *Educational Program Initiatives for A New Ear at The Bakken Library and Museum: A Proposal to the Medtronic Foundation*, February 1998, The Bakken Museum, Minneapolis, MN 55416.
- [17] *The Bakken Strategic Plan 1998-2000 Approved by Board of Directors, December 13, 1997*, Big Picture Document folder, The Bakken Museum, Minneapolis, MN 55416.
- [18] "Library Objective for Approval by the Board," January 18, 1984, Big Picture Document folder, The Bakken Museum, Minneapolis, MN 55416.
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- [20] "Syllabus for Summer Workshop," June 18 – July 13, 1984, Director's folder, The Bakken Museum, Minneapolis, MN 55416.
- [21] "Minutes of Meeting of Board of Directors of Bakken Library of Electricity in Life," October 17, 1984, 1984-85 folder, The Bakken Museum, Minneapolis, MN 55416.
- [22] In 1985, Kipnis was employed as a science educator at the Bakken Museum.
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- [25] Kipnis, N.S., *History of the Principle of Interference*, Ph.D. Thesis. University of Minnesota, Minneapolis, MN, USA., 1984.
- [26] B. Sullivan, Minnesota Department of Education, Highlights of State Education Policies from 1970-2000, <http://mn.gov/mnddc/past/pdf/00s/00/00-HSE-MDE.pdf>.
- [27] During the 1970s and early 1980s, schoolteachers in Minnesota had fought to increase salary and improve welfare. In 1981 especially, there was a massive statewide strike activity. The Teacher Improvement Project Grant can be understood as the outcome of this movement. [Minnesota Education Association, *MEA, Minnesota Education Association: 137 Years Proud*, Education Minnesota, pp. 36-54, 1999.]
- [28] Minutes of Meeting of Board of Directors of Bakken Library of Electricity in Life," January 30, 1985, 1984-85 folder, The Bakken Museum, Minneapolis, MN 55416.
- [29] After the first successful Summer Institute, the Bakken Museum gradually broadened its annual topic to optics (in 1986), sound (in 1987), and light (in 1988). The Summer Institute in 1987 was granted by NSF. [Minutes of Meeting of Board of Directors of Bakken Library of Electricity in Life," March 6, 1986, 1986-1994 folder, The Bakken Museum, Minneapolis, MN 55416.]
- [30] David Rhees to Earl E. Bakken, November 28, 1995, New Wing folder, The Bakken Museum, Minneapolis, MN 55416.
- [31] Meyer, Scherer & Rockcastle, Ltd and the staff of the Bakken Library and Museum, *Draft: The Bakken Library and Museum Building Program*, July 01, 1996, p.10, New Wing folder, The Bakken Museum, Minneapolis, MN 55416.
- [32] "New Wing to Be Built," *The Bakken Library & Museum*, Vol. 19, No. 1, p. 1, Spring 1997.

- [33] Among the Guiding Principles of the museum, which was enacted in 1994, the third principle is about the audience. The firstly listed target audience is students, and, in parentheses, “particularly gifted children” is specified. [“Guiding Principles,” education folder, The Bakken Museum, Minneapolis, MN 55416; David Rhees, Interview by author, Tape recording, the Bakken Museum, MN, April 30, 2014.] Moreover, one of four priority programs in the Bakken Museum from 1998 to 2000, Earl Bakken Science Program, was also designed to talented students who can utilize the mentoring program with science, engineering, and medical professionals. [The Bakken Museum, *Priority Program for the New Medtronic Science Education Center in the Bakken Library and Museum: A Proposal to the Medtronic Foundation*, October 15, 1998, The Bakken Museum, Minneapolis, MN 55416.]
- [34] “Executive Director’s Report for the Meeting of the Board of Directors, at The Bakken Library and Museum,” September 5, 1996, Board Meeting 5/11/95 folder, The Bakken Museum, Minneapolis, MN 55416.
- [35] Above these, Rhees gave a list of possible funding sources based on the museum’s and his own network. Minnesota High Technology Council, the K-12 Education Committee of the High Tech Council, SciMath Assembly, and the University of Minnesota’s Institute of Technology were on the list. [“The Bakken Library and Museum Executive Director’s Report for Board of Directors Meeting,” May 23, 1996, Board Meeting 5/11/95 folder, The Bakken Museum, Minneapolis, MN 55416.]
- [36] Ibid. While “non-profit” organization is charted at the state level, “charity” is exempted from federal income tax.
- [37] David Rhees to Dr. C. Walton Lillehei, December 12, 1996, Director’s folder, The Bakken Museum, Minneapolis, MN 55416. However, the result of the funding request could not be accessed.
- [38] At the end of the letter, Rhees attached an explanation about the mutual advantages of the Bakken Museum and Medtronic from the renovation. [David Rhees to Mr. and Mrs. Winston Wallin, “Welcome to The New Bakken! Capital Campaign for New Wing and Renovations,” May 30, 1996, Director’s folder, The Bakken Museum, Minneapolis, MN 55416.]
- [39] D. Stillings, “The Bakken: A Library and Museum of Electricity in Life,” *Journal of Scientific Exploration*, Vol. 15, No. 2, pp. 255–66, 2001.
- [40] The academic background of Stillings is not clear. However, it is certain that he was not educated as a historian.
- [41] David Rhees, Interview by author, Tape recording, the Bakken Museum, MN, April 30, 2014.
- [42] In the interview, Rhees explained the two reasons for opening the Bakken Museum to the general public during the 1990s. First, the staff of the museum thought that their excellent collections should be accessible to more people. Second, they also realized that it would not be economically sustainable if they did not develop new audiences.
- [43] Frankenstein exhibition still exists at the museum.
- [44] S.E. Weil, *Making Museums Matter*, Smithsonian Institution Press, p. 32, 2002.
- [45] C. G. Screven, “United States: A Science in the Making,” in Gail Anderson ed., *Reinventing the Museum: Historical and Contemporary Perspectives on the Paradigm Shift*, Rowman & Littlefield Publishers, Inc., p. 163, 2004. For more recent trends in science museums, especially in East Asia, see S.W. Jeon, G. Ryu, and S.J. Moon, “Museum Gamification Design using Story Elements,” *The International Journal of Advanced Culture Technology*, Vol. 8, No. 4, pp. 25-32, 2020 and T, Jiang, S. Jin, and X. Jin, “Cross-Border Innovation: The Effects and Development Strategy of Chinese Museum Cultural and Creative Products,” *The International Journal of Advanced Culture Technology*, Vol. 9, No.2, pp. 1-9, 2021.
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