

Va Tech in the 1890s
Getting Ready for the Electrical Age

Paper submitted for
International Social Science Review
January 8, 2002

Ellen Apperson Brown
Blacksburg, VA
January 8, 2002

The Virginia Agricultural and Mechanical College had been in existence for almost twenty years when, in 1890, electric lights and an electric power plant were first installed. No one at this small land-grant college in Blacksburg, Virginia, could have predicted the changes that electricity would bring – to the campus, the curriculum, and to the job prospects for its graduates. The school had gone through many changes of administration and had been hampered by political interference, but with the arrival of Dr. John M. McBryde, in 1891, technology began to blossom and flourish. By 1900, the word *Technological* had officially been added to the school's name, and electrical engineering had become the most popular course of study.¹ The decade of the 1890s was one of impressive growth and leadership, preparing the V.A.& M. College, or VPI, as it came to be known, to participate fully in the expanding technological revolution of the Twentieth Century.

Meanwhile, far to the north, scientists, inventors and businessmen were busy developing, manufacturing and selling light bulbs, turbines and electric motors. When the General Electric Company first emerged, in 1892, as a consolidation of the Edison General Electric Company and the Thomson-Houston Company, many small companies were undergoing similar changes. General Electric continued buying up smaller companies throughout the 1890s, finding that it was easier to buy a company (thus acquiring its patents and its talented scientists and inventors) than to try to compete with them in the marketplace. Although the company struggled during the economic downturns of the 1890s, by 1900 G.E. was poised to lead the country into the electrical age.²

It is hard for us to imagine a world without electricity, but up until 1890 Blacksburg was a typical small Southern town, with no electric streetlights or power plant. The college was woefully ill equipped to house its students or offer them an agricultural or mechanical education, and it certainly could not provide much in the way of technological training. According to E.A. Smyth's history of the college (1922):

When Dr. McBryde took charge, in June, 1891, the new administration found on hand to begin with: two brick academic buildings; one brick dormitory; the old Preston-Olin Building, converted into a poorly equipped shop building; two old wooden buildings (one, a small one, used as a shop)... there were practically no shops or laboratories; no water works, sewerage, public hall, infirmary, laundry or adequate lighting system.³

The dilapidated buildings may have disappointed President McBryde, but he did not become discouraged. His background as a professor of agriculture and botany and his recent experience as President of South Carolina College, reorganizing it into the University of South Carolina, prepared him well for the challenges in Virginia. He had a clear vision for what a land grant college could be, and he knew how to accomplish his goals. He wrote up a comprehensive plan for the college and presented it to the Board in the summer of 1891:

I am convinced that the true development to be given to such schools [land-grant schools] should lie in the direction of technology. They should be made, as far as our social and economic conditions will allow, more and more professional and technical. This field.... is virgin, the demand for such training is great, and increasing, the line of work is definite and clear cut.⁴

McBryde reorganized the curriculum, made many significant changes to the faculty, and began to develop new sources of much needed revenue. Evidence suggests that he was familiar with other institutions that were introducing electrical engineering into their course of studies. There were, in fact, several schools that had already established electrical engineering programs by this time. The Massachusetts Institute of Technology had started training men for careers “in the new electrical industry” in 1882, and educators were beginning to recognize “engineering as a challenging profession.”⁵ Other colleges started offering electrical engineering, including Cornell University, the University of Wisconsin, the University of Missouri and Stanford University. Frederick Terman, a historian writing for Proceedings of the IEEE, notes these early engineering programs were started before careers for electrical engineers had been very well defined:

Thus the first electrical engineering programs were created more in anticipation of what was expected to develop than to meet an already existing need. However, events quickly justified the supporters of these programs, and by the 1890s enrollment in them was as great if not greater than in the older fields of civil and mechanical engineering. Thus at MIT 27% of the entire institute graduates in 1892 were electrical engineers.⁶

The VPI catalogues tell the story of Dr. McBryde’s commitment to technology, and especially to electrical engineering. The catalogue for 1891-92 includes the following description of equipment, under electrical engineering:

This department occupies two rooms. The large lecture-room is well lighted and ventilated and supplied with steam, gas and electricity. Abundant provision is made for experiments on light. It is furnished with excellent seats, lecture table,

cases, etc. The laboratory is similar in size to the lecture rooms. Continual additions of apparatus, manufactured for the most part in our own shops, are being made to the equipment. Connection with the electric light dynamo furnishes to both rooms any current from 1/100 of an ampere to 200 amperes.⁷

Put another way, there was practically no equipment at all. Ten years later, the equipment listed under electrical engineering takes up two pages in the catalogue (1902-1903):

The Dynamo Laboratory is supplied with a "30 H.P., 4 pole, 110 volt D.C. motor with drum armature, a 10 H.P. Stanley 2-phase 500 volt induction motor, a pair of 5K.W., type H transformers.... [and even] a Siemen's electro-dynamometer, 20 amperes."⁸

McBryde accomplished these changes gradually, but steadily, providing leadership in many critical areas. He was the first president of the college to be given the authority to hire faculty and structure the curriculum. Up until his presidency the Board of Visitors had taken full responsibility for deciding who to hire and what should be taught, often to the great detriment of the school.

C.E. Vawter, Rector of the Board of Visitors, was serving his second term when McBryde took over as president. Vawter must have respected McBryde's administrative abilities, for he expressed support for his initiatives and backed him up during the inevitable controversies that arose.⁹ One such political battle occurred early in McBryde's first term, when two former faculty members tried to launch an investigation against the Board of Visitors, claiming the funds had been misappropriated. School historian Duncan Kyle Kinnear states that, "it was charged that the board had used funds

from the Morrill Act of 1862 and of 1890 to erect an electric power plant and a water supply plant...and for such things as constructing a shop, erecting a boiler-house and smokestack..."¹⁰ These complaints persuaded the investigators, however, that the State had been neglectful of its responsibilities to support the college and should begin to provide larger appropriations in the future. Vawter, the Board of Visitors, and the politicians all began to rally around McBryde's vision for the school.¹¹

One of the new members of the faculty under McBryde leadership was Samuel R. Pritchard, as adjunct professor of physics and electrical engineering. The catalog for 1893-94 explains that, "out of his own pocket Professor Pritchard bought the basic items needed to outfit the Electrical Engineering Laboratory."¹² Pritchard and McBryde further strengthened the department by appointing two students to be assistants in the electrical engineering department: Cadet Claudius Lee, a sophomore, and Cadet James Gilbert Price, a special student. The school experimented with ways to provide financial assistance to students, and many innovative arrangements were made. McBryde instituted a policy in his first term allowing:

...part time paying positions [that] included running engines and dynamos, maintenance of machines, firing boilers and furnaces in the various buildings and laboratories; maintaining the electric light plant, creamery, dairy, gardens, greenhouses,.... assisting in manufacturing operations at the foundry, forge, woodworking and metal-working shops; waiting on tables in the mess hall.¹³

By 1895 there were 24 graduate students at VPI, and many of them had assignments as assistants in the laboratories, workshops or the classroom. Information about these individuals is sketchy, but a few of the students left letters and journals that

allow us some insights into their interests and career plans. Two brothers from Marion, Hull and John Apperson, attended VPI during the 1890s, and both of them landed in Schenectady by 1900, seeking employment with the General Electric Company. Like so many others of their classmates, Hull and John were attracted to electrical engineering, but they could not imagine exactly what an electrical engineer might do.

Alfred Hull Apperson was born in Chilhowie, near Marion, Virginia, in 1869. His father was a Civil War Veteran who served as a medic and hospital steward throughout the war. Hull, the oldest of seven children, attended local schools and was just finishing high school in 1887 when his sister Mary died of typhoid, followed soon thereafter by his mother. Dr. Apperson, his father, had been working at the newly opened Southwest Virginia Insane Asylum in Marion, but he gave up that job and began to look into developing industrial concerns, including mining, railroading and a foundry. He also became a commissioner to the Chicago World's Columbian Exposition in 1893, putting together a display featuring Virginia's natural resources.

Hull's life was certainly affected by his mother's death, his father's remarriage and by the financial uncertainty of his father's career changes. A note left among Hull's papers indicates that he attended the Virginia Agricultural and Mechanical College for a year or so, but he resigned in 1890. He worked in a retail store in Roanoke for three or four months in 1891, and in January of 1892 he made a trip to Cuba. The letters he received from his father and the journals Hull himself recorded indicate that he was there to work in a factory with some sort of machinery. He was homesick, he didn't like his room, and he couldn't speak the language, so the adventure only lasted about three months. By April of 1892, Hull headed back home, and returned to Blacksburg. His

stepmother's brother, Alex Black, offered him a part-time job, and President McBryde accepted him as a special student for the coming term.¹⁴

He graduated in 1894, with a B.S. in electrical engineering, and stayed on as a graduate student/paid assistant. At his graduation Hull presented a paper he had written on the "incandescent light bulb." According to family tradition, he installed much of the electrical wiring on campus, and other records indicate that he became an officer in the cadet corps, starting the school's first artillery battalion. He learned carpentry and probably had some responsibilities in the school's woodworking shop.

Some of Hull's contemporaries were hired as teaching assistants, and many of them went into teaching as a profession. Students at VPI were interested in learning about the exciting new technologies of their day, but they could not find many suitable job openings, particularly in the south. Nevertheless, by 1896, 60% of the VPI upperclassmen were enrolled in either mechanical or electrical engineering.¹⁵ Hull did not get offered any position at the college that seemed likely to develop into a career. He stayed on as a graduate student until sometime in 1898, but there is a gap after that in family and school records. He resurfaces again in Schenectady in 1900, where he works at General Electric for up to four years, most likely connected in some way with the training program. By 1905 he is married and living in Norfolk, Virginia, for an electrical inspecting and underwriting firm.

Hull's brother, John, was nine years younger. John came to VPI in the fall of 1894, listed first as a sub-freshman and the following year as a sophomore. During his sophomore year he apparently did not apply himself very well to his school responsibilities, and his father wrote Hull in alarm:

Dear Hull,

March 9, 1895

Last night's mail brought me the Report of John's grade at college. He has, I see, six studies. In one he is reported "very good" in two "not graded," which I presume means that it was so low as not to reach even "very poor," in one he is "absent" in one he gets "very poor" and the other "poor" with 14 demerits. Notwithstanding he still does not write though Sallie and Lizzie has been very thoughtful of him in sending something for him every chance, he is not even courteous enough to acknowledge this attention, and to me no letter at all except the one asking permission to go to Staunton. This however makes no difference to me. I should try to do my duty whether he writes or no if I find what I have to spend for him is doing any good. What I have has been for the most part hard earned and I do not propose to throw it away.¹⁶

John completed his sophomore year but withdrew from the college, his father probably having told him he had to pay his own way. An energetic young man, he soon found employment working for the branch railroad being constructed back home in Smyth County. The Marion and Rye Valley Railroad had been formed in 1892 to connect the Norfolk and Western Railroad with a mining operation in Rye Valley and with other resources in Grayson County. John, at seventeen, was fond of the out-of-doors and liked the challenges and practical responsibilities of engineering, and he soon became the foreman over several hundred workmen. Like his brother Hull, however, John could not find lasting employment in the South, and by 1900, he, too, arrived in Schenectady, New York, to apply for a job with General Electric.

The Bugle of 1900 included a report from the VPI Alumni Association entitled, "Some of Our Alumni: Their Occupation and Addresses."¹⁷ Surprisingly, there are five VPI alumni listed in Schenectady, as engineers with the General Electric Company. John Apperson does not appear on the list, probably because he had not yet begun claiming membership in the alumni organization, and also due to the fact that he did not immediately get hired to work there as an electrician. General Electric had just inaugurated its engineering training program and was actively recruiting college graduates to apply. 1900 was a good year for all those who had studied electrical engineering at VPI during the 1890s. Graduates were placed in companies all across the country. Among these employers were:

Sprague Electric Company – Jersey City; Keystone Bridge Company- Pittsburg; Trigg Shipbuilding Company – Richmond; Newport News Shipping and Dry Dock Company – Newport News; Va. Southwestern Railroad – Elizabethton, Tennessee; Electric Light and Power Company – Richmond; Richmond Locomotive Works – Richmond; Electric Works – Mystic, Connecticut; Trevor Binford Electric Company – Richmond; and Atlantic Coast Line – Rocky Mount, North Carolina, Rich Patch Ore & Mining Company – Low Moor, Va.; United Gas Improvement Company – Jersey City; and Virginia-Carolina Improvement Company – Richmond.¹⁸

Ten alumni were listed as instructors at VPI, and seventeen were teaching at other institutions: in high schools, trade schools and in colleges and universities.¹⁶ Dr. McBryde's prediction was becoming a reality, and VPI students were indeed finding jobs that required a familiarity with the new emerging technologies. In his opening speech to

the Board of Visitors, McBryde spoke of the need for and costs of providing technical education, saying:

The men and materials demanded, in accordance with the terms of the acts of endowment...are sufficient to send out, well equipped for their life work, not only agriculturalists and mechanics, but analytical chemists, and civil, mechanical and mining engineers as well. A small additional outlay would enable them to train architects, biologists, mineralogists, geologists, electrical engineers, horticulturalists, vita-culturalists, etc. It must be remembered, however, that these men are to be trained not only as specialists, but as citizens...It is not only possible...but proper for these schools to educate men for manufacturing and commercial purposes.¹⁷

VPI was catching up, by the turn of the century, with many of her peers in other states. Companies hiring electrical engineers were not looking for candidates with PhDs or even masters degrees. It was sufficient for most of these new engineers to have a general knowledge of the industry and the new technology, and the majority found “continuing education” on the job. Many schools could offer only a broad introduction, but it did not matter since other schools were in the same situation:

The electrical content of the early electrical engineering curricula was minimal. Engineering knowledge about electrical phenomena was limited, there were few if any textbooks, and laboratory facilities were meager...Cornell lab was “little more than the electrical section of the physics laboratory of that day.” The “little more” was one direct current generator built by Prof. Wm Anthony in 1874...At MIT the laboratory situation was only slightly better until the completion of the

40,000 square foot Augustus Lowell Laboratory of Electrical Engineering in 1902 financed by a memorial gift of \$50,000.¹⁸

Much has been written about the history of the General Electric Company and its phenomenal growth and success. There are many ways to explain the success, but it is good to remember that the founding fathers had no guarantee of success during the early years of the company's history. According to Bernard Colson:

The company (Thomson-Houston) had to convince local capitalists to risk money in a new and unproven enterprise. Although today we consider electric lighting a necessity, we must remember that there was no obvious need for electric lighting in the late nineteenth century...By emphasizing that electric lighting was scientific, modern, and progressive, the company helped persuade businessmen that it would be appropriate to risk money on the new technology.¹⁹

John S. Apperson, Jr. '98 worked in Schenectady at General Electric for 47 years. He was trained in the Test Program and worked his way up to be the second most senior engineer working under Power & Mining. The company went through significant reorganizing soon after World War I, and Apperson eventually settled into a management position in Engineering General, handling patents and coordinating orders for different branches of the huge industrial giant. In his spare time he devoted himself to the enjoyment of the Adirondack Forests and to the protecting the Wilderness clause in the New York constitution, which mandated the forests be kept "forever wild and free."

John Apperson's story demonstrates the exciting possibilities that existed for an intelligent and eager young man interested in finding a good job and making his mark in

the world. He, and many others, found the encouragement, contacts and training they needed at VPI, and they maintained close ties to the alumni association.

In 1925 and again in 1930, Claudius Lee '96, Professor of Electrical Engineering at VPI, attended a summer workshop in Schenectady along with other college professors from around the nation. One of his hosts was John Apperson, and several letters and photographs have survived to record the event. One of Lee's students wrote, in December 1930:

Yuletide brings to our memory thoughts of our friends and experiences of the past. We, who were at Schenectady last summer will always remember that fine fraternity of teachers whom we lived with for five weeks at French Point, Schenectady, and on that trip through New England. A Merry Christmas to you,
R.G. Kloeffer.²⁰

Also included among Professor Lee's papers is an envelope of photographs of bathers on a dock at Lake George, sent with fond regards by John Apperson.

The fledgling school that Dr. McBryde took over in 1891 benefited from his leadership in obvious ways – in the growth of the physical plant, the faculty, the budget, the enrollment and in reputation. McBryde's presidency was exceptional in many respects, especially his receptiveness to new technological trends, his resourcefulness in finding jobs for students, his encouragement of student activities (the development of the Alumni Association), and his progressive vision for education that would train men to become productive citizens. Dr. McBryde's administration steered confidently through an era of rapid change, introducing students to the rudiments of technology and preparing them for the wonders of the electrical age. Technology provided an arena in which VPI

alumni could excel, competing for jobs with graduates from other land grant schools throughout the country. By putting **Technological** into the name of the school, Dr. McBryde offered Virginians a new sort of educational opportunity (very different from the classical education available at that other Virginia university, in Charlottesville), and nudged an eager generation of students into full participation in the industrial wonders of the twentieth century.

¹ Duncan Kyle Kinnear, The First 100 Years: A History of Virginia Polytechnic Institute and State University (Blacksburg: VPI Educational Foundation, 1972), 143-146.

² W. Bernard Carlson, Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900 (Cambridge: Cambridge University Press, 1991), 340.

³ E.A. Smyth, VPI Semi-centennial: A Brief History of the College, 1872-1922 (Blacksburg: VPI Alumni, 1922), 33.

⁴ Kinnear, 146.

⁵ Frederick E. Terman, "A Brief History of Electrical Engineering Education," Proceedings of the IEEE, vol. 86, no.8 (August 1998), 1794.

⁶ Terman, 1794.

⁷ Virginia Agricultural and Mechanical College Catalogue, 1891-1892, 42.

⁸ VPI Catalogue, 1902-1903, 74-75.

⁹ Kinnear, 147.

¹⁰ Kinnear, 135.

¹¹ Kinnear, 135.

¹² Harry Temple, The Bugle's Echo: A Chronology of Cadet Life at the Military College at Blacksburg, Virginia (Blacksburg, Va: Va Tech Corps of Cadets Alumni, 1996), 336.

¹³ Temple, 278.

¹⁴ Apperson Correspondence, Personal Collection

¹⁵ VPI Catalogue, 1895-1896.

¹⁶ Apperson Papers

¹⁷ Bugle 1900, 23-25.

¹⁸ Terman, 1794.

¹⁹ W. Bernard Carlson, Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900 (Cambridge: Cambridge University Press, 1991), 355.

²⁰ Claudius Lee Papers, Va Tech Special Collections

Bibliography

Secondary Sources

- Birr, Kendall. Pioneering in Industrial Research: The Story of the General Electric Research Laboratory. Washington: Public Affairs Press, 1957.
- Carlson, W. Bernard. Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900. Cambridge: Cambridge University Press, 1991.
- Gorowitz, Bernard, ed. The General Electric Story 1876-1986: A Photohistory. Schenectady: Hall of History, 1989.
- Hammond, John Winthrop. Men and Volts: The Story of General Electric. Philadelphia: J.B. Lippincott Company, 1941.
- Hart, Larry. Schenectady's Golden Era, 1880-1930. Scotia: Old Dorp Books, 1974.
- Hirsh, Richard. "Emergence of Electrical Utilities in America."
<http://americanhistory.si.edu/csr/powering/hirsh1/frmain.htm>
- Kinnear, Duncan Kyle. The First 100 Years: A History of Virginia Polytechnic Institute and State University. Blacksburg: VPI Educational Foundation, 1972.
- Miller, John Anderson. Workshop of Engineers: The Story of the General Engineering Laboratory of the General Electric Company, 1895-1952. Schenectady: Maqua Company, 1953.
- Nye, David E. Electrifying America: Social Meanings of a New Technology, 1880-1940. Cambridge: M.I.T. Press, 1997.
- Passer, Harold C. "Development of Large-Scale Organization: Electrical Manufacturing Around 1900." Journal of Economic History. vol. 12, Issue 4 (Autumn, 1952) 378-395.
- Smyth, E.A. VPI Semi-centennial: A Brief History of the College, 1872-1922. Blacksburg: VPI Alumni, 1922. (Jeanette Hamlin Personal Collection)
- Temple, Harry Downing. The Bugle's Echo: A Chronology of Cadet Life at the Military College at Blacksburg, Virginia, the Virginia Agricultural and Mechanical College and the Virginia Polytechnic Institute. Blacksburg, Va.: Va Tech Corps of Cadets Alumni, 1996.
- Terman, Frederick E. "A Brief History of Electrical Engineering Education."
Proceedings of the IEEE. vol. 86, no.8 (August 1998) 1792-1800.

Va Tech Electrical Service: 100 Years of Service. 1893-1993, A Brief History of the Virginia Tech Electric Service. Blacksburg: Va Tech, 1993.

Primary Sources

Va Tech Special Collections.

Papers of Claudius Lee, Dr. Pritchard, and Dr. Brown

VPI Catalogues – 1891-1900

Grey Jackets – June 1903; January 1903

Bugles – 1896-1904

Apperson, Alfred Hull. Letters to Family Members: 1893-1908. Personal Collection

Apperson, John S. Personal Correspondence: 1893-1963. Personal Collection