



HIGHER EDUCATION IN MID 19TH AND EARLY 20TH CENTURY AMERICA

In the United States, the start of the second half of the 19th century was an era when few instructors in academic institutions held advanced degrees, such as Master of Arts, Master of Science, or Doctor of Philosophy. This was simply because few academic institutions in America awarded advanced degrees. America's academic institutions were in their infancy, with many of the early colleges being established by various religious denominations, for the primary purpose of training men for the ministry. Consequently, the great majority of instructors at these early academic institutions were men, and predominantly clergymen. During this time, other than the ministry, the two most commonly chosen professions requiring any type of an academic education were medicine and law.

Scattered primarily in the States east of the Mississippi, these early academic institutions consisted of mostly small colleges that provided a limited undergraduate curriculum with a primary focus on the liberal arts and religious studies. The students, predominantly young men of wealthy families, were offered an education in the classics, which included Greek, Latin, ethics and rhetoric, ancient history, geometry, logic and music. Markedly absent from the vast majority of these early colleges was any course in astronomy, biology, chemistry, geology, zoology or any other natural sciences.¹

Also, markedly absent from the vast majority of these early colleges were female students. Before the second half of the 19th century, women in this country had limited access to the higher education offered at American colleges. It was not until the late 19th and early 20th century that increasing numbers of this nation's colleges began to accept women. Those young women able to extend their education beyond grammar school, attended a female academy, seminary, or a state normal school where they were most of-

ten trained as elementary and secondary schoolteachers. In fact, during the late 19th century and into the early 20th century, a majority of the students attending normal schools - educational institutions whose main purpose was to train schoolteachers and establish teaching standards (i.e. norms) - were women. Enrollment numbers from the California State Normal School at San Jose show just how dominant the attendance of women at a state normal school could become.²

Year	Enrollment	Percentage of Women
1874-1875	328	82.6
1884-1885	528	85.2
1894-1895	675	92.6
1904-1905	608	93.4
1909-1910	619	96.3

During this period in American history, women who attended these educational institutions did not focus on the classics but, in sharp contrast to their male counterparts, were often trained in the natural sciences.³ Beginning in the last quarter of the 19th century and into first quarter of the 20th century, instruction in natural history and laboratory science became an important component of the curriculum of normal schools. As a result, practically every normal school in America included botany, geography, nature study, and physiology. Beyond these courses many normal schools had required curricula that included one or more of the following subjects: astronomy, biology, chemistry, geology, mineralogy, and physics.⁴

The California State Normal School at San Jose, for example, provided an extended curriculum of courses in natural history and sciences, and in addition, possessed a natural history museum and a herbarium.⁵ The museum featured cases hold-

ing specimens in conchology, including a collection of over three thousand specimens of West Coast shells provided by an amateur conchologist, Mr. Henry Hemphill, and a collection of more than fifteen hundred rare California and foreign shells provided by Miss Jennie R. Bush. Other branches of natural history were well represented within the museum by twenty cases of minerals, thirty cases of insects, two cases of crustaceans and radiates, one case of California tertiary fossils, one case of Silurian fossils, and two cases of foreign and native woods.⁶ A herbarium, gathered through years of effort by Miss Mary EB Norton, the instructor of botany, contained several thousand plants, among them representative species from each continent. Each plant specimen was carefully classified, labeled, and arranged in its case. The aim of the California State Normal School at San Jose was to make this museum collection useful and instructive, as opposed to just a display to satisfy simple curiosity.⁷

Beyond the museum and herbarium, the California State Normal School at San Jose maintained a chemistry laboratory, complete with the necessary equipment for experimental work by the students. In the case of chemistry and physics, the students themselves manufactured much of the equipment used, which better prepared them for teaching elementary science in the rural communities of California. The school was equipped with microscopes for the study of botany, physiology, and zoology.⁸ For astronomical studies, although the Normal School did not have an observatory on the campus in San Jose, each senior was allowed use of the large telescope at the Lick Observatory during annual trips up Mount Hamilton.⁹

This emphasis on the natural sciences at the California State Normal School prepared women to become qualified science teachers, primarily at the elementary school level, given that there were far more grade school than high school teaching positions, especially in rural countryside of California during the later years of the 19th century.¹⁰



Lick Observatory, Mount Hamilton, California.

Detroit Photographic Company, c1902.

Photograph courtesy of the Prints and Photographs Division, Library of Congress.

Number: LC-DIG-ppmsca-17974

ELEMENTARY EDUCATION IN MID 19TH AND EARLY 20TH CENTURY AMERICA

In the United States, during the second half of the 19th century, the majority of America's children attended one-room school houses where the teachers were predominantly young women.¹¹ Just how disproportionate women were as schoolteachers in the far reaches of the West is exemplified in the County of Monterey, California, where in the year 1900, the school system was divided into 101 school districts employing 125 female teachers and 10 male teachers. Based on those figures, the Monterey County school system was dominated by one-room schoolhouses with women making up 93% of the schoolteachers, primarily engaged in elementary education.¹²

During this period in American history, the majority of these female instructors in elementary schools did not hold advanced degrees in education or teaching credentials from accredited academic institutions. Most were in their teens or early twenties, with many having little or no education beyond the eighth grade.¹³ As a result of this virtually complete lack of training in pedagogy, teaching was based almost entirely on repetition and memorization. This method of instruction had children reading and reciting from textbooks until they knew large portions of the material by heart.¹⁴ With William McGuffey's *Eclectic Reader* being the most common textbook of the 19th century, there were eleven- and twelve-year-old children who had memorized and could recite 200 or even 300 pages of the *McGuffey Reader* practically word for word.¹⁵ Other children, whose only opportunity to obtain any schooling was limited to their attendance of Sunday school, were provided an education through the memorization of scripture.¹⁶ One such student, who first learned by rote learning of the scripture, was the famous California naturalist John Muir, who by age eleven had memorized much of the Bible and could recite the entire New Testament and most of the Old Testament verbatim.¹⁷ In sharp contrast to learning through memorization and recitation,

the method of study that Louis Agassiz wished to introduce into the American educational system was one that encouraged using textbooks together with objects of nature.

LOUIS AGASSIZ'S METHOD OF STUDY

Louis Agassiz's method of study was one that encouraged students to develop their critical thinking abilities through a combination of inquiry-based observation and a direct "hands-on" approach to learning. His method of teaching natural history encouraged a spirit of investigation, while developing the faculties of observation, critical reasoning, and independent thinking. Agassiz, in his own words, describes his teaching technique, and how this pedagogical approach differed from the dominant method of the late 19th and early 20th century, that of continual recitation and memorization:

Our school system has been developed in a manner which has produced the most admirable results, and is imitated everywhere as the most complete and the most successful; but, while we have attained the highest point in that respect, we are also best prepared by that very position to make any further improvement which may lead to a better future. And I believe that the introduction of the study of natural history, as a branch of the most elementary education, is what can be added to what is already so admirable a system. The difficult art of thinking can be acquired more rapidly by this method than by any other. When we study moral or mental philosophy in text-books, which we commit to memory, it is not the mind we cultivate, it is the memory alone. The mind may come in; but if it does in that method, it is only in an accessory way. But if we learn to think, by unfolding thoughts ourselves, from the examination of objects around us, then we acquire them ourselves, and we acquire the ability of applying our thoughts in life. The teacher who is competent to teach the elements of this science, must, of course, feel a deep interest in it; he must know how to select those topics which are particularly instructive and best adapted to awaken an interest, to sustain it, and to lead forward to the understanding of more difficult questions. He should be capable of rendering the subject attractive, interesting, and so pleasant, indeed, that the hour for the school should be welcomed by the scholar instead of being dreaded as bringing something imposed by duty, and not desirable in itself.¹⁸

Agassiz's "hands-on" method of instruction presented a new approach for teaching biology and elementary science in the United States. Students would now be taught to study rocks, plants, and animals, not only in the classroom, but in the field as well. This method of instruction, encouraging students to study the object of nature rather than a book's description of the object of nature, was a brilliant pedagogical tool that served to inaugurate widespread reform in science education.¹⁹



The Anderson School of Natural History on Penikese Island.

Photograph courtesy of the Marine Biological Laboratory Archives.

THE INFLUENCE OF PENIKESE ON AMERICAN EDUCATION

That there should be a course of science teaching in the elementary schools was borne in upon the minds of educators in this country as soon as the discoveries and methods of Charles Darwin were generally understood and the idea began to take form when the pupils of Louis Agassiz went back to their schools from Penikese Island.²⁰

Few events during this period in American history had a more significant influence on educational development of this country than the establishment of the Anderson School of Natural History on Penikese Island.²¹ A considerable amount of the success associated with this educational experiment was the result of Louis Agassiz's immense popularity on the American stage, which enabled the Harvard professor to generate an enormous quantity of press surrounding the opening of Penikese. Savvy to the powerful role of media coverage in informing the masses and shaping public opinion, Agassiz had encouraged journalists from newspapers along the Eastern seaboard, including the New York Times, to visit the Anderson School and report on the daily happenings.²² The resulting articles, picked up and published in leading newspapers throughout the United States, vividly described the activities taking place at the summer school. Americans were presented with stories and hand-drawn illustrations of young female students attending lectures, collecting specimens, and dissecting marine animals, along side their male counterparts.²³ In addition to the newspaper reports generated that summer of 1873, for many years following, glowing articles about the Penikese experience, penned by the cohort of students from that original class, were published in virtually every popular periodical, education and science journal of the day. The years of continual publicity associated with the Anderson School of Natural History turned into decades. This extended campaign of publicity not only broadened public opinion of the value of Agassiz's method, but served to advance the acceptance of women as teachers of nature study. Even more, the immense amount of publicity associated with Agassiz's ex-

perimental summer school of science catalyzed a nature study movement that swept the country and inspired in the American public a deep appreciation for nature. The workings of this movement changed the way science in American schools was taught, by emphasizing learning from tangible objects of nature. This emphasis was celebrated by the movement's unswerving hymn: Louis Agassiz's "study nature, not books."

And so it was, that the idea of summer schools for advancing the teaching skills of educators was introduced to America when Louis Agassiz conducted the first summer session on Penikese Island in 1873. A summer program for Sunday school teachers, established on the shores of Chautauqua Lake in the wilderness of upstate New York, would soon follow.