People Essay, Research Paper

Evelyn Boyd Granville

May 1, 1924 –

My Life as a Mathematician, by Evelyn Boyd Granville

This article originally appeared in SAGE: A Scholarly Journal on Black Women, Vol 6, No. 2 (Fall 1989), p44-46. It is copyrighted by Sage Women’s Educational Press, Inc., and is reproduced with their permission and the permission of Professor Evelyn Granville.

Fortunately for me as I was growing up, I never heard the theory that females aren’t equipped mentally to succeed in mathematics, and my generation did not hear terms such as “permanent underclass,” “disadvantaged” and “underprivileged.” Our parents and teachers preached over and over again that education is the vehicle to a productive life, and through diligent study and application we could succeed at whatever we attempted to do. As a child growing up in the thirties in Washington, D.C., I was aware that segregation placed many limitations on Negroes, (We were not referred to as Blacks in those days.) However, daily one came in contact with Negroes who had made a place for themselves in society; we heard about and read about individuals whose achievements were contributing to the good of all people. These individuals, men and women, served as our role models; we looked up to them and we set out goals to be like them. We accepted education as the means to rise above the limitations that a prejudiced society endeavored to place upon us.

I was born in Washington, D.C. on May 1, 1924, the second child and second daughter born to William and Julia Boyd. Over the years my father held a variety of jobs–janitor at large apartment complexes, chauffeur, and messenger with the Federal Bureau of Investigation. Even in the midst of the Depression that devastated this country in the late twenties and early thirties, I was not aware of our family ever being without the necessities of life. When we were young my mother stayed at home to care for her two daughters. Later, after my mother and father separated, my mother found employment at the United States Bureau of Engraving and Printing as a currency and stamp examiner and worked there until she retired. Even though the District of Columbia was a segregated city, life for me in Washington was not unpleasant. There were many recreational facilities in the areas that we were free to use. The libraries and museums in the city were open to all and provided me many hours of enjoyment and learning.

I loved school. The “colored” school system of Washington was in no way an inferior school system. The system attracted outstanding administrators and teachers; teachers at all levels were well-trained and highly dedicated to their profession. I cannot think of one teacher I had in elementary school, junior high school, or high school who did not demand excellence. My favorite subject was mathematics, and as far back as I can recall, I set my sights on becoming a mathematics teacher. I was the salutatorian of my junior high school graduating class and one of five valedictorians when I graduated from Dunbar High School. This high school had graduated many outstanding Black leaders and had gained a national reputation for the quality of its educational program. Dunbar had the tradition of encouraging students to attend ivy league colleges in the north. My home room teacher, also one of my math teachers, encouraged me to apply to two schools in Massachusetts, Smith College in Northampton and Mt. Holyoke in South Hadley. Even thought the fees at each school ere very high, I submitted applications to both in the hope of getting a scholarship, I was accepted by both colleges, but neither offered any financial assistance for the freshman year. My mother’s sister, who was determined that I attend a northern college, offered to pay half my fees for the first year. A scholarship from Phi Delta Kappa, a national sorority of Black teachers, provided additional financial aid. I looked forward to college with great expectation and in the fall of 1941 I entered Smith College.

Smith, with an enrollment of approximately two thousand students, is the largest private college for women in this country. Although the students who enroll in this institution come from the finest public and private secondary schools, at no time did I feel that I could not compete with them. My schooling in the public schools of Washington, D.C. ranked with the best. After completing the required courses in languages and the humanities, I concentrated my studies in mathematics, theoretical physics and astronomy. I was fascinated by the study of astronomy and at one point I toyed with the idea of switching my major to this subject. If I had known then that in the not too distant future the United States would launch its space program, and astronomers would be in great demand in the planning of space missions, I might have become an astronomer instead of a mathematician. Smith was very generous in providing financial aid to me after my freshman year. Summer work as a mathematician at the National Bureau of Standards in Washington provided additional funds for school. I was elected to Phi Beta Kappa and to associate membership in Sigma Xi in my senior year and graduated summa cum laude from Smith in 1945 with honors in mathematics. A scholarship from the Smith Student Aid Society enabled me to start graduate study in the fall.

I was accepted at two graduate schools, the University of Michigan and Yale University. I chose Yale because the university granted me a scholarship to supplement the financial aid I received from Smith College. During subsequent years at Yale I was twice awarded a Julius Rosenwald Fellowship and for my final year of study I was granted an Atomic Energy Commission Predoctoral Fellowship. The fellowships enabled me to continue my study for the Ph.D. degree without interruption. Graduate study was demanding, but I enjoyed studying under the mathematics scholars on the Yale faculty. Dr. Einar Hille, a distinguished mathematician in the field of functional analysis, served as my research advisor. In my doctoral dissertation I discussed properties of Laguerre series in the complex domain. I was awarded the Ph.D. degree in mathematics in 1949. Many years later I learned that Dr. Marjorie Lee Brown, who received the Ph.D. degree in mathematics in 1949 from the University of Michigan, and I were the first two Black women in the United States to receive doctorates in mathematics.

Following the receipt of the doctorate I spent a year as a research assistant at the New York University Institute for Mathematics and part-time instructor in the mathematics department of the university. Because I found teaching so fulfilling I decided to look for a full-time teaching position for the following year. I accepted an appointment as Associate Professor of Mathematics at Fisk University in Nashville, Tennessee. The contrast between New York City, a large cosmopolitan city in the north, and Nashville, a much smaller and segregated city in the South , was quite marked. Nonetheless, I adjusted well and enjoyed my two-year stay on the campus. The department attracted several very capable majors, including two women who later went on to receive doctorate degrees in mathematics. I taught Dr. Vivienne Malone Mayes, who received her doctorate from the University of Texas at Austin, and Dr. Etta Zuber Falconer, who received the Ph.D. degree in mathematics from Emory University.

In July 1952 I returned to Washington, D.C. to accept a position as mathematician at the National Bureau of Standards (NBS). The work entailed consulting with ordinance engineers and scientists on the mathematical analysis of problems related to the development of missile fuzes. The division I joined at NBS later became an agency in the Department of the Army and was renamed the Diamond Ordnance Fuze Laboratories (DOFL). While working at DOFL I met several mathematicians who were employed at NBS as computer programmers. At that time the development of electronic computers was in its infancy. The application of computers to scientific studies interested me very much, which led to my giving serious consideration to an offer of employment from International Business Machines Corporation (IBM). I left DOFL in December 1955 to work for IBM.

I joined IBM in January 1956. At a two-week training session at the Watson Computing Center in New York City I was introduced to the IBM 650 electronic computer and the programming language SOAP. I found programming to be a challenge because the creation of a computer program is an exercise in logical thinking and problem solving. After a year in the Washington, D.C. office of IBM, where I developed programs for the IBM 650, I moved to New York City to work as a consultant in numerical analysis at the New York City Data Processing Center of the Service Bureau Corporation., an IBM subsidiary. I enjoyed the work at the Center, but I did not enjoy living in New York City. Housing was in very short supply and what little was available was quite expensive. When the National Aeronautics and Space Administration (NASA) awarded IBM a contract to plan, write, and maintain computer programs for the U.S. space program the company opened the Vanguard Computing Center in Washington, D.C. When the offer was made to transfer to the Center, I readily agreed to return to Washington to be a part of the team of IBM mathematicians and scientists who were responsible for the formulation of orbit computations and computer procedures, first for NASA’s Project Vanguard and later for Project Mercury. I can say without a doubt that this was the most interesting job my lifetime–to be a member of a group responsible for writing computer programs to track the paths of vehicles in space. I left IBM in November, 1960 when I married and moved to Los Angeles, California. In California, I joined the staff of the Computation and Data Reduction Center of Space Technology Laboratories to do research studies on methods of orbit computations. In the early sixties there was a great dess. As I look back now I wonder how I was able to handle a full-time load at CSULA, an evening class at the University of Southern California and the elementary school classes. I was happy in my work and I felt that I was a good teacher; hence, the full schedule was not a burden to me.

My involvement with the teaching of the course for prospective elementary school teachers led to my association with Jason Frand to co-author a textbook for college courses comparable to the one taught at CSULA. We found an editor–Louis Leithold–and a publisher–Wadsworth Publishing Company. The first edition of the book appeared in 1975 and was adopted by over fifty colleges across the country. The success of the first edition led to a second edition published in 1978. By the time of the publication of the second edition, acceptance of the “new math” curriculum was waning and changes in the teaching of elementary school mathematics was being considered and adopted. The emphasis shifted in “basic mathematics” and our textbook was no longer appropriate for teacher education courses. I found the writing of a textbook to be very demanding and time- consuming. My co-author and I were very proud of the finished product, but neither of us was included to write another textbook. Instead, I turned my attention to gaining more knowledge in the area of computer science and computer languages.

The start of the year 1983 found me anticipating another major step in my life– retirement and a move from Los Angeles. In 1970 I married Edward V. Granville, a successful real estate broker and a long-time resident of Los Angeles. My husband was born and raised in East Texas and planned to return to the area when he retired from his business. I often accompanied him on visits to Texas and , after making several trips, I was convinced that a move to a rural setting in East Texas would be a welcome change from the Los Angeles metropolis. We found an ideal setting in a 16-acre parcel with a house and a four-acre lake new Tyler, Texas. After nearly seventeen years of teaching, I retired from CSULA in March 1984 and moved to Texas.

Retirement was short-lived. When a member of the Board of Education of the Van Independent School District learned of my experience in computer education, he urged me to join the faculty of the district for the 1984 fall term to teach a computer literacy class to eighth graders. Although I had no training for public school teaching, I assumed that my past teaching experience would suffice in the place of formal training in teacher education. I was given a full teaching load– three sections of the computer literacy class, a section of eighth grade mathematics and a beginning algebra class at the high school. It did not take long for me to discover that public school teaching is quite different from college teaching. I realized quickly that I was totally unprepared to manage the classes assigned to me. After several months the district administrators and I came to the conclusion that it would be wise for all concerned for me to relinquish my appointment. I left the job shortly before Thanksgiving; my tenure in the school district had lasted less than three months.

Shortly after I left the school district I received an invitation to join the faculty of Texas College, a small, predominantly Black four-year college in Tyler, Texas. In Fall 1984 the college had approved a program for a major in computer science and an opening existed for a teacher in this area. I joined the faculty of the college in January 1985 and taught there until May 1988. I welcomed the opportunity to teach in the new program because I knew I would be assigned to teach courses for which I had no formal training. Over the years I have learned that one of the best ways to become proficient in a subject is to teach the subject. The three and one- half years I spent at Texas College provided me with as much education in computer science as I brought to the students.

I decided to forego teaching during the academic year 1988-1989 in order to have the leisure time to travel in the United States. My plans for the future are not firm at this time, but I know that I want to be involved in the educational process in some way. The excellent education and training I was privileged to receive place upon me an obligation to improve educational opportunities for others. There are a number of avenues open for making a meaningful contribution–continue teaching at the college level, volunteer to participate in a tutorial program for students at the elementary or secondary level, join a volunteer group working to wipe out adult illiteracy in this country. I know now that retirement for me is a long way off.

mand for mathematicians Granville

May 1, 1924 –

My Life as a Mathematician, by Evelyn Boyd Granville

This article originally appeared in SAGE: A Scholarly Journal on Black Women, Vol 6, No. 2 (Fall 1989), p44-46. It is copyrighted by Sage Women’s Educational Press, Inc., and is reproduced with their permission and the permission of Professor Evelyn Granville.

Fortunately for me as I was growing up, I never heard the theory that females aren’t equipped mentally to succeed in mathematics, and my generation did not hear terms such as “permanent underclass,” “disadvantaged” and “underprivileged.” Our parents and teachers preached over and over again that education is the vehicle to a productive life, and through diligent study and application we could succeed at whatever we attempted to do. As a child growing up in the thirties in Washington, D.C., I was aware that segregation placed many limitations on Negroes, (We were not referred to as Blacks in those days.) However, daily one came in contact with Negroes who had made a place for themselves in society; we heard about and read about individuals whose achievements were contributing to the good of all people. These individuals, men and women, served as our role models; we looked up to them and we set out goals to be like them. We accepted education as the means to rise above the limitations that a prejudiced society endeavored to place upon us.

I was born in Washington, D.C. on May 1, 1924, the second child and second daughter born to William and Julia Boyd. Over the years my father held a variety of jobs–janitor at large apartment complexes, chauffeur, and messenger with the Federal Bureau of Investigation. Even in the midst of the Depression that devastated this country in the late twenties and early thirties, I was not aware of our family ever being without the necessities of life. When we were young my mother stayed at home to care for her two daughters. Later, after my mother and father separated, my mother found employment at the United States Bureau of Engraving and Printing as a currency and stamp examiner and worked there until she retired. Even though the District of Columbia was a segregated city, life for me in Washington was not unpleasant. There were many recreational facilities in the areas that we were free to use. The libraries and museums in the city were open to all and provided me many hours of enjoyment and learning.

I loved school. The “colored” school system of Washington was in no way an inferior school system. The system attracted outstanding administrators and teachers; teachers at all levels were well-trained and highly dedicated to their profession. I cannot think of one teacher I had in elementary school, junior high school, or high school who did not demand excellence. My favorite subject was mathematics, and as far back as I can recall, I set my sights on becoming a mathematics teacher. I was the salutatorian of my junior high school graduating class and one of five valedictorians when I graduated from Dunbar High School. This high school had graduated many outstanding Black leaders and had gained a national reputation for the quality of its educational program. Dunbar had the tradition of encouraging students to attend ivy league colleges in the north. My home room teacher, also one of my math teachers, encouraged me to apply to two schools in Massachusetts, Smith College in Northampton and Mt. Holyoke in South Hadley. Even thought the fees at each school ere very high, I submitted applications to both in the hope of getting a scholarship, I was accepted by both colleges, but neither offered any financial assistance for the freshman year. My mother’s sister, who was determined that I attend a northern college, offered to pay half my fees for the first year. A scholarship from Phi Delta Kappa, a national sorority of Black teachers, provided additional financial aid. I looked forward to college with great expectation and in the fall of 1941 I entered Smith College.

Smith, with an enrollment of approximately two thousand students, is the largest private college for women in this country. Although the students who enroll in this institution come from the finest public and private secondary schools, at no time did I feel that I could not compete with them. My schooling in the public schools of Washington, D.C. ranked with the best. After completing the required courses in languages and the humanities, I concentrated my studies in mathematics, theoretical physics and astronomy. I was fascinated by the study of astronomy and at one point I toyed with the idea of switching my major to this subject. If I had known then that in the not too distant future the United States would launch its space program, and astronomers would be in great demand in the planning of space missions, I might have become an astronomer instead of a mathematician. Smith was very generous in providing financial aid to me after my freshman year. Summer work as a mathematician at the National Bureau of Standards in Washington provided additional funds for school. I was elected to Phi Beta Kappa and to associate membership in Sigma Xi in my senior year and graduated summa cum laude from Smith in 1945 with honors in mathematics. A scholarship from the Smith Student Aid Society enabled me to start graduate study in the fall.

I was accepted at two graduate schools, the University of Michigan and Yale University. I chose Yale because the university granted me a scholarship to supplement the financial aid I received from Smith College. During subsequent years at Yale I was twice awarded a Julius Rosenwald Fellowship and for my final year of study I was granted an Atomic Energy Commission Predoctoral Fellowship. The fellowships enabled me to continue my study for the Ph.D. degree without interruption. Graduate study was demanding, but I enjoyed studying under the mathematics scholars on the Yale faculty. Dr. Einar Hille, a distinguished mathematician in the field of functional analysis, served as my research advisor. In my doctoral dissertation I discussed properties of Laguerre series in the complex domain. I was awarded the Ph.D. degree in mathematics in 1949. Many years later I learned that Dr. Marjorie Lee Brown, who received the Ph.D. degree in mathematics in 1949 from the University of Michigan, and I were the first two Black women in the United States to receive doctorates in mathematics.

Following the receipt of the doctorate I spent a year as a research assistant at the New York University Institute for Mathematics and part-time instructor in the mathematics department of the university. Because I found teaching so fulfilling I decided to look for a full-time teaching position for the following year. I accepted an appointment as Associate Professor of Mathematics at Fisk University in Nashville, Tennessee. The contrast between New York City, a large cosmopolitan city in the north, and Nashville, a much smaller and segregated city in the South , was quite marked. Nonetheless, I adjusted well and enjoyed my two-year stay on the campus. The department attracted several very capable majors, including two women who later went on to receive doctorate degrees in mathematics. I taught Dr. Vivienne Malone Mayes, who received her doctorate from the University of Texas at Austin, and Dr. Etta Zuber Falconer, who received the Ph.D. degree in mathematics from Emory University.

In July 1952 I returned to Washington, D.C. to accept a position as mathematician at the National Bureau of Standards (NBS). The work entailed consulting with ordinance engineers and scientists on the mathematical analysis of problems related to the development of missile fuzes. The division I joined at NBS later became an agency in the Department of the Army and was renamed the Diamond Ordnance Fuze Laboratories (DOFL). While working at DOFL I met several mathematicians who were employed at NBS as computer programmers. At that time the development of electronic computers was in its infancy. The application of computers to scientific studies interested me very much, which led to my giving serious consideration to an offer of employment from International Business Machines Corporation (IBM). I left DOFL in December 1955 to work for IBM.

I joined IBM in January 1956. At a two-week training session at the Watson Computing Center in New York City I was introduced to the IBM 650 electronic computer and the programming language SOAP. I found programming to be a challenge because the creation of a computer program is an exercise in logical thinking and problem solving. After a year in the Washington, D.C. office of IBM, where I developed programs for the IBM 650, I moved to New York City to work as a consultant in numerical analysis at the New York City Data Processing Center of the Service Bureau Corporation., an IBM subsidiary. I enjoyed the work at the Center, but I did not enjoy living in New York City. Housing was in very short supply and what little was available was quite expensive. When the National Aeronautics and Space Administration (NASA) awarded IBM a contract to plan, write, and maintain computer programs for the U.S. space program the company opened the Vanguard Computing Center in Washington, D.C. When the offer was made to transfer to the Center, I readily agreed to return to Washington to be a part of the team of IBM mathematicians and scientists who were responsible for the formulation of orbit computations and computer procedures, first for NASA’s Project Vanguard and later for Project Mercury. I can say without a doubt that this was the most interesting job my lifetime–to be a member of a group responsible for writing computer programs to track the paths of vehicles in space. I left IBM in November, 1960 when I married and moved to Los Angeles, California. In California, I joined the staff of the Computation and Data Reduction Center of Space Technology Laboratories to do research studies on methods of orbit computations.

In the early sixties there was a great demand for mathematicians

In the summer of 1967 I was faced with two major decisions. ESD was cutting its staff in Los Angeles due to a decline in government contracts; a new position was offered to me in Washington, D.C. Also, I was facing the break-up of my marriage. I decided to remain in Los Angeles, resign from IBM and proceed with a divorce. A third major decision was to seek a teaching position at a college or university instead of a research position in private industry. This turned out to be a good decision–one I have never regretted. An appointment as Assistant Professor of Mathematics at California State University, Los Angeles (CSULA), came in September 1967. After years of working “nine to five,” I enjoyed the flexibility of a college teaching schedule. My years of experience in industry were put to good use at CSULA; I was assigned to teach classes in computer programming and numerical analysis. Another course assigned toe was the required mathematics course for prospective elementary school teachers. The so-called “new math” had been incorporated into the elementary school curriculum and the course was designed to show students how abstract mathematical concepts can be used to give meaning to mathematics programs in the lower grades. Teaching this class led me to new field of interest– mathematics for grades K through 6–and to my participation in a special mathematics program launched by the State of California in Fall 1968. The project–known as the Miller Mathematics Improvement Program–provided a supplemental program in mathematics at selected elementary schools throughout the state. It grew out of a program called Project S.E.E.D., developed by Dr. William Johntz at the University of California at Berkeley. Teachers for the project were recruited from college faculties. I spent the academic year 1968-1969 teaching two hours a day at an elementary school in Los Angeles; I taught a second grade class and a fifth grade class. As I look back now I wonder how I was able to handle a full-time load at CSULA, an evening class at the University of Southern California and the elementary school classes. I was happy in my work and I felt that I was a good teacher; hence, the full schedule was not a burden to me.

My involvement with the teaching of the course for prospective elementary school teachers led to my association with Jason Frand to co-author a textbook for college courses comparable to the one taught at CSULA. We found an editor–Louis Leithold–and a publisher–Wadsworth Publishing Company. The first edition of the book appeared in 1975 and was adopted by over fifty colleges across the country. The success of the first edition led to a second edition published in 1978. By the time of the publication of the second edition, acceptance of the “new math” curriculum was waning and changes in the teaching of elementary school mathematics was being considered and adopted. The emphasis shifted in “basic mathematics” and our textbook was no longer appropriate for teacher education courses. I found the writing of a textbook to be very demanding and time- consuming. My co-author and I were very proud of the finished product, but neither of us was included to write another textbook. Instead, I turned my attention to gaining more knowledge in the area of computer science and computer languages.

The start of the year 1983 found me anticipating another major step in my life– retirement and a move from Los Angeles. In 1970 I married Edward V. Granville, a successful real estate broker and a long-time resident of Los Angeles. My husband was born and raised in East Texas and planned to return to the area when he retired from his business. I often accompanied him on visits to Texas and , after making several trips, I was convinced that a move to a rural setting in East Texas would be a welcome change from the Los Angeles metropolis. We found an ideal setting in a 16-acre parcel with a house and a four-acre lake new Tyler, Texas. After nearly seventeen years of teaching, I retired from CSULA in March 1984 and moved to Texas.

Retirement was short-lived. When a member of the Board of Education of the Van Independent School District learned of my experience in computer education, he urged me to join the faculty of the district for the 1984 fall term to teach a computer literacy class to eighth graders. Although I had no training for public school teaching, I assumed that my past teaching experience would suffice in the place of formal training in teacher education. I was given a full teaching load– three sections of the computer literacy class, a section of eighth grade mathematics and a beginning algebra class at the high school. It did not take long for me to discover that public school teaching is quite different from college teaching. I realized quickly that I was totally unprepared to manage the classes assigned to me. After several months the district administrators and I came to the conclusion that it would be wise for all concerned for me to relinquish my appointment. I left the job shortly before Thanksgiving; my tenure in the school district had lasted less than three months.

Shortly after I left the school district I received an invitation to join the faculty of Texas College, a small, predominantly Black four-year college in Tyler, Texas. In Fall 1984 the college had approved a program for a major in computer science and an opening existed for a teacher in this area. I joined the faculty of the college in January 1985 and taught there until May 1988. I welcomed the opportunity to teach in the new program because I knew I would be assigned to teach courses for which I had no formal training. Over the years I have learned that one of the best ways to become proficient in a subject is to teach the subject. The three and one- half years I spent at Texas College provided me with as much education in computer science as I brought to the students.

I decided to forego teaching during the academic year 1988-1989 in order to have the leisure time to travel in the United States. My plans for the future are not firm at this time, but I know that I want to be involved in the educational process in some way. The excellent education and training I was privileged to receive place upon me an obligation to improve educational opportunities for others. There are a number of avenues open for making a meaningful contribution–continue teaching at the college level, volunteer to participate in a tutorial program for students at the elementary or secondary level, join a volunteer group working to wipe out adult illiteracy in this country. I know now that retirement for me is a long way off.