



**My STEM Story**

## **Aquila Islam From Pakistan**

[October 29, 2018](#)

### ***Trail Blazer***

The year was 1948, and the month was May. Less than a year ago a new country had made its appearance on the map of the world, carved out of a subcontinent well known in the annals of history. The birth-pains of Pakistan had not yet subsided and memories of the blood-drenched partition were still fresh in all minds. Karachi, presently a sprawling city of 20 million was a small town of not more than a 400,000, neat and clean, but dusty, just like a desert. In the hot blazing afternoon two persons were trekking across a shade-less barren stretch of land. One upright distinguished looking elderly man and the other a weak sickly girl child looking much younger and smaller than her 11 years. They were headed towards a Girls' school. At the gate of the school the man was sort of taken aback. The sign there said, "Men are not permitted inside". Accustomed to respect rules and regulations as he himself had been a Headmaster (Principal) of a well-recognized school in Bombay (now Mumbai), he bent to tell his granddaughter to venture alone to cross the gate. The little girl did manage to find the Principal's office. There she was asked to do surprise admission tests in Urdu, English and Arithmetic for class VII. She fared well in Urdu and English but Arithmetic was a disaster. She scored ZERO. She was refused admission. With tears rolling down her cheeks she managed to stutter that she had already passed class VI from a prestigious convent of Indore (the capital of a central Indian state) and even got 4th position in a class of 40. She was asked to present the certificate the next day. A conditional admission was granted, so that if she failed in the first monthly test she would be reverted to class III.

Never in my lifetime have I dreaded a test so much, and I was on top of world when I scored 8 out of 25, 33% needed to pass the test. I had made life miserable for my father, insisting on tutoring me for this test. As far as I can recall this was the only time when I sought help in my studies. In the second monthly test I scored 60% and after that the marks oscillated between 95

and 100%. My teachers and principal showered me with praise and were extremely unhappy when I had to leave school, because it was not a high/secondary school. Those were difficult times and in spite of being so young I was sensitive to the trials and travails of growing up in a large family with limited resources. Still, we were a happy family, with my parents being an ideal loving couple and my father and grandfather initiating the eldest two in Urdu and Persian poetry and intellectually empowering my brother and myself. My father was one of the two Chartered Accountants in the country at that time. I was the first female of my family to be educated in a school. Historically, no female among our ancestors was ever allowed to study in school. My mother was tutored at home up to lower secondary level, and my paternal grandmother could not read or write at all. When I graduated from high school my grandmother decreed, "No more Education, High School Certificate is more than enough for a girl.". She governed the family like a dictator and in the cultural scenario of that time the will of parents had to be respected. My father was an obedient son and my mother remained silent in presence of her mother-in-law. I had clinched first position among girl students in the Board Exams. Still, I was not being allowed to continue my education. I went on a hunger strike but my grandmother had no mercy.

The Principal of my Secondary school (New Town Girls School, Karachi) Ms. Safia Khan was an accomplished teacher and a wonderful human being. She inculcated in us a love for English literature and trained us for debating and declamation contests. My confidence and my logical and analytical capabilities were developed under her guidance. Armed with these and with the connivance of my father and grandfather I was able to enroll in a government College for Women. Our School was not affluent enough to offer Science. So I had NO INKLING about PHYSICS until I joined the college. Luckily in those days there was no such restriction that only those who had studied Science in School could pursue Science Studies. I hated Chemistry, was comfortable with Mathematics but was fascinated with Physics. I cannot forget my sense of wonder on discovering that a tiny constriction in a clinical thermometer could keep a permanent record of a person's fever. Another mind-boggling bit of learning was Wien's Displacement Law for Black Body Radiation. I proudly went around trying to impress all and sundry that sitting here on Earth we can determine the temperature of the Sun, by simply measuring the wavelength of its peak radiation. Unraveling innumerable wonders, from the Microscopic to the Macroscopic world, from Nano to Mega, from quarks to galaxies, from subatomic sizes to Parsecs, submerged me in the mysteries of the Cosmos. I was the torch-bearer for female education for my entire clan. My sisters, cousins, sisters-in-law and nieces are all highly educated. One of my nieces is a Rheumatologist in Los Angeles. The brother who was initiated in literature by our father and grandfather is now a nationally acclaimed journalist who has been a state guest of the US, France, Germany and Switzerland. His wife is Managing Director of an internationally recognized NGO, IRC (Indus Resource Centre), working for female education and for empowerment of women and marginalized segments of the society.

As I started my journey for graduation in Physics at the University of Karachi, there was no end in sight nor objectives defined. Three years of BSc (Honours) flew past like a whistle. I was the ONLY female student in the department but had many female friends from other departments who came visiting. We were celebrating the end of exams when I was called to the Chairman's office. The Vice Principal of my former college was also there. These two eminent teachers had already conspired to define my future. The Physics Department of the women college was in dire

need of a Lab instructor, and I was the ONLY available choice. Much to my chagrin and against my wishes I was sort of dragged into Physics teaching. My chairman assured me that I could still pursue my studies for a Master's degree, dividing time between college and University. Immersed suddenly in this role, with no training, nor any conscious aptitude for teaching, I was surrounded by class XI and class XII female students only 2 or 3 years my junior. Strangely there was an instant bonding with them. I loved experimenting with tactics for explaining concepts and learning from interaction with young minds. In spite of my teaching engagement, I was able to complete my Master's degree in Physics from the University of Karachi, obtaining First-Class first position. I was almost selected for a Fulbright Scholarship but denied due to my involvement in student movements during my university days. Teaching Physics up to graduate(BSc) level was my passion. Dr. I. H. Usmani, Chairman of the Pakistan Atomic Energy Commission was a seminar speaker at our college in the early sixties. He offered me the post of Scientific Officer at PINSTECH(PAEC) and insisted that I should immediately change my profession from teaching to research. He sent me the requisite application forms the next day, but by then I was addicted to teaching and my students loved and respected me. It is on record that every year a different innovative approach was adopted to discuss the same old topic. In those times prescribed textbooks were not in vogue. Computers were non-existent in our world and libraries were the only resource for knowledge. This environment gave me ample opportunity to experiment and explore. Our students almost always were at the top in the university examinations.

I had been teaching for 9 years when I was encouraged to apply for a British Council scholarship for teacher Education, by the regional head of the British Council in Hyderabad. I did this and was interviewed in Karachi. Apparently, I fared very well but did not receive any feedback. In the meantime, I was nominated for the coveted Colombo Plan scholarship, thanks to the concerted efforts of my Principal Mrs. Shams Abbasi, who had great confidence in me. One day I was called to the principal's office. The regional head of the Hyderabad British Council was there, accompanied by an Englishman, the Head/President of British Council from England. He was touring Pakistan and had come to ask me why I had not accepted the offer of a scholarship. He was astonished to find out that I had not received any letter. There were some "special friends" who made sure that any "good offer" for me was intercepted at the post office. Anyway, I was no longer interested in the British Council Scholarship because the Colombo Plan scholarship was for an MSc. Program at the University of Waterloo, Canada. The Englishman did not like it. According to him I was the star candidate in the interview and if I was opting for Colombo Plan because of a Master's Degree, he had the AUTHORITY to OFFER me a SOUTHFIELD SCHOLARSHIP at the University of London, which was meant for British Citizens only. He said that the University of Waterloo was not comparable with the University of London. He convinced me to opt for the Southfield Scholarship. The British Council officers were most cooperative. They looked after my Passport/Visa procurement. I got mail from London, informing that my name-plate had been fixed on a residence room. The Canadian High Commission was consistently calling for acceptance of the Colombo Plan scholarship. At one stage the Government of Pakistan threatened to withdraw both the scholarships as "Both countries had friendly relations with Pakistan, and they could not afford to displease either". How I ended up in Waterloo still baffles me. Perhaps my fascination with the Northern Lights (Aurora Borealis), instigated me. I knew the Physics of Aurora but its picturesque description by Marie Corelli, in her novel Vendetta, entrapped me.

At the University of Waterloo, I studied Biophysics, a discipline totally new for me. This was the first time I was introduced to Biology. Professor Snyder, our professor for Cell Biology, was a gentle soul, interested in music, especially in trombone, and carpentry. He must have been good because I scored 97% in his paper. According to him I deserved 100% but that would be “too strange”. Dr. Kruv was my advisor as well as Professor for Radiation Biophysics. In general, the Physics faculty at Waterloo was competent and friendly. I never felt that I was in a foreign land. I had joined the University of Waterloo in mid-September and in December a CIDA Officer visited the campus, bringing an offer for PhD study. I was given full liberty to choose any University, any program. I was very happy at Waterloo, which enjoyed a good reputation. Dr. Snyder, Dr. Kruv and Dr. Peter, our professor for NMR, offered to be my PhD supervisor, but I was terrified of the PhD qualifying exam, reputed to be extremely challenging. Also, the dome of the nuclear reactor building at McMaster beckoned to me. I joined McMaster for my PhD in July 1971. Professor Summers-Gill proudly informed me that I was the only female student among 120 graduate students at McMaster’s Physics Department. He directed me to probe the nuclear levels of the odd-odd nucleus  $\text{Eu}146$ . Those were trying times for me. I was a novice in this field and went through a very difficult phase of learning to roll a target, to fill the diffusion pumps every few hours, to manage the numerous dials on the control panel of the Tandem Accelerator and to take the beam down the beam line. For the first 2 years I went through nightmares, with too much noise in all my particle spectra, and Dr. Summers-Gill would not agree to change the problem. I had to manipulate other members of my committee to finally shift the study to Shell Model States in  $\text{La}138$ . My struggle in the first 2 years enabled me to finish my PhD in another 2 years, This was a record as probably no-one else had been able to finish in 4 years.

Returning to Pakistan after my PhD in Nuclear Physics in 1975 I was posted as the Principal of Government Girls College, Larkana by the Education Department of Sindh. I finally joined PAEC as a Senior Scientific Officer at NPD (Nuclear Physics Division) of PINSTECH (Pakistan Institute of Nuclear Science and Technology) in 1976. In 1979 I got an offer for a Post-Doctoral Fellowship from McMaster. Dr. Summers-Gill’s obsession with  $\text{Eu}146$  persisted. During my Post-Doctoral studies I had to befriend  $\text{Eu}146$  again. Because of energy Limitations we sought permission from AECL (Atomic Energy of Canadian Ltd.) to conduct a 5-day experiment at Chalk River. Security Clearance for a Pakistani took many weeks. While at Chalk River I was never allowed to be alone in the Lab. A security person was monitoring all the time, day and night, even when I was developing my plates and counting tracks in the dark room. The senior scientist who was collaborating with us was embarrassed but one can never argue with security personnel. I think  $\text{Eu}146$  finally became MY NUCLEUS because I still receive queries about it.

I had to re-join college on my return from post-doctoral studies due to family constraints and the Sindh Government’s unprofessional attitude. There I found a wonderful team (Asima Ali, Nazish Kazimi and Bilquis Tufail) and together we were able to chart new courses. In 1988 we organized an All-Karachi Science Fair in which male participants were also invited for the first time. In 1989 we again organized a thematic science fair which became the talk of town and trail-blazing. Many pilot projects evolved from that fair. There were editorials in its praise. In 1984 some dedicated and concerned teachers from different colleges formed a group which worked for the betterment of Physics education. Later this group was registered as the Centre for Physics Education under the patronship of Professor Salam. I was honored as its founding

president. CPE has organized two International Conferences, many national and local Workshops and hands-on training programs for teachers and students. On April 21 this year CPE organized “A Day With the Women Physicists of Pakistan” at NCP, in collaboration with NCP and HEC. Currently, a challenging project is underway. MSc and PhD students are being guided for quality research in innovative fields by national experts. These research scholars will select their topics and mentors and will present their report/mini-thesis in December.

I finally retired as Principal of a prestigious college in 1996. Since then, I have been involved in various academic and administrative capacities in a number of private universities. In April 2010 I was offered a post of Professor of Physics in Karakoram International University. In May 2010 my status was upgraded to Dean of Natural Sciences, and soon to Senior Dean. I was able to initiate research and incorporate innovative approaches in academic and co-curricular matters by virtue of my position. I resigned from KIU in April 2014, due to family pressure and flight problems. But my bond with the faculty and students of KIU is still strong. My current interest is Astronomy. The clear blue sky of Gilgit beckons me. We are in the process of building an Observational observatory at KIU in Gilgit Baltistan, at the foot of towering Karakoram. Though I have left KIU, my association with the observatory project is on solid a footing.

From the treasure box of memories, I recall a couplet. The poet’s name, however, is missing from my memory pages. It says,

“Lives of great men all remind us,  
We can also make our lives sublime,  
And parting leave behind us,  
Footprints on the sands of time,”

I think some great women (e.g., Lise Meitner, Madam Curie, Irene Curie, Maria Goeppert Mayer) could also prompt us to make our lives sublime.