

## MY YEARS AT IIT BOMBAY

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I intend to present some glimpses of my years at IIT Bombay from 1975 to 2017. I have rarely talked about myself in public. But since these are my reminiscences, I am obliged to deviate from my practice. I hope that these recollections will throw some light on the times our department went through.

I joined IIT Bombay by accident. In 1974, I had arrived in Mumbai on vacation from the Centre of Post Graduate Instruction and Research of the University of Bombay at Goa, where I was on deputation from the Tata Institute of Fundamental Research. Someone told me that interviews for faculty positions were soon going to be held at IIT Bombay. So I approached the then Head of the Department of Mathematics at IIT Bombay Prof. M.N. Vartak. He said that the last date for receiving applications was long over, but I could hand in an application. So I wrote an application and waited at the Tata Institute of Fundamental Research in Colaba for a telephone call. The call came and I traveled to Powai in the late afternoon. As I neared the Director's office, I saw that the last scheduled interview (that of Prof. K.D. Joshi) was taking place. Then my turn came, and the interview went smoothly.

I was offered a faculty position, but joining the institute did not go very smoothly. The medical officer at the IIT Hospital found that there was a murmur in my heart and my heart was too large. I used to pride myself in being generous, but little did I know that in fact, I had a very large heart! In any case, I had to go through several anxious moments and various tests, including visiting some government hospitals. Then the Senior Medical Officer suggested that I could be offered a temporary position for 2-3 years, similar to my position at the Tata Institute of Fundamental Research. Anyway, when a Senior Cardiologist at a Government Hospital gave a fitness certificate, the matter was closed, and I joined the Institute on a regular basis. I came to know later on that this episode took place not because of the large size of my heart, but because of the narrow mindedness of a Senior Professor.

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Outline of a talk given at the Diamond Jubilee Symposium of the Department of Mathematics at IIT Bombay on January 6, 2019.

This brings me to say that when I joined IIT Bombay, many existing faculty members were not so pleased. In fact the reception was rather cold. Of course, there were exceptions like Prof. Vartak. Why so? Because at that time, there were only four recognised fields of study in the Mathematics Department of IIT Bombay: Elasticity, Solid Mechanics, Statistics and Computation, in that order. I did not fit in any of them. An overwhelming majority of the faculty members were working in the first two areas. In fact, it was often said in our department at that time that the essence of mathematics was mechanics - solid and fluid!

Having joined the department, I tried to get together like-minded people. Although each one was working in a different area, something common had to be evolved. So some of us started a seminar in finite geometry based on the book 'Finite Geometries' of Dembowski. The seminar did not run for a very long time, but one of the by-products of the seminar was the doctoral work of Sharad Sane. So it did achieve something tangible.

I found out that it was not easy to change the face of the department. In fact until 1988, there was not a single algebraist in the department. We had to really put pressure on the so-called high ranking members of the department to have at least one algebraist! Compare this to the present day situation, where there are so many good algebraists working in our department that to enter here as an algebraist, the bar is raised higher! Our request was granted. Several good algebraists applied. In Marathi, there goes a saying, "A blind man asks for one eye but gets two." Do you know who these two algebraic eyes of the department turned out to be? Prof. Sudhir Ghorpade and Prof. Jugal Verma, who joined the department around 1989.

On this background, the influence of Prof. Vartak cannot be over-emphasized. He was the sobering voice on many occasions and in many debates. He was very ably assisted by Prof. B. S. Ramachandra Rao, who is present in the audience today. Prof. Ramachandra Rao and Prof. Vartak did not work in the same area but they were like-minded and they had a vision for the future of the department. I truly believe that without the joint effort of these two persons, our department would not have been where it is now. Prof. Vartak was a very mild person and he had to be protected, and so the Director appointed Prof. Ramachandra Rao as an Associate Head for some years. With this kind of arrangement, the department progressed steadily.

By 1984 or so, our department had four specialisations in the M.Sc. programme: Pure Mathematics, Applied Mathematics, Statistics and Operations Research, and Computer Science. For some of us, it became apparent that there needed to be balanced programmes. So a

An M.Sc. programme called **Statistical Informatics** was presented to the Senate of IIT Bombay in 1994. It was renamed as **Applied Statistics and Informatics**.

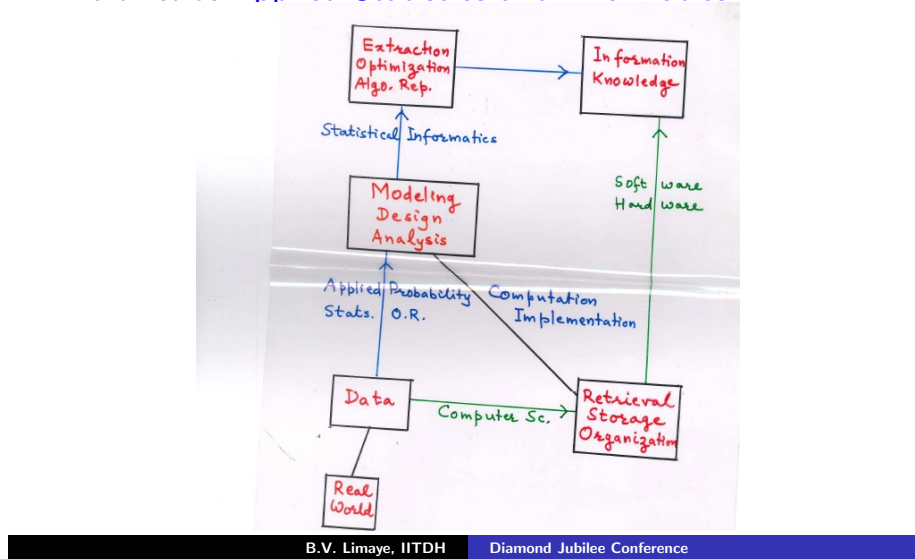


FIGURE 1. Transparency shown to the Senate

‘scholastic programme’ in Mathematics combining applied and pure aspects was proposed. Another industry-oriented ‘utilitarian programme’ called Statistical Informatics was proposed, in which parts of mathematics, statistics and computer science could be intertwined to train students to work in industry. I remember two committees formed: one for the scholastic programme, convened by Prof. Pai who is present here today, and another for the utilitarian programme, convened by Prof. Patwardhan, who is no more. After some serious debates, we evolved an agreement within the department. The next requirement was the approval of the Senate. When you want to start a new programme, you have to do some preparation. What kind of preparation? Well, you have to approach some senior and vocal members of the Senate and convince them about the importance of such a programme. I think Prof. Ramachandra Rao must have done something similar when he initiated the Dual Degree programme at IIT Bombay. As soon as the item on the programme in Statistical Informatics came to the floor of the Senate, Prof. Subba Rao of the Electrical Engineering Department eloquently supported it. On the other hand, there were doubts about what Statistical Informatics meant. I showed the transparency

in Figure 1 while introducing the programme to the Senate in my capacity as the Head of the Department of Mathematics. It showed the journey from the Real World Problems to Knowledge and Informatics via Statistical procedures like Data Mining. I was not an expert in these things, but several colleagues helped me out. The programme was eventually accepted, but with a different name, namely Applied Statistics and Informatics. This programme started in 1995 and soon became successful. We can celebrate its Silver Jubilee in 2020.

Now I am going to talk about three not so well-known things in which I was involved. Until 1995 or so, there were three cadres of the faculty: Lecturer, Assistant Professor and Professor. If you were not a Professor, you were addressed as 'Dr' or 'Shri' according as whether or not you had earned a Ph.D. degree. Then the cadre of Associate Professor came in, and there was a problem of how to address an Associate Professor. I found all this very anomalous. I felt that Professor means somebody who professes. We all profess when we go to a classroom and we do the same kind of work: teaching and research. Hence everyone should be called a professor. I sent an item to Institute faculty meeting. If I remember correctly, Sudhir Ghorpade who was the Secretary of the Institute faculty meetings at that time. read out what I had written, since my throat was not working well. There was a heated discussion. Can you imagine? Senior professors of the institute vehemently opposed my suggestion, saying they had earned their professorship with so many years of hard work and after so many attempts. There were also more democratic people who argued in favour of my suggestion. Director Prof. S.P. Sukhatme kept quiet throughout the discussion, and just said "We will see what can be done." After a few months, a communication came from the Registrar of the Institute saying that the Director has decided that, in future, all faculty members, including visiting faculty members, should be addressed both in oral and written communication as Professors. I think IIT Bombay was the first to take this step. I am not sure what the situation is in other IITs even now.

The second thing I would like to mention is that until 2005, there was no position of a Dean of Faculty Affairs. Instead, there was an Advisory Committee which made recommendations to the Director regarding sabbatical leave, lien and participation in international conferences. I was the Convener of this committee for almost 6 years from 1997 to 2003. One problem used to arise when faculty members would be offered positions in universities abroad during their sabbatical year. According to the statutes of the Institute, employment could be not taken up during a sabbatical leave. So applicants for sabbatical leave used to go around the problem in some nebulous way by saying that

they would be paid only travel money or only an honorarium. With the benevolent support of the then Director Ashok Mishra, the statutes were read very carefully and it was found that during asabbatical leave, no 'regular' employment could be accepted. Visiting professorship or visiting assistant professorship was not a regular appointment, and so one should be able to accept it. I remember the first person who availed of this liberal interpretation was Prof. Shevgaonkar from the Electrical Engineering department. This practice is now followed as a routine.

The third thing I would like to mention is regarding the Joint Entrance Examination. In 2001, I was requested to become a Vice Chairman of the Joint Entrance Examination at IIT Bombay. I was reluctant to accept. But I was told that in the next year IIT Bombay would be the Organizing Institute, and so I could get experience of the nitty-gritty of the confidential operations at the all India level, in order to prepare myself for the Organising Chairmanship in the following year. I accepted Vice Chairmanship of JEE in 2001. In those years, the Screening Test of the JEE did not have negative marks. Suppose there are hundred questions in the test and every question has four alternatives, only one of which is correct. I proposed to the Joint Admissions Board that giving negative marks for incorrect answers would be fair and would prevent undue advantage to candidates who randomly mark answers. I was voted down. But as soon as the preparations for the JEE 2002 examination started, I called a meeting of the seven Chairmen of the JEE, one from each of the IITs. I presented a white paper in the meeting, for which I had prepared well, including writing to the Educational Testing Service at Princeton. I gave a mathematical explanation that the correct thing to do would be to give 3 marks for the correct answer and -1 for any of the 3 wrong answers, so that the expected value of random marking would be 0, as it should be since random marking is equivalent to being absent for the examination. Some of the JEE Chairmen were aerospace engineers, mechanical engineers etc. Not many appreciated my mathematical reasoning. What they did appreciate was that earlier there were only 101 possibilities (0 to 100 marks), which resulted in a lot of bunching of candidates, and it was very difficult to draw the line for qualifying the candidates for the subsequent Main Test. Now there would be 401 possibilities (-100 to 300 marks), and so a much less bunching! All I cared was that they agreed to my proposal.

We kept it a secret for almost a year since there was already some opposition in the previous year. I only informed the then Organizing Director Ashok Mishra of IIT Bombay about the forthcoming negative marking in the 2002 Screening Test of the JEE. The exam took place,

and on that day there was a big commotion. There were reports in the newspapers, questions were asked in the Parliament. When letters would come from the Parliamentary Secretary to our JEE office, I would simply file them. Next year onward, not only the JEE, but the JAM and the GATE examinations also had negative marks for incorrect answers. So what is the moral of the story? Go right ahead and do your thing if you seriously and sincerely think it is the right thing to do. Others will follow suit.

I would like to end my talk by presenting to you a Chinese poem and a ‘take’ on it by some of my students. This is a poem that I present in my class at the end a course.

### *A Chinese Poem*

There once lived a man  
 who wanted to learn how to slay dragons.  
 He enrolled in an Institute of Technology,  
 and spent hours learning how to slay dragons.  
 After four long years, he graduated with flying colours,  
 and was ready to practice the technique he had learned.  
 Alas! He soon found that there were no dragons to slay.  
 He then joined the same Institute he graduated from,  
 and started teaching how to slay dragons!

My students in IIT Dharwad presented the following ‘take’ on this poem.

### *A ‘Take’ on the above poem by students at IIT Dharwad*

There live men and women who want to learn  
 how to prove theorems and apply them in the real world.  
 They enrol in Institutes of Research,  
 and spend days and nights learning how to prove theorems.  
 After long years (usually five), they graduate  
 and are ready to apply the theorems they had proved.  
 Alas! They often find no applications of their theorems.  
 They then join the same Institutes they graduated from,  
 and start teaching how to prove theorems!

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