

Net or physical, science or math, the librarian is not going anywhere anytime soon

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Dear Professor Sitabhra Sinha, Prof. Ravindran, Dr Pandian and others, I'm extremely happy that Matscience has chosen to gratefully remember and celebrate the more than 20 years of service rendered by our friend Dr Paul Pandian. He joined us in 2002 after serving the faculty and students of a well-known IIM. Shifting from a management school library to a physics, math and computer science- oriented library didn't pose much of a problem. He adapted rather quickly. I am also happy and grateful that you invited me to be in the company of some of India's senior librarians and information professionals to be with all of you, the faculty, students, and staff of this Institute to felicitate Dr Paul Pandian on the eve of his retirement. I congratulate the organizers of this event for choosing the topic, ***The role of the physical library in the Internet era***, which is being discussed by many people around the world.

Why me?

Many of you may wonder why I am asked to speak today along with the country's senior librarians and information scientists. Maybe perhaps because I am a friend of Matscience. I have been coming to Matscience since 1996 when I began volunteering at MS Swaminathan Research Foundation and worked with their team on ICT-enabled development (ICT4D). I frequented the IMSc library and even took the help of Dr Pandian and Mr Venkatesan in learning to use the CD-Rom version of what later became MathSciNet. Prof. Balasubramanian, former director, was kind enough to invite me to join Matscience as a visiting professor. Dr G Subramonian, then head of the computer services team had a problem. He had to provide me with a system running on Microsoft Windows at an institute where no one has ever used MS Office!

Indeed, I wrote two papers on the status of mathematics research in India and a report on physics research in India for DSIR-NISSAT. You may see them here:

1. Subbiah Arunachalam & K Umarani, Status of Mathematics Research in India in 1990 and 1994: An Analysis Based on *Mathsci, Information Today & Tomorrow*, NISSAT-DSIR, 2001. <https://repository.arizona.edu/handle/10150/106294>.

2. Subbiah Arunachalam and S I Rino, Mapping Mathematics Research in India in 1998: An Analysis Based on *Mathsci* [https://www.researchgate.net/publication/279641976 Mapping Mathematics Research in India in 1998 An Analysis Based on Mathsci](https://www.researchgate.net/publication/279641976_Mapping_Mathematics_Research_in_India_in_1998_An_Analysis_Based_on_Mathsci) [Also submitted as a report to NISSAT-DSIR in 2001]

3. Arunachalam, S. Mathematics Research in India Today: What Does the Literature Reveal?. *Scientometrics*, **52**, 235–259 (2001). <https://doi.org/10.1023/A:1017915823434>

4. DHAWAN, SM and ARUNACHALAM, S. Physics Research in India: An Analysis Based on *Physics Abstracts* 1992. Report submitted to the Department of Science and Technology, New Delhi. 1998.

About me

I am a small-town boy who landed in New Delhi in my early twenties and became an accidental information scientist (not the Shannon-Weaver and computer kind, but the kind dealing with S&T literature). I have no formal training in library work or journalism, but I taught in one of India's best LIS schools for eight years and was asked to teach science communication for eight years in a highly rated journalism school. The first large library I visited was the British Council Library in Chennai which I saw when I came to the city in 1961 in search of getting admission to a Master's course in chemistry. When I was not meeting chemistry professors, I spent time at the British Council Library. Despite being a quintessential desi and an anticolonialist, I fell in love with what our erstwhile rulers offered: books, magazines, journals, not just neatly arranged but well used by avid readers, and the friendly staff were ever ready to help with a smile. Without my knowing or trying, I seemed to have slipped into my true calling. It was not science *per se* but about science and its relation to society. Thanks to my interest in science and scientists, I was labelled an information scientist and scientometricist. Instead of doing science like most of you, I started looking at measuring science and the science-society interface. My circle of friends expanded to local librarians as well as science policy analysts, and database creators and policy formulators from around the world.

Scientists and libraries

Scientists are essentially engaged in the production of new knowledge often with support from the state and private philanthropy. They do two things: 1. They seek information, and 2. they produce new information. Some only work with their brains (theoretical scientists) and most others work with their brains and hands (experimentalists); some work in the fields (earth scientists, ecologists, environmental researchers, oceanographers, etc.). Of course, they teach, mentor graduate students, attend conferences, write proposals, collaborate with others near and far, etc. Most importantly, they live and work in what we may call the knowledge space. As Newton famously said, they need to 'stand on the shoulders of giants' to see further. Libraries and librarians enable them to stand on the shoulders of giants which are nothing but all the journals, databases, reports, books, etc. assiduously gathered by them and remote sources. Now the Internet does a large part of the work of gathering and makes it possible for remote sharing even between total strangers.

Don Swanson and Literature based discovery

As early as the 1980s Don Swanson of Chicago University showed how bits of information could be put together in ingenious ways to create new knowledge without any additional theorizing or experimentation. In 1986, he showed that valuable scientific insights can be found by identifying hidden connections between disjoint pieces of existing literature. We call it literature-based discovery. For example, he made a series of such discoveries ranging from the connection between migraine and magnesium and fish oil and Reynaud's disease.

Grigori Perelman: Awards and journals mean nothing

In another even more dramatic case, the Russian mathematician Grigori Perelman, living the life of a recluse, solved the Poincaré conjecture and posted his epochal results as three preprints in arXiv and forgot about it and literally disappeared from the scene. Here are the links to the epoch-making preprints:

1. **"Ricci flow with surgery on three-manifolds" (November 13, 2002):** This preprint introduced Perelman's adaptation of Richard Hamilton's Ricci flow program to 3-manifolds and outlined the basic strategy for his approach to the Poincaré Conjecture. <https://arxiv.org/abs/math/0211159>.
2. **"The Ricci flow in four dimensions" (December 11, 2002):** This preprint built upon the first one, focusing on the 4-dimensional case and establishing key estimates for the Ricci flow, leading to crucial convergence results. <https://arxiv.org/abs/math/0303109>.
3. **"Finite extinction time for the Ricci flow on certain three-manifolds" (March 14, 2003):** This final preprint dealt with the critical issue of demonstrating finite extinction time for the Ricci flow on compact 3-manifolds, ultimately completing the proof of the Poincaré Conjecture. <https://arxiv.org/abs/math/0307245>.

The Millennium Prize folks at the Clay Institute chose him as the first recipient of the Millennium Prize, but Perelman said he had nothing to do with awards, which are after all decided by mere mortals. Besides, he thought Hamilton, another mathematician had done equally significant work. He had earlier refused to accept the Fields Medal as well, despite the members of the Medal Committee and other eminent trying to convince him for several months to accept it. He thought the members of the jury were incompetent to judge his work.

Don Swanson, in all probability, might have used the library and would have considered librarians as friends. After all, the University of Chicago persuaded him to leave a career in physics to accept a position in LIS. Indeed, his office is just across from the office of Abe Bookstein, a well-known information scientist with a deep background in math. I doubt if Perelman would have cared much for libraries. I am also not sure if Ramanujan's visits to libraries would have had any significant impact on his out-of-the world contributions. The limited number of years he lived was not even enough for him to fill the notebooks George Andrews and others opened to us long after his death.

Woodward and Garfield

Let us move on to a chemist, whose pioneering work in total synthesis not only enriched organic chemistry but also had influenced research in medicine, pharmacology, and natural product chemistry. The dozens of large molecules his group synthesized include cholesterol, quinine, cortisone, reserpine, vitamin B12 and strychnine. Incidentally, Prof. Balaram, whose insightful editorials in *Current Science* we all miss, was a postdoc with Woodward for a year before he returned to India and joined IISc. One day, from his office at Harvard, Woodward called Gene Garfield in Philadelphia. As you may know, Garfield was the information scientist extraordinaire who invented citation indexing. Woodward wanted a paper urgently. Some other scientist was also working on the same problem as Woodward and literally there was a race. Garfield said that he would post it through FedEx. "No, I have a competitor and time is of the essence," said Woodward, "I need it now." "Ok," said Garfield, "I would Fax it right away". The hurried reply from Harvard was "No, my competitor is German and the paper is in German. I need an English translation asap." Garfield, ever the saviour of distressed info seekers, got the paper and translated it sentence by sentence to Woodward although Garfield had not used the little German he knew in many years. That is a classic example of not just service but service of the finest kind. He not only searched and provided the material but took time to translate over the phone even if his ability to translate was not of professional quality, leaving aside whatever he was doing. The point is, Woodward, a Nobelist, used librarians (and by extension) libraries. Garfield did such things irrespective of who you are. In my own case, in the early days when I had hardly published two or three papers, he started sending me week after week Automated Search Citation Alert Topics (ASCATopics), a search service designed for each individual based on the keywords often used in their work. And it arrived by airmail. Again, when I was with the Indian Academy of Sciences, Garfield had come to speak at the FID Congress at Bombay. I obtained the permission of the Academy's President and invited him to Bangalore where he

not only met many Indian scientists and students, gave four or five talks and got a first hand knowledge of what it is to do science in the Third World. His response was to index Pramana from Volume 1 issue 1 onwards in Current Contents. You can't read Current Contents on the Net. You need a physical copy week after week, and you need a librarian to subscribe to it. I know for sure that Current Contents impacted the quality of the research of most of the faculty and students of the IISc of the 1970s. Balaram has written and spoken about it. When it comes to newsy magazines such as New Scientist,

So the lesson for us is, when it comes to physical libraries and the Internet, it is not a question either or. Although as Lord Tennyson's poem says, "old order changeth yielding place to new," both need to coexist. I will reinforce his point with my next example.

What can happen if we depend too much on digital? Sometime in October the British Library's server was hacked, and the entire service came to a standstill. They suspect a ransomware attack and have deployed cyber security teams to investigate. The news got wide press and social media coverage and large number of users, especially those who depend heavily on the information they were seeking and those who had to travel across continents, have incurred heavy losses. Prof. Edith Hall has asked the Library Director nine questions and her questions have received hundreds of comments. [See [The Editorial: Nine Questions for the British Library's Chief Executive](#)]

That is why we at the International Science Council's Steering Group on the Future of Scientific Publishing are promoting open access through preprints and public peer review and a system of scholarly communication where neither the author nor the reader needs to pay. Other organizations like COAR (Coalition of Open Access Repositories) and individual professors like Bjoern Brembs are also supportive of this idea.

One more thing in favour of brick-and-mortar libraries. Most scientists depend on the most recent published literature. That is why we subscribe to journals, attend conferences, cross oceans to spend time with our professional colleagues in their labs. As of today digital services do not routinely index or take you to the front pages of Nature and Science or New Scientist where you get nuggets of recent newsy developments. Often you need to browse physical copies.

Let me close these brief ramblings with a shoutout, "Long live the library and the librarian" and say "Thank you Pandian for all the good deeds you have done to me and countless others, always with pleasure."

I have met in my long life many librarians and am happy with some and not so happy with others. You had always remained modest and never overstepped into areas where you were not an expert. That endeared you to all of us. The other day, during the Alladi centenary, I had a brief conversation with a retired IMSc and CMI professor who said "Ever since Dr Pandian joined us, the library has always done well and seen much progress." He also paid compliments to you as a person. I felt happy. Once I asked you about the large number of non-IMSc visitors coming in and using subscribed journals and databases. I know in many Indian academic libraries they don't allow such use. Their reason is that they have signed a contract with the publishers. I liked your reply. Your philosophy that when we let someone use our library, they automatically become our users, you said. When many librarians act as agents of the publishers you follow the right path. Congratulations. And grateful thanks for all that you have done to the scientists and students of this Institute and beyond.