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OPINION

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THE INITIATIVE OF G. SWARUP AND V.G. BHIDE BEHIND THE ESTABLISHMENT OF IISERS: AN UNTOLD STORY

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The first IISERs started functioning in Pune and Kolkata from 2006. Around 1996 a group of academics from Pune, led by G. Swarup and V.G. Bhide, along with a few leaders of industry, had proposed a centre at the University of Pune for a 5-year undergraduate programme for teaching science in close association with industry: Advanced Centre for Science and Technology (ACST). Based on primary source materials, we discuss how this proposal transformed during the next few years and played a role in the establishment of the IISERs. Although the IISERs eventually followed a model considerably different from what was envisaged in the early proposal, a critical evaluation of the early proposal is important in a history of how the IISERs were initiated. While the earlier proposed name ACST had 'technology' in it, it may be noted that it was envisaged as an institute for training students in science in close collaboration with industry and usual departments in a typical engineering college were not planned.

Introduction

Indian Institutes of Science Education and Research – abbreviated as IISERs – have emerged as centres of national importance for imparting quality undergraduate education in basic sciences in India. The first two IISERs in Pune and Kolkata were established in 2006. Three more IISERs came up within the next few years: Mohali (2007), Bhopal (2008) and Thiruvananthapuram (2008). Then, after a gap of several years, two more IISERs were started (at Tirupati in 2015 and at Berhampur 2016).

During the first few decades after Independence, students could get an outstanding training in a branch of basic science by doing BSc in one of the several reputed colleges spread across India. Many of these colleges started declining in the 1980s and 1990s for reasons we shall not discuss here. Since the Indian Institutes of Technology – the IITs, of which the first five were established during the first two decades after the Independence – kept growing in reputation and prestige during this era, brilliant science students coming out of high school often felt that engineering would be the most viable career option for them. Those students who wanted to opt for a career in basic sciences had limited options before them, although some of the IITs had good undergraduate science programmes as well. The establishment of IISERs changed the scenario completely. The IISERs quickly became the favoured destination of many brilliant young students interested in basic science.

Several years before the establishment of the IISERs, G. Swarup and V.G. Bhide drew national attention towards the need for establishing institutes of national character for imparting undergraduate education in basic sciences. In a history of IISERs compiled by Sathyamurthy and Bandopadhyay[1], this initiative had been summarized in three sentences[2]: "The gradual decline of science education in the country led the leaders in the field of science like Govind Swarup, V. G. Bhide and others in Pune to propose a centre of excellence in basic sciences within the Pune University. The Government of India agreed in principle to set up National Institutes of Science (NISs) in Pune, Allahabad, Chennai and Bhubaneswar. However,

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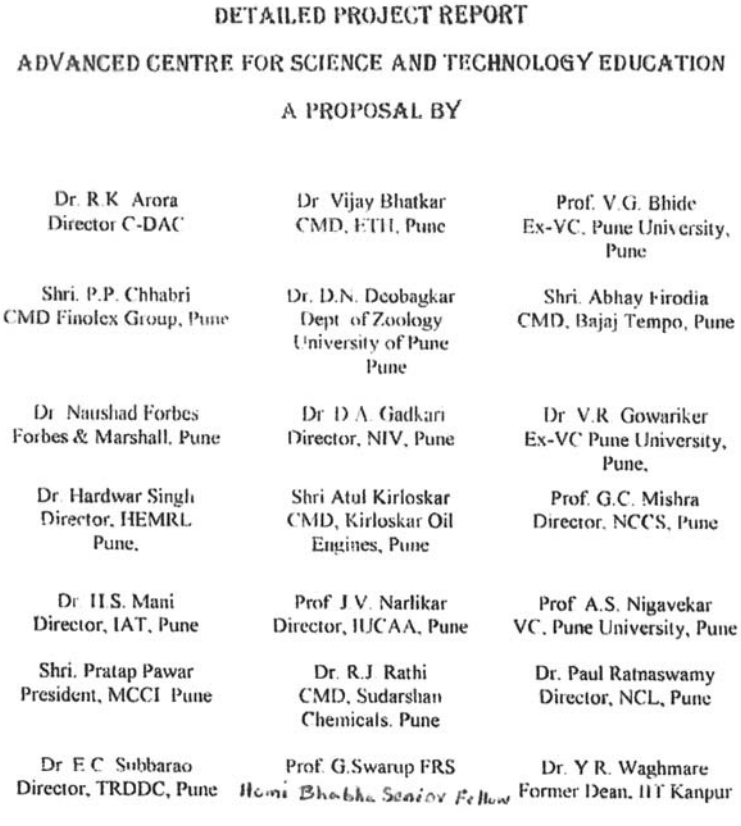
before these could be established, general elections were held and the government at the Centre changed." No further details are provided and, as will be clear from later discussions, this short summary does not tell the whole story properly. An earlier paper on IISERs by Khare[3] also summarized this initiative in a similar manner. Swarup[4] himself wrote a short note on the genesis of IISERs, in which he mentioned: "The entire correspondence is being scanned for keeping in the library of NCRA-TIFR, Pune." To the best of our knowledge, details of the early Pune initiative based on this full correspondence and other source materials are not available in any published literature.

Given the central position the IISERs have assumed in the undergraduate science education in India, this untold and forgotten history behind the establishment of IISERs should be of great relevance to anybody interested in the history of science education in modern India. Luckily, before he passed away on 7 September 2020, Swarup could scan the relevant papers connected with the Pune initiative and deposited the resulting electronic files to the library of IISER Pune. We have been able to get a copy of these electronic files, containing letters exchanged on this initiative, minutes of important meetings, proposals for setting up the institutes, etc. Our account here is primarily based on these papers[5].

Based on the initial discussions of Swarup and Bhide with the Vice-Chancellor of the University of Pune, Bhide prepared a 12-page initial proposal dated 12.6.1996 for a 5-year integrated MSc teaching programme at Pune University. After receiving positive response from high governmental levels, a brainstorming session to discuss the proposal of Swarup and Bhide was organized at Pune on 25 and 26 March 1999, attended by about 40 participants. One of the authors of this paper (SA) was a participant in this session. In a letter dated 27 July 1999, it was mentioned that a detailed project report (DPR) had been prepared about this proposal. Figure 1 gives the list of persons from whom this proposal came[6]. Unfortunately, all our efforts to locate a copy of the full DPR have failed so far. However, amidst the papers deposited by Swarup to the IISER Pune library, we found a 6-page executive summary of the DPR[7], which gives a good idea of the contents of the DPR.

The later successful effort for establishing IISERs started a few years after this initial effort. In the Foreword to the history of IISERs, C.N.R. Rao[8] wrote the following without naming Swarup or Bhide: "The idea of having a national institution or a university dedicated to science was not completely new. Some years ago, in the National Committee for Science and Technology chaired by Shri C. Subramaniam, I had brought up the idea of establishing such institutions for science which would be equivalent to the IITs in engineering. For some reason, it could not happen. I kept repeating this in many places, and the idea was even included in a Planning Commission document during 1989–90. . . When I was the Chairman of the Science Advisory Council to the Prime Minister, Dr. Manmohan Singh, I described the idea of IISERs to the Prime Minister. He thought that it was a very good idea and gladly endorsed establishing them." With the support of the Prime Minister, things moved quickly, as described by K. Ganesh[9]: "On the basis of the strong recommendations of the Science Advisory Council to the Prime Minister, which met on 4 March 2005 under the Chairmanship of Prof. C. N. R. Rao, the Government of India took the pathbreaking decision to create new institutions devoted to Science Education and Research named as 'Indian Institutes of Science for Education & Research (IISER).'" The next step was to prepare the detailed project report (DPR). S. Dattagupta, who was the Convenor of the Committee for this purpose, has written[10]:



DETAILED PROJECT REPORT

ADVANCED CENTRE FOR SCIENCE AND TECHNOLOGY EDUCATION

A PROPOSAL BY

Dr. R.K. Arora Director C-DAC	Dr. Vijay Bhatkar CMD, ETH, Pune	Prof. V.G. Bhide Ex-VC, Pune University, Pune
Shri. P.P. Chhabri CMD Finolex Group, Pune	Dr. D.N. Deobagkar Dept. of Zoology University of Pune Pune	Shri. Abhay Firodia CMD, Bajaj Tempo, Pune
Dr. Naushad Forbes Forbes & Marshall, Pune	Dr. D.A. Gadkari Director, NIV, Pune	Dr. V.R. Gowariker Ex-VC Pune University, Pune,
Dr. Hardwar Singh Director, HEMRL Pune,	Shri Atul Kirloskar CMD, Kirloskar Oil Engines, Pune	Prof. G.C. Mishra Director, NCCS, Pune
Dr. H.S. Mani Director, IAT, Pune	Prof. J.V. Narlikar Director, IUCAA, Pune	Prof. A.S. Nigavekar VC, Pune University, Pune
Shri. Pratap Pawar President, MCCI Pune	Dr. R.J. Rathi CMD, Sudarshan Chemicals, Pune	Dr. Paul Ratnaswamy Director, NCL, Pune
Dr. E.C. Subbarao Director, TRDDC, Pune	Prof. G.Swarup FRS Homi Bhabha Senior Fellow	Dr. Y.R. Waghmare Former Dean, IIT Kanpur

Fig. 1 The List of Authors for the DPR.

"Sometime in the summer of the year 2005, I was designated *Programme Coordinator*, for the IISER project, by the Ministry of Human Resource Development (MHRD). . . A Coordination Committee was formed with myself as convenor, . . . to formulate a *Vision Document*, a Detailed Project Report (DPR)." The fast pace with which things moved can be gauged from the fact that the first batches of students in the two first IISERs were admitted barely a year after the formation of this Coordination Committee.

From the dates given in the last two paragraphs, it is clear that the earlier DPR resulting from the initiative of Swarup and Bhide preceded the later DPR by about six years. To many of us who were close to Swarup, he often complained ruefully that his and Bhide's initial conceptualization behind IISERs has not been recognized or remembered sufficiently. Swarup[11] delivered the 9th Foundation Day Lecture at IISER Pune in 2019 on 'Radio Universe'. Towards the end of this lecture, he took a few minutes to summarize their initial efforts. He said: "there is no doubt that the initial proposal in 1996 and a great deal of correspondence and many meetings by the Pune group during 1996-2004 resulted in the recommendation by Prof. C.N.R. Rao to the Cabinet for the establishment of IISERs. He surely deserves credit for the same. In my view, he has not acknowledged initiatives by the Pune group."

The Leaders of the Pune Initiative

We now give short life sketches of Bhide and Swarup, the driving forces behind the older proposal, before discussing their initiative.

Fig. 2 V.G. Bhide (1925 – 2006).

Vishnu Ganesh Bhide: Padmashri Professor V.G. Bhide (8 Aug 1925 – 25 June 2006) was a highly accomplished Indian Physicist who contributed immensely to scientific research, technology, as well as education. Based on his detailed biography[12], we give a few highlights here.

Bhide, after his brilliant academic career and after working with the renowned Professor Tolansky as a postdoc, gained name and fame for his contributions to the physics of crystal growth and was awarded another PhD by London University. After his return to India, he joined the Institute of Science, Mumbai (then Bombay), where he "made very valuable contributions to ferroelectricity, ferromagnetism and oxidic semiconductors, among others."[12]. With a strong belief in indigenous development of instruments like Mössbauer Spectrometer and bent crystal X-ray spectrometer, he "developed a complete technology for making liquid crystal displays."[12] After joining the National Physical Laboratory, he also worked extensively on Solar energy harvesting and solar thermal systems. He was appointed in 1982 as the Chair of Energy studies in Pune University (now Savitribai Phule Pune University (SPPU)). He introduced the concept of Integrated Energy systems and installed one in a nearby village. As the celebrated Vice-Chancellor of Pune University, he introduced many collaborative programmes between Pune University and other national institutes bringing the NCRA-TIFR, IUCAA, CDAC and National Centre for Cell science into the Pune University campus. It was during the later phase that he and Swarup thought of bringing new flavour and strength to the higher education system, as described in the main text.

Govind Swarup: Professor Govind Swarup FRS (March 23, 1929 – Sept 7, 2020) was a renowned Indian radio astronomer, who became a legend in his lifetime. He was invited to write his scientific autobiography for the *Annual Review of Astronomy and Astrophysics*[13] (the only Indian astronomer to receive this honour so far). As there are also detailed obituaries[14-15] and studies of his unique personality[16-17], we shall confine ourselves to his salient contributions only.

After his initial forays in research at the National Physical Laboratory, Delhi in 1951 and CSIRO, Australia during 1952-53 and later continuing his work in solar radio astronomy in USA, Swarup joined Ron Bracewell in Stanford University in 1957 and completed an outstanding PhD in 1961. As the story goes, he along with three other radio astronomers decided to return to India at the invitation of Homi Bhabha to set up experimental facilities in the nascent field of radio astronomy. Swarup joined TIFR, Mumbai in 1963.

Swarup initiated the experimental work on radio

Fig. 3 Govind Swarup (1929-2020).

astronomy, first by building a small radio telescope array at Kalyan, Mumbai and later envisioning the large Ooty Radio Telescope to make very sensitive angular size observations of distant radio sources using the method of lunar occultation. These observations resulted "in an angular size–flux density relation for extragalactic radio sources that indicated that the sources of smaller flux density have smaller angular diameter and are likely to be located statistically at larger distances"[18]. These sensitive observations supported the Big Bang model. During the next few years, Swarup was keen on building a 2 km long and 50 m wide Giant Equatorial Telescope on the equator. This did not fructify and after many internal discussions, he came up with the brilliant idea of making a mammoth telescope array, named later as the Giant Metrewave Radio Telescope. One of the authors (SA) closely worked with Swarup to bring this to reality along with a very experienced team of scientists and engineers. GMRT was commissioned in 2001 and has been further upgraded recently. GMRT has won world-wide acclaim and currently about 40 countries use this array for frontline astrophysical objectives. All those who knew Swarup have been deeply impressed by his sharp intelligence, acute understanding of converting ideas into technology products and frontline scientific observations, thereof.

Swarup, after his retirement in 1996, got seriously interested in improving higher education in the universities and along with V.G. Bhide exerted himself over the next several years to set up the National Institutes of Science, as we shall describe now.

Swarup won a large number of accolades and awards, including Fellowship of the Royal Society, England, and all the national science academies of India and the award of Padmashri by the Government of India.

The Initial Evolution of the Pune Proposal

The ball started rolling with a letter dated April 30, 1996 from Swarup to the Vice-Chancellor of Pune University regarding "the possibility of starting a 'five' year integrated M.Sc. course in several branches of science at the Pune University"[19]. During the next few weeks, there were several discussions among the faculty members of the University, and a 12-page note titled "Proposed Programme for a Five Year Integrated M.Sc. Teaching Programme at Pune University" prepared under the leadership of Bhide was ready by June 12, 1996[20]. Apart from the decline in standards in the BSc programmes around the country, this note stressed the intrinsic limitations of the system of teaching BSc through the affiliated colleges widely prevalent in India[21]:

(ii) The students who opt for science after 10+2 level are trained for their first degree in affiliated colleges who do not have adequate and adequately qualified staff, do not have requisite laboratory and library facilities etc. The academic environment in these colleges is so dampening that even the highly motivated are driven away from science.

(iii) Methods of teaching, almost total disappearance of experimentation and demonstration, rigidity of syllabi, examination system laying more stress on memory rather than on understanding have all been responsible for continual decline in the standard of education. There is a sharp and precipitous fall in the standard at the B.Sc. level.

This note envisaged a common course programme in the first year of the 5-year programme, after which students would be divided into various streams.

This note was circulated to several eminent citizens of Pune outside the University within the next few months – especially to several leading industrialists. It may be noted in Figure 1 that several industrialists were to become signatories of the DPR prepared a little later. A.S. Kirloskar of the Kirloskar Group, N.K. Firodia of Bajaj Tempo and P. Chabria of Finolex were some industrialists involved in the discussions from the very beginning[22]. Based on these discussions, a proposal – consisting of a 9-page synopsis[23] and a 27-page concept document[24] – was sent to Dr. Chitra Naik, Member (education) Planning Commission, with a covering letter dated December 19, 1996[25].

One finds that this proposal differed from the earlier note from Bhide and his colleagues in significant ways. Instead of an integrated MSc teaching programme within

Pune University, this proposal was now for an autonomous *Advanced Centre for Science and Technology* (ACST) to be located on the Pune University campus. In spite of the addition of the word "Technology", it was pointed out that this Centre "will offer five year integrated course leading to the M.Sc. degree" [26]. Decline of interest in basic science among the students was pointed out: "In 1950-51, 32.1% of the students who passed the higher secondary examination opted for science. However, this percentage has dropped over the years and is today around 18%"[27]. The more worrisome aspect was the drop in the quality, with brightest students opting for professional courses: "The dismal fact is that persons who do not get admission in professional schools namely medical and engineering schools gravitate towards science, not because they are interested or motivated in doing science but because they must do something and they do not know what else to do"[28]. After listing several past deliberations about the deteriorating science education situation[29], the proposal suggested the following to reverse this trend[30]:

	Capital	Recurring	Recurring for five years
	(Rs. in Crores)		
1. Building and other infrastructure	12.00		
2. Equipment	08.00		
3. Staff & Salaries		02.00	10.00
4. Fellowship & Stipend		01.00	5.00
5. Lab.components & chemicals.		01.00	5.00
6. Endowment	25.00		
	45.00		20.00

Fig. 4 The Estimated Expenditure of ACST During the First Five Years[32].

> The Advanced Center of Science and Technology will be a radical departure from the existing colleges and universities as it will bring teaching and research under the same roof . . . It would seek to create an ambience of creativity, innovativeness and intellectual adventure where young minds will see constantly sparks of creativity, exciting them and inducing them to be creative, dedicated and motivated. The twin roles of conventional teaching university and a research institute would be performed by this single entity.

The following outline of the student training programme was put forth[31]:

> The input of the programme will be restricted to 300 annually distributed amongst four streams namely, (1) Physical Sciences, (2) Life Sciences, (3) Mathematical and Computational Sciences and (4) Earth Sciences. . .
>
> First year will be common to all. In the first year, the students will be exposed to basic physical principles, mathematical rigour and the excitement of Life Science. . .
>
> At the end of the first year, students can opt for any of the four streams. . .
>
> In the fourth and fifth year, the student will devote himself to his chosen field of specialization. . . In the fifth year, the student will carry out major investigations or undertake developmental work in research laboratories and in industries. This internship programme will be a distinctive feature of the system.

Very surprisingly, not only was a stream on chemical sciences not suggested, but also there was no mention of chemistry in the student training programme! This omission of chemistry would continue in further revisions of the proposal. We have no idea of the reason behind this.

The approximate total expenditure of ACST in the first five years was projected to be Rs. 65 crores, as shown in the table in Figure 4 taken from the proposal[32]. Of great interest is the Table shown in Figure 5, suggesting where the funds were expected to come from[33]. It was envisaged that as much as Rs. 25 crores out of the total budget of Rs. 65 crores would come from industries. The industrialists involved in the discussions behind this proposal must have conveyed a signal that industries would be willing to support such a Centre in a big way. Swarup and Bhide consciously believed that we must train

		Rs. in crores Over a period of five years
1.	Industries	25.00
2.	CSIR, DST, DAE, DOS, DBT etc.	15.00
3.	Govt. of India, Ministry of Human Resource Development	15.00
4.	State Government	5.00
5.	Public Donations	5.00
6.	UGC	5.00
		65.00

Fig. 5 Suggestion Regarding the Source of Funding for ACST[33].

basic scientists for innovating technology; hence this decision to invite industrialists for their contribution.

With strong endorsement from the Planning Commission to which this proposal was initially submitted, it moved to the next level. On July 22, 1997, Y.K. Alagh, Minister of State for Power and Science & Technology in the short-lived United Front Government led by I.K. Gujral, wrote to Swarup[34]: "as you know I am very supportive of this Project. I have requested Secretary (DST) to provide assistance from the S&T Ministry. As regards issues relating to Science and Technology, we assure you of our full support. UGC will have to be involved."

Soon after this assurance from Alagh, the Lok Sabha elections led BJP to power and A.B. Vajpayee took over as Prime Minister on 19 March 1998. However, the proposal progressed through the evaluation process of the Ministry of Science & Technology, and in a sanction order from this Ministry dated 21-9-98[35], a fund of Rs. 10 lakhs was approved for the preparation of a Detailed Project Report (DPR). A letter from the office of Murli Manohar Joshi, Minister for Human Resources Development, dated December 18, 1998 was sent to Swarup that Joshi wanted to know more about this project[36]. Swarup sent a detailed note to Joshi[37] and then a brainstorming session was held at the Inter-University Centre for Astronomy and Astrophysics, Pune, during 25-26 March 1999. According to the minutes of this meeting[38], "Seventy five scientists, technologists, science administrators and science agency heads were invited. Out of these, nearly 40 participated . . . and most of those who could not participate . . . communicated their views." The ideas emerging from the deliberations of this meeting were essentially the same as what were put forth in the earlier proposal sent to the Planning Commission on December 19, 1996. One novel feature was the delineation of the areas in which ACST may concentrate. We find the following in the minutes[39] : "The proposed research areas around which ACST should be structured namely (1) Information Science and Technology (2) Advanced Materials and (3) Biotechnology, genetic engineering etc, was welcomed by everyone. . . Indeed one of the suggestions was that there should be fourth area namely basic sciences."

Following this brainstorming session, the DPR was prepared. As we already pointed out, we have not been able to find the full DPR, but a 6-page Executive Summary is available to us[40]. We have already presented the list of signatories in Figure 1. The Centre was to be called Advanced Centre for Science and Technology Education (ACSTE). According to the Executive Summary[41], "Besides providing research facilities at the frontiers of science and at the cutting edge of technology, ACSTE will offer a five year integrated education programme leading to M.Sc. degree and in some cases to M. Tech. degree." It is further noted[42]: "The teaching and research activities of ACSTE will be centred around four schools namely (a) School of Basic Sciences, (b) School for Information Science and Technology, (c) School of Advanced Materials and (d) School of Life Sciences and Biotechnology." The details of the student training programme remained the same as outlined in the earlier proposal.

Reading the Executive Summary, one gets the sense that what was envisaged was primarily a Centre geared towards applied research which will train students to acquire skills useful for industry. Basic science clearly seemed less central in the scheme of things, in spite of a proposed school devoted to it. Not all persons involved in the discussions felt satisfied with the proposal. The eminent physicist TV Ramakrishnan FRS, who had attended the brainstorming session, expressed his support for the overall plan of the Centre but had reservations about various details in the proposal. He wrote in an e-mail to Swarup and Bhide dated 30 March 1999[43]: "The proposal document . . . could perhaps be less detailed. . . Consistent with the broad goals, there are several routes. Why constrain this freedom by spelling out one route in detail and give room for literal minded or negative to slow down things? This is specially true for the academic part of the programme." There were dissenting voices within Pune University itself. S.R. Gadre, Head Chemistry Department, wrote in a letter dated December 7, 1999[44]: "The role of chemistry, which is a central and significant science, seems to be rather undervalued."

So far the deliberations on the proposal had progressed at a reasonable pace. The time elapsed from Swarup's first letter to Pune University VC (April 30, 1996) to the date when the DPR was ready (27 July 1999) was slightly more than three years. However, the process slowed down after that. There was no response from the Government – either positive or negative – for a very long time after the DPR was submitted. Among Swarup's papers, we find several letters from him to Murli Manohar Joshi, Minister for Human Resources & Development, (dated 4 September 2000, 4 October 2000, 14 December 2000, 14 May 2001) requesting a short appointment to discuss the proposal. It is not clear whether Joshi, himself an academic who had served as professor of physics at Allahabad University, could give an appointment to Swarup.

Transformation to an All-India Proposal

Swarup has written[4]: "Despite considerable follow-up by the Pune group during 1999–2002, the then MHRD minister, Murali Manohar Joshi remained lukewarm to the

idea, although later discussions between him and Arun Nigavekar (the then Chairman, UGC) in early 2003, did result in a decision to establish four National Institutes of Science (NISc), at Allahabad, Bhubaneswar, Chennai and Pune." We now discuss what we find within the Govind Swarup papers[5] about this decision for four Institutes.

Things started moving when Arun Nigavekar, who was a strong supporter of the Swarup-Bhide proposal as the Vice-Chancellor of Pune University, took over as Chairman of the University Grants Commission (UGC). In a letter to Swarup dated dt 7th Sept. 2002, he wrote about the decision of UGC "to establish a few higher education and teaching research institutions"[45]. In the minutes of the 409th meeting of the University Grants Commission (UGC) held on 9th April 2003, we find the following[46]:

> The Commission agreed, in principle, for establishment of Institutes for promoting quality, teaching and research in Basic Sciences in collaboration with other scientific agencies in X Plan.
>
> The Commission further agreed that the Centre for Studies in Integrated Sciences be established at the following places:
>
> (i) East: At Bhubaneshwar in the proximity of Utkal University
>
> (ii) West: At Pune in the proximity of University of Pune
>
> (iii) North: At Allahabad in the proximity of Allahabad University
>
> (iv) South: At Chennai in the proximity of Anna University

In fact, UGC allocated some funds for these centres, as mentioned by Nigavekar in a letter dated July 23, 2003, to the then VC of Pune University[47]:

> The Centres would be called as National Institute of Sciences (NISc) and would have a budget of Rs. 50 crores each spread over five years. The provision of Rs. 100 crores has been done for this activity in the Xth Plan and UGC has approached the Planning Commission for making provision of Rs. 100 crores . . . Presently each of NISc would be provided with Rs. 25 crores.

Even after UGC made this budget provision, work for these Centres could not be taken up immediately, as there was a question of whether UGC was empowered to set up such Centres. Nigavekar requested the Secretary of the Ministry of Human Resource Development on October 8, 2003 to obtain the necessary clearance[48]: "I would appreciate if you kindly seek the clearance from the Ministry of Law at the earliest." It appears that this clearance did not come before the next Lok Sabha election, after which a Congress Government took over in May 2004.

While the work for establishing these Centres could not be taken up without the necessary approval even after UGC allocated funds for them, discussions continued among academics. It is highly confusing that the suggested name for these centres kept changing continuously. Also, while the earlier proposal of ACSTE from the Pune group envisaged a Centre of applied sciences which would have a part of its funding coming from the industry, the Centres proposed by UGC were supposed to focus on basic science with government funding. The members of the Pune group who had earlier proposed ACSTE met on 8 November 2003 and prepared a note with the suggestion that the Pune Centre may be different from the other three[49]: "Some of us are of the view that the new institute, at least in Pune, should be named as "National Institute of Technology (NIST)" as the gap between science and technology is only a few years now."

After Arjun Singh took over as Minister of Human Resources Development in the Congress Government, the Pune group sent a letter to him dated August 24, 2004. After mentioning their earlier efforts and then praising the UGC proposal for setting up four NISc's, they wrote[50]:

> It is indeed a great pity that such an innovative proposal supported by various science agencies of the Government, hailed by the scientific community and now piloted by the UGC has been languishing for the last six years. We would like to most humbly appeal to you to take personal interest . . . and . . . ensure . . . necessary clearances so that NISc can admit students to this highly exciting and educational and research programme by July, 2005.

Swarup, Bhide and Yash Pal met Arjun Singh at his residence on 9 October 2004. Within four days, on 12 October 2004 Arjun Singh chaired a meeting to discuss this proposal. With the green signal from Arjun Singh, discussions started for setting up the first Centre in Pune. Curiously, we find that the name Advanced Centre for Science and Technology (ACSTE) was again brought back in the various documents resulting from these discussions[51]. However, before concrete steps could be taken for establishing this first Centre, a parallel development took place.

According to an office memorandum of Ministry of Human Resource Development dated 13 March 2005[52]:

> The Scientific Advisory Council to the Prime Minister (SAC–PM) in its first meeting held on

> 04.03.2005 in New Delhi under the Chairmanship of Prof. C.N.R. Rao recommended creation of two new Institutions . . . to be named "National Institute for Scientific Research & Education (NISRE)" likely to be located at Pune and Kolkata. The financial requirement for these Institutions was recommended at a level of Rs. 500 crores for each Institution over a period of five years.

This information was immediately picked up by two Pune newspapers, which reported about this initiative within a couple of days of this meeting of the Scientific Advisory Council[53]. Bhide and Swarup presumably first learnt about this initiative from the newspapers and sent a letter dated March 7, 2005 to Kapil Sibal, Minister of Science and Technology, thanking the government for this initiative[54]. An office memorandum of Ministry of Human Resource Development dated 30th June, 2005 announced the setting up of two committees to do the detailed planning of the two institutes[55]. Swarup and Bhide were included as members in the committee for setting the Institute at Pune.

Some important changes from the earlier Swarup-Bhide proposal may be noted. Firstly, Swarup and Bhide initially envisaged a centre on the campus of Pune University, which is a state university. But the IISERs became independent institutes of the central government under the Ministry of Human Resource Development. Secondly, the original name of the centre, the Advanced Centre for Science and Technology (ACST), had the word 'technology' in it, although it was planned as a centre for training students in science with a close synergy with industry. Note that the traditional departments in typical engineering colleges (such as electrical and mechanical engineering) were never meant to be a part of the centre. On the other hand, IISERs made it clear in their name that they were meant for "Science Education and Research" – counter-parts of what the IITs were for engineering.

We end our narrative here, since the subsequent developments have been covered by Sathyamurthy and Bandyopadhyay[1].

Conclusion

The unsatisfactory state of undergraduate education in science in the 1990s was widely acknowledged within the Indian scientific community. It appears to us that few persons in India have struggled so persistently as Swarup and Bhide to rectify the situation. They had the tenacity and dedication to continuously follow up their efforts for nearly a decade through successive governments – without giving up even at times when a possible success of their efforts appeared doubtful. The entire Indian academic community should be grateful to them for their heroic and untiring efforts. In spite of our enormous respect for Swarup and Bhide, however, we note that Swarup's statement during his convocation address at IISER Pune that "there is no doubt that" that it was the proposal from the Pune group which ultimately "resulted in the recommendation by Prof. C.N.R. Rao to the Cabinet for the establishment of IISERs" does not quite fit the facts. As we have seen, the Pune group envisaged an Institute geared towards a kind of training in science that can lead to innovative technology, with significant funding coming from industry. On the other hand, the SAC-PM headed by C.N.R. Rao recommended the setting up of Institutes focussing on basic science funded primarily from government sources. Perhaps the IISERs which came up turned out to be better institutes, albeit different, than what they would have been if the Swarup-Bhide proposal was followed literally at that time.

We should remember that the early 21st Century was still a time when higher education was supported by the Government of India in a major way. With changing times, now we are entering an era when even those organizations, which had been supported by the government over many years, are now urged to explore ways to generate their own resources and own funds. Since India spends a smaller fraction of GDP on education and science compared to many other countries strong in science, we firmly believe that the Government of India has to provide more – and not less – support for basic science if India has to be internationally competitive. However, having closer ties with industries is certainly becoming very important today – especially when industries are willing to provide support in a spirit of philanthropy. It is in this context that the Swarup-Bhide proposal acquires a new relevance at the present time. Having a good synergy with industry is also likely to provide additional job opportunities for graduating students, as emphasized by Khare[3]. Because of the expected synergy with industry, the original name of the centre proposed by Swarup and Bhide, Advanced Centre for Science and Technology (ACST), even had the word "technology" in its name. However, it should be noted that traditional engineering departments were never meant to be a part of it. With the strong support of the Prime Minister, with whom C.N.R. Rao was in direct contact, IISERs could be started on a much bigger scale with a substantial budget. Not expecting that kind of government support in the early years of their proposal, Swarup and Bhide were initially envisaging one centre at a much smaller scale having organic links with both Pune University and the captains of industry in that part of India.

One other important point may be noted here. While Swarup and Bhide were motivated to propose a centre because of the decline of the Indian universities, they were proposing a centre on the campus of a university. Even the four centres suggested in the 409th meeting of UGC were planned in the proximity of universities. Such centres, if established, clearly would have helped in reviving these universities. In contrast, IISERs were planned as independent institutions having no connections with universities. In fact, the establishment of IISERs led to the further deterioration of the universities by attracting good students away from them. Was this a good development for India? We are not sure of the answer and pose this question before our readers.

Was Swarup justified in his feeling that the effort of the Pune group was afterwards not sufficiently acknowledged by the Indian academic community? The fact that there was no previous study to properly document the efforts of the Pune group before this paper of ours provides a proof that Swarup's feeling was justified. We Indians are notorious for having very short collective public memory and often make no attempt to document the heroic efforts behind the establishment of our major institutions which may go unnoticed. The tremendous competition for getting admission into IITs has led to a gigantic money-spinning industry of coaching centres spread all over India. But how many Indians know anything about those persons who conceived and set up the first IITs? Unless we record the history of how our important educational institutions came up, we shall be an ungrateful generation who forgets our debts to our predecessors.

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