

ACM India Survey on PhD Production in India for Computer Science and IT

2013 – 2014

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The purpose of this study is to collect reasonably reliable data on PhD production in CS in India, and then use it to identify useful trends. This exercise was motivated by the Taulbee report in the US, and Dr Gautam Shroff, Vice President and Chief Scientist, Tata Consultancy Services has been leading this year's survey. Based on the inputs and experience from the survey conducted in 2011 and 2012, the survey and report for academic year 2013-14 has been incorporated.

Institutes Included

Last year, the study attempted to include all institutions which have a PhD program in CS/IT.

A list of 2507 institutes from all over India was obtained from AICTE. According to the data available on the websites, of these institutes, 73 institutes stated that they have a PhD in CS or IT. We added to these, other institutions (IITs, NITs, etc.) which are known to be granting PhDs in computer science – inputs for this was taken from various researchers and faculty and from the previous study. Additional institutes were obtained from the partner institutes to TCS Research Scholar Program. This gave a total of 146 institutes which claims to have a PhD program and which could be included in this study. This list of institutions is in Appendix H.

Data Collection

An online form was created, and sent to the Head of Department (CSE/IT) and the Director of the institutes. The form asked for information on: the number of PhD faculty, number of non-PhD faculty, total number of PhD students enrolled and the total number of PhDs graduated last year who got their degree. The form also asked for the stipend that was paid to the PhD students and the major problems that the institutes face with regard to the PhD programme.

Reminders were sent, and the institutions were informed that if they failed to respond, the data of students pursuing PhD from those institutes cannot be captured.

We got responses from 39 institutes through online survey. We assume that the other institutions (i.e. which did not respond and for which we could not find relevant data) don't have an active PhD program, or if they do, it is too small to be of any significant impact.

For this year's report, we have grouped the institutions as follows:

- Group 1: Institutions which provided the data about number of faculty, PhDs enrolled, and PhDs awarded. (39)
- Group 2: Institutes which provided data last time but did not do so for this year's report. (10)
- Group 3: Institutions which did not submit the filled form, but the number of faculty, and the total number of PhDs enrolled was available on their website. (4)
- Group 4: Institutions which did not submit the form and we could not find information about the PhD students enrolled on their websites, but obtained information about the number of faculty. (7)

For group 2, we took the data from last year's study – assuming that it would not have changed significantly this year.

Analysis

PhD Production

The number of students who completed their PhD from August 2013 to July 2014

Group 1 institutes: 140

Group 2 institutes (estimated): 49

Group 3 institutes (estimated): 21

Group 4 institutes (estimated): 24

To better understand where these PhDs are being produced, we divide the institutions in two categories: those that have 80% or more faculty with PhDs, and others. Presumably the first category represents the more research-focused institutions, while the second category is likely to be the more teaching-focused institutions. There are 21 institutions in the first category (List of these institutions and their data ids given in Appendix E), and 18 institutions in the second category (Appendix F). With this classification, we have the following for PhD production:

- ***Research-focused institutes produced a total of 162 PhDs and other institutions produced 72. The total number of PhDs produced last year from all institutions is 234.***

Based on the detailed data provided by Group 1 institutions, we can say:

- ***Of the total PhDs produced, 70% were male and 30% were females.***

Looking at the statistics for the number of students who are enrolled: Group 1: 1338

Group 2: 399

Group 3: 214

Group 4 Estimated: 202

For all the institutes, the total adds up to 2153. And for group 1 and group 2 is 1737. Additionally, the total number of part time students doing PhDs in institutes belonging to Group 1 is 455 and that of Group 2 are 53.

Using this total, we can estimate the number of PhDs likely to be produced in the country in the coming years. We assume that 90% of these students will graduate over the next five years. If we expect that these graduations will be spread across 5 years with approximately uniform distribution, the number of PhDs graduating will come to around 380 per year for the coming five years. Since we know that the enrolment in PhD programs has been increasing over the past few years, we can expect the increase to be gradual. We assume that the increase in first year is x , in 2nd year is $2x$... and in 5th year it is $5x$. With this, we can estimate that the number of PhDs graduating will gradually increase to about 405 per year in about 5 years among all institutions, and about 325 per year from institutions in group 1 and 2.

Overall, keeping in mind the likelihood of overestimation for institutions in group 2 and 3, we can say that the PhD production in the Academic Year 2013-14 was around 234, and that PhD production is likely to grow gradually to about 350 per year in about 5 years.

Areas of Research

In this section we analyse the areas of research chosen by the students who completed their thesis in 2013-2014.

As can be seen from fig 1, the most popular area of research is Networks. Database/Information Retrieval, Software Engineering and Informatics are fields which are also popular as a research interest among PhD students. (This data is only from institutes in group 1 who filled the online form.)

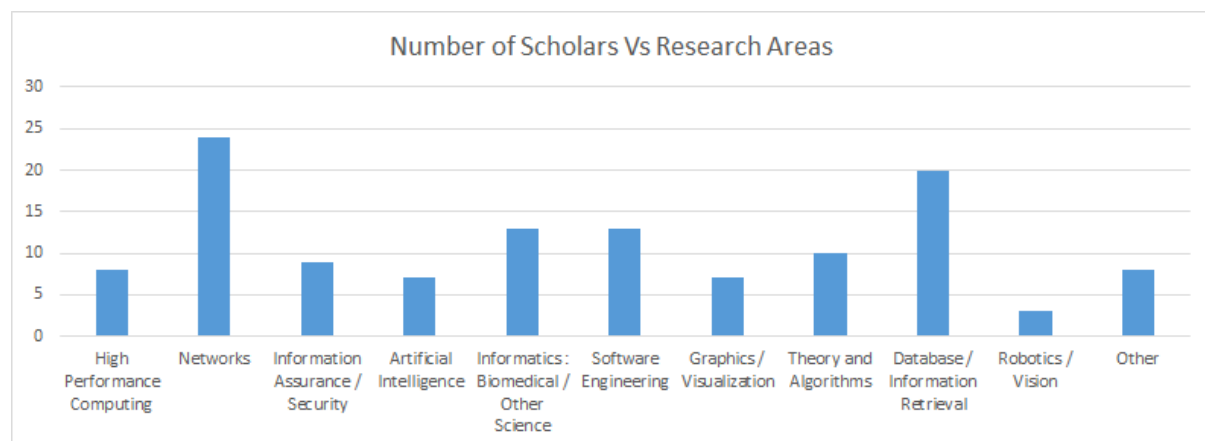


Fig 1: Area of research chosen by students who completed their PhD in 2013 - 2014. Comparing this with last year's response, we observe an increase in interest for Software Engineering, Database/Information Retrieval and Informatics.

Employment Statistics

Based on the data provided by institutes of group 1, the most popular choice of employment after completing PhD is teaching or joining a research job in India.

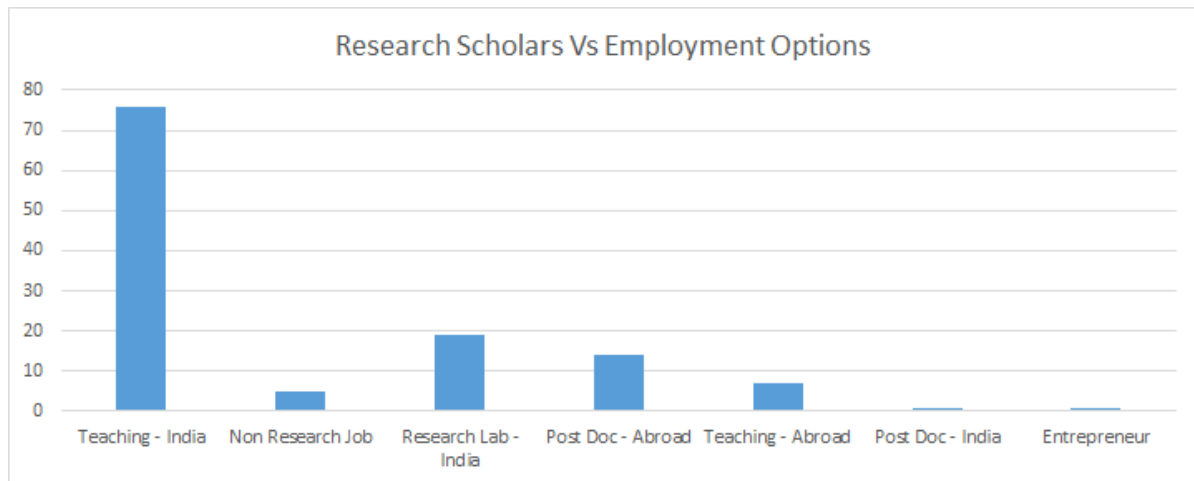


Fig 2: The employment options chosen by students who completed their PhD in 2013-2014.

Stipend/Compensation given to PhD students

Based on the data provided by 34 institutes about the stipend paid to a PhD student, we can say:

The highest salary given: Rs 30,000

The lowest salary given: Rs 8,000

Average salary a student can expect is: Rs. 16,794

Issues/Challenges faced by the PhD program

The online form had an open question for institutes to list down the issues they face with the PhD program. The response that we got can be broadly categorized into the following:

- Shortage of Faculty
- Attracting good students to pursue PhD
- Financial Support
- Lack of tie ups in the industry and other institutions
- Employment opportunities after successful completion
- Choice of Problem area for PhD

Faculty

For the 60 institutes covered in the study, the total number of faculty with PhD is 912 and the average faculty with PhD in the CSE/IT department of an institute is 15.

References

1. CRA Taulbee Survey. <http://cra.org/resources/taulbee/>

Acknowledgements

I would like to thank Sachin Parkhi for his help in conducting the study and preparing the report. I would also like to thank all the institutions who provided data by either filling the form or by sending data over email.

Appendix

A. Group 1 institutes: Provided Data

Name of the Institution	PhD Faculty	Non PhD Faculty	Male PhD Graduates (13-14)	Female PhD Graduates (13-14)	Total PhD Graduates	Faculty from PhD Students	PhD students enrolled	Part Time PhD Students Enrolled
Ahduni	17	2	0	0	0	0	7	2
BHU	6	1	6	1	7	0	19	19
BITS Pilani	11	3	5	0	5	3	31	20
Chennai Mathematical Institute	11	0	0	0	0	0	20	5
Delhi University (Main Campus)	20	1	2	5	7	5	52	15
Don Bosco College of Engineering and Technology	2	17	0	0	0	0	12	0
Dr. BATU, Institute of Petrochemical Engineering	Data Not Provided	4	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided
IIIT Bangalore	34	0	2	1	3	0	51	28
IIIT Delhi	21	0	2	0	2	0	59	7
IIIT Hyderabad	40	3	2	2	4	0	71	22
IITB-Monash Research Academy	10	0	3	Data Not Provided	3	0	137	6
Indian Institute of Science Bangalore	27	0	8	2	10	0	89	12
Indian Institute of Technology Bhubaneswar	3	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	4	Data Not Provided
Indian Institute of Technology Bombay	40	0	10	2	12	0	112	48
Indian Institute of Technology Gandhinagar	4	0	0	0	0	0	7	0
Indian Institute of Technology Guwahati	27	0	2	2	4	0	58	20
Indian Institute of Technology Indore	9	0	0	1	1	0	25	0
Indian Institute of Technology Kanpur	27	0	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided
Indian Institute of Technology Mandi	8	0	0	0	0	0	28	1
Institute of Mathematical Sciences Chennai	9	0	2	0	2	0	21	0
Jadavpur University Kolkata	29	4			21	1	15	10

JIIT Noida	21	71	2	1	3	1	57	7
MNNIT Allahabad	13	11	8	0	8	1	59	28
Mumbai University	1	1	0	0	0	2	22	
National Institute of Technology Bhopal	11	8	1	3	4	1	45	29
National Institute of Technology Calicut	10	11	2	1	3	1	35	13
National Institute of Technology Goa	9	0	0	0	0	0	2	0
National Institute of Technology Meghalaya	10	4	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	7	6
National Institute of Technology Raipur	2	5	1	0	1	1	9	8
National Institute of Technology Trichy	8	7	1	0	1	0	42	18
National Institute of Technology Warangal	13	2	8	0	8	2	21	7
National Institution of Technical Teachers' Training and Research	2	3	1	Data Not Provided	1	Data Not Provided	13	1
School of Computer Sciences, Mahatma Gandhi University	1	9	3	2	5	Data Not Provided	52	42
Sridevi Institute	2	24	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided
Symbiosis Institute of Technology	2	20	Data Not Provided	Data Not Provided	0	3	6	6
Thapar University	20	10	7	5	12	2	80	50
University Institute of Engineering and Technology	9	16	0	0	0	0	7	0
University of Hyderabad	23	3	7	3	10	2	63	21
Vishwakarma Institute of Information Technology	3	44	3	0	3	0	0	0
Total	515	284	88	31	140	25	1338	451

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B. Group 2 institutes: Provided data for last year's report

Name of the institute	PhD Faculty	Non PhD faculty	PhD Graduates (13-14)	Total PhD Enrolled
Dhirubhai Ambani Institute of Information and Communication Technology	54	4	3	61
IIT Allahabad	49	1	11	81
Indian Institute of Technology Hyderabad	8	0	0	14
Indian Institute of Technology Kharagpur/ CSE and Scholl of IT	34	1	10	85
Indian Institute of Technology Patna	10	0	10	22
Indian Institute of Technology Roorkee	10	0	5	14
Jamia Hamdard	5	7	1	7
National Institute of Technology Surathkal	13	11	5	35
Netaji Subhas Institute of Technology	9	10	2	22
TIFR	15	0	2	28
Total	207	34	49	369

C. Group 3 institutes: PhD faculty and students enrolled data found on website

Name of Institute	PhD Faculty	Non PhD Faculty	PhD Graduates (13-14) (Estimated)	Total Enrolled
IIT Rajasthan	8	0	2	16
ISI Kolkata	43	0	10	83
BHU IT	9	0	2	29
IIT Madras	27	0	7	86
TOTAL	87	0	21	214

D. Group 4 institutes: Only PhD faculty data available on website

Name of the Institute	Ph D Faculty	Non PhD Faculty	PhD Graduates (13-14)(Estimated)	Total Enrolled(Estimated)
Amrita University	5	20	1	10
Delhi Technological University	7	14	2	14
Indian School of Mines, Dhanbad	10	0	2	20
JNU	17	1	4	34
University of Pune	1	9	0	2
BIT Mesra	19	9	5	50
Gitam	43	10	10	70
Total	103	75	24	202

E. Research-focused institutes: 80% or more PhD faculty

Research Institutes	Focussed	PhD Faculty	Non PhD Faculty	PhD Graduates (13-14)	Total PhD enrolled
Ahduni		17	2	0	7
BHU		6	1	7	19
Delhi University (Main Campus)		20	1	7	52
IIIT Hyderabad		40	3	4	71
IITB-Monash Research Academy		10	0	3	137
Indian Institute of Science Bangalore		27	0	10	89
Indian Institute of Technology Bhubaneswar		3	0	0	4
Indian Institute of Technology Bombay		40	0	12	112
Indian Institute of Technology Gandhinagar		4	0	0	7
Indian Institute of Technology Guwahati		27	0	4	58
Indian Institute of Technology Indore		9	0	1	25
Indian Institute of Technology Kanpur		27	0	0	Data Not Provided
Indian Institute of Technology Mandi		8	0	0	28
Institute of Mathematical Sciences Chennai		9	0	2	21
Jadavpur University Kolkata		29	4	21	15
National Institute of Technology Goa		9	0	0	2
National Institute of Technology Warangal		13	2	8	21
University of Hyderabad		23	3	10	63
Chennai Mathematical Institute		11	0	0	20
IIIT Delhi		21	0	2	59
IIIT Bangalore		34	0	3	51
Total		387	16	94	861

F. Institutions with less than 80% PhD Faculty

Teaching Focussed Institute	PhD Faculty	Non PhD Faculty	PhD Graduates (13-14)	PhD Enrolled
BITS Pilani	11	3	5	31
Don Bosco College of Engineering and Technology	2	17	0	12
Dr. BATU Institute of Petrochemical Engineering	0	4	0	
JIIT Noida	21	71	3	57
MNNIT Allahabad	13	11	8	59
Mumbai University	1	1	0	22
National Institute of Technology Bhopal	11	8	4	45
National Institute of Technology Calicut	10	11	3	35
National Institute of Technology Meghalaya	10	4	0	7
National Institute of Technology Raipur	2	5	1	9
National Institute of Technology Trichy	8	7	1	42
National Institution of Technical Teachers' Training and Research	2	3	1	13
School of Computer Sciences, Mahatma Gandhi University	1	9	5	52
Sridevi Institute	2	24	0	
Symbiosis Institute of Technology	2	20	0	6
Thapar University	20	10	12	80
University Institute of Engineering and Technology	9	16	0	7
Vishwakarma Institute of Information Technology	3	44	3	0
Total	128	268	46	477

H. All institutes included in the study

Name of Institute
AIT Technical Campus
Akshaya College of Engineering and Technology
Aligarh Muslim University
Amity School of Engineering and Technology
Amrita University
Andhra University College of Engineering
Anna University
Asian School of Technology
Aurangabad College of Engineering
Avinashilingam Deemed University for Women
BHU IT
Bengal Science and Engineering University
BITS Pilani
BITS Mesra
Bapuji Institute of Engineering and Technology
Bengal Engineering and Science University, Shibpur
Chennai Mathematical Institute
College of Engineering
College of Technology and Engineering, Udaipur
D.E.I. Technical College
Delhi Technological University
Delhi University (Main Campus)
Department of Computer Science and Applications, Kurukshetra University
Department of Studies in Computer Science, Manasa Gangothri, University Of Mysore
Desh Bhagat Foundation Group of Institutions, Ferozpur Road Moga
Dhirubhai Ambani Institute of Information and Communication Technology
Don Bosco College of Engineering and Technology
Dr. Babasaheb Ambedkar Technological University Institute of Petrochemical Engineering
Dr. B.R Ambedkar National Institute of Technology, Jalandar
Dr C.V Raman Institute of Science and Technology
East West Institute of Technology
GITM Institute of Technology
Goduati Engineering College For Women
Government College of Technology, Coimabtoe
Guru Gobind Singh Indraprastha University
Guru Nanak Dev Engineering College
Guru Teg Bahadur Khalsa Institute of Engineering and Technology
IIIT Allahabad
IIIT Bangalore
IIIT Delhi
IIIT Hyderabad

IITB-Monash Research Academy
ISI Kolkata
Indian Institute of Science Bangalore
Indian Institute of Technology Bhubaneswar
Indian Institute of Technology Bombay
Indian Institute of Technology Delhi
Indian Institute of Technology Gandhinagar
Indian Institute of Technology Guwahati
Indian Institute of Technology Hyderabad
Indian Institute of Technology Indore
Indian Institute of Technology Kanpur
Indian Institute of Technology Kharagpur/ Scholl of IT
Indian Institute of Technology Kharagpur/CSE
Indian Institute of Technology Madras
Indian Institute of Technology Mandi
Indian Institute of Technology Patna
Indian Institute of Technology Rajasthan
Indian Institute of Technology Roorkee
Indian Institute of Technology Ropar
Indian School of Mines, Dhanbad
Institute Of Engineering Jiwaji University, Gwalior
Institute Of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur
Institute of Mathematical Sciences Chennai
Invertis Institute of Engineering & Technology
ITM University, Gwalior
JNU
Jadhavpur University Kolkata
Jaipur National University
Jamia Hamdard
Jamia Millia Islamia
JIIT Noida
JNTUH College of Engineering Hyderabad
K S R Institute For Engineering And Technology
K S Rangasamy Institute of Technology
K. L. E. Society's College of Engineering And Technology, Belgaum
K.V.G. College of Engineering
LMNIIT
MNNIT Allahabad
Madan Mohan Malvia Engineering College
Madhav Institute of Technology & Science
Maharashtra Institute of Technology, Pune
Manonmaniam Sundaranar Uviversity
Mumbai University
National Institute of Technology Agartala
National Institute of Technology Bhopal

National Institute of Technology Calicut
National Institute of Technology Durgapur
National Institute of Technology Goa
National Institute of Technology Jamshedpur
National Institute of Technology Kurukshetra
National Institute of Technology Meghalaya
National Institute of Technology Raipur
National Institute of Technology Rourkela
National Institute of Technology Silchar
National Institute of Technology Surathkal
National Institute of Technology Trichy
National Institute of Technology Warangal
National Institution of Technical Teachers' Training and Research
Netaji Subhas Institute of Technology
Padmashree Dr. D. Y. Patil Institute of Engineering and Technology
PSG College of Technology
Rajeev Gandhi Proudhyogiki Mahavidyalaya
Ramrao Adik Institute of Technology
Sant Longowal Institute of Engineering and Technology
Sardar Patel College of Technology
School of Computer Science and IT
School of Computer Sciences, Mahatma Gandhi University
Shobhit Institute of Engineering and Technology
Shri G.S Institute of Tech. and Science
Shri Guru Gobind Singhji Institute of Engineering and Technology
Shridevi Institute of Engineering And Technology
Sir M.visvesvaraya Institute of Technology
SJB Institute of Technology
SNDT Womens University
SNS College of Technology
Sona College of Technology
Sri Jayachamarajendra College of Engineering
Ssbt's College of Engineering and Technology
Swami Vivekanand Institute of Technology, Sagar
Symbiosis Institute of Technology
Symbiosis Institute of Technology & Science
Thapar University
Thiagrajan College of Engineering
TIFR
University Institute of Engineering and Technology
University of Hyderabad
University of Pune
Veer Surendra Sai University of Technology, Burla
Vishwakarma Institute of Information Technology
Vishwakarma Institute of Technology

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CUSAT, Kochi-kerala
Govt. College of Engg. (GCOEP), Pune
Heritage Institute of Technology
Institute of Technology, Nirma University - Ahbad
MIT, Manipal
National Inst of Technology (NIT), Jalandhar
Osmania University
Punjab Engg College, Chandigarh
SASTRA, Thanjavur
Veermata Jeejabhai Technological Instt (VJTI), Mumbai
Walchand College of Engg. - Sangli