Research Data Management in Central Universities and Institutes of National Importance: a Perspective from North East India

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Abstract

The current study is an attempt to explore the perception of the library professionals about research data management (RDM). It reports the present scenario of research data management in the libraries and explores the views of professionals on aspects of RDM like stakeholders, awareness on NDSAP, formulation of an institutional research data management policy, requirement of data management plan by research funding agencies, necessary areas of training for library professionals to provide research data management, motivations for library professionals and potential challenges for research data management. It has been found that researchers have approached the library for research data and most of the professionals have intentions to facilitate research data management. Out of the different benefits of research data management, library professionals rated top priority to the opportunity to learn new skills through RDM. Professionals perceived upskilling of library staff to provide RDM to be the most daunting task of all the challenges.

Keywords: Research Data Management, RDM, library professionals, North East India, Perception, Universities, challenges

1. Introduction

Research data refers to all different kinds of data which are generated during the course of any kind of research work. These are valuable resources gathered by the earlier researchers at the expense of much time and money. Very often, a research process includes the generation of a huge amount of data which serves as a tool for validating the findings of the research work. Data generated during the course of a research work are valuable resources and if properly stored these resources can be accessed, referred, re-evaluated for academic and research purposes in future (Tripathi et al., 2017).Most often, the current research activities in a discipline are based on the data of the earlier research in that area, therefore research data management (RDM) has become very significant in the advancement of scholarly pursuit. For collaborative research, research data management is especially beneficial in making optimal use of data. Successful research data management in an

institution can only be accomplished through the collaborative effort of the stakeholders for RDM namely – researchers, library staff, information technology staff, academic staff, research support office (or administrators). It would be relevant to mention here that the ongoing pandemic has amplified the necessity of research data management.

1.1 Research funding agencies and the need for RDM

In most cases, at present data generated from tax payer funded research is not being utilized fully and there is scope to use the data beyond its initial purpose of generation (Levine, 2014). Due to this, there is a probability that we may waste money and time on similar research projects or else we are unable to reuse existing data for new findings. Moreover funding bodies and national governments are seeking an improved return on investment from funded researchers. As such, a number of international research funding agencies have set a mandate for researchers to submit a data management plan while applying for research grant. Likewise many renowned international publishers require the researchers to submit their raw data based on which they have come up with their research publications/findings.

Data Management Plans (DMP) are documents that act as supplement to the grant application by the researcher (Averkamp et al., 2014). It describes the strategies the researcher would adopt like means to generate, organize, control versions, analyze, share, preserve, archive, etc. for the datasets.

1.2 Role of Library in RDM

Library professionals have already been instrumental in managing, preserving and disseminating scholarly resources and making these resources accessible to the users. For data management, broadly, libraries can develop two types of data services: data management services and data curation services (Carlson, 2014). Data management services come into play when researchers themselves are generating or collecting data in pursuit of their research work. These services include support in developing data management plans, assistance to document, organize data, ensuring data security, etc. Data curation services are intended to enhance the utility of the data beyond the initial purpose for which data was generated. The accessibility of the data is enhanced through activities like application of metadata, assigning permanent identifiers to data sets, etc.

1.3 Necessity of a clear perception of RDM for library professionals

Managing research data incurs expenses and skilled manpower is necessary for its execution (Bhardwaj, 2019). Therefore, it may not be possible for an institution to incorporate research data management at one go. All resources may not be available at once, but professionals should try to understand the landscape first (Latham, 2017). Since providing RDM service is a collaborative exercise, therefore library professionals need to have a clear understanding of the roles and responsibilities of the other stakeholders like IT staff and research administration (or research support office). If equipped with a clear perception of RDM, library professionals can play a vital role in an institution by leveraging

the cooperation of the other institutional RDM stakeholders and approach the parent authorities for necessary permissions and amenities to initiate RDM in their institutions.

1.4 National Data Sharing and Accessibility Policy (NDSAP) of India

The Govt. of India has formulated the National Data Sharing and Accessibility Policy (NDSAP) which facilitates sharing of all sharable non- sensitive data generated using public funds by Ministries/Departments /Subordinate offices/Organizations/ Agencies of Government of India as well as States. The objective of this policy is to facilitate access to Govt. of India owned shareable data in machine readable form through a wide area network all over the country in a periodically updatable manner, within the framework of various related policies, acts and rules of Govt. of India, thereby permitting a wider accessibility and usage by public.

1.5 Open Government Data initiative of India

The Government of India supports open data through the Open Government Data (OGD, data.got.in) portal. Through this portal the government department and ministries publishes their datasets, documents, services and tools for the general public to access and use. The government intends to encourage sharing of datasets for national planning and development.

2. Literature review

To develop RDM services, libraries have to work in partnership on several aspects with the other stakeholders for RDM notably campus IT department, research support office, researchers. Lewis, M. (2010) determined nine such areas -- Develop the data confidence of library workforce, provide data advice to researchers, develop the data awareness of researchers, teaching of data literacy to post graduate research students, introduce data into the undergraduate research based learning, development of data curation capacity, identify data management skills to be introduced in the syllabus of Library & Information Science (LIS) schools, lead on local data policy and influence national data policy.

Naum, A. (2014) has discussed the initiatives in Australia about RDM by the Australian National Data Service (ANDS) which formed the Research Data Australia Service, a national registry that describes data collection produced by the Australian researchers. The study also describes the dynamic role of library staff in successfully executing the Showcasing Research Data Project.

Tenopir, C. et al., (2014) have described data intensive and collaborative research to be a driving force for libraries to incorporate research data services (RDS) through their study on librarians' RDS practices in US and Canadian academic research libraries. Moreover they have reported on the RDS related library policies in these libraries and have stratified the RDS into two sections: a) informational or consulting RDS and b) Technical or hands on RDS.

Koltay, T. (2019) has reviewed the different RDM services library professionals can offer to the researchers. Initially libraries are more likely to offer informational services than hands on services. Informational services include consulting with researchers on data management plan (DMP)s, on different metadata standards and providing reference support for finding and citing data sets.

The study by Steiner, K. (2015) in the university libraries in New Zealand highlights the success of a dedicated interdisciplinary team of researchers, teachers, librarians in a university in propagating RDM as a holistic process. Some of the problems encountered in providing RDS were willingness of the researchers to share research data and their varied interests and needs. RDM not being included as a topic in the university level was another problem for development of RDS.

Pinfield, S., Cox, A. M. & Smith, J. (2014) provided an insight into the contribution of academic libraries to RDM. Within an institutional framework, they have determined the main components of an RDM programme, explored the major drivers for RDM activities. Relationship of the library with other key stakeholders such as IT department and research support office play a very decisive role for the success of RDM in the institution. The authors have put forward a model to encompass the main aspects of an institutional RDM programme.

According to Latham, B. (2017), for initiating RDM at first libraries can concentrate on those RDM services that easily align with traditional library services e.g. informational RDM services to some extent aligns with reference service. Lack of adequate opportunities for library professionals to enhance their skills in RDM has been a prime challenge for library professionals.

From the evaluation of Li Si, Wenming et al. (2015) in the top 100 Universities of the world research data introduction is the most frequently provided research data service by these university libraries. Different strategies have been proposed for university libraries to impart research data services in cooperation with stakeholders. It has been proposed for the recruitment of scientific data specialists, recommendation of tools and templates for DMPs, etc.

In their study on library professionals in 2018 , Faniel, M. and Connaway, L. S. have identified the effect of some influencing factors linked with library professionals' RDM support to researchers namely – (i) technical resources (ii) human resources (iii) researchers' perception about the library (iv) leadership support and (v) communication, coordination and collaboration.

Through a study on professionals of South Africa Kahn, M. et al. (2014) has described the need for a policy on RDM by giving due consideration to all RDM stakeholders.

Patel, D. (2016) has proposed a framework for research data management which includes different aspects of research data management like developing an institutional policy for research data management, copyright and data licensing, data classification, etc. A proposal for National Repository of Open Research Data has been provided through the study.

Tripathi, M. et al. (2017) have depicted the perception of the researchers towards the availability of raw data in open access for further use and interpretation by the succeeding researchers. It was found that researchers are optimistic about the availability of data in open access but at the same time they were reluctant to share their own data.

Pal, B. & Singh, S. K. (2019) have emphasized the need of a national research data management policy in addition to NDSAP of India so that utility of the data from all kinds of research could be enhanced. They have proposed an Indian Academic Research Data Repository (IARDR) under the leadership of INFLIBNET.

In a study on selected Norwegian academic libraries in 2019, Boateng, K. A. and Owusu-Ansah, C. M. found that library professionals desired to develop their skills on RDM. Professionals perceived RDM as an important aspect to enhance library services.

3. Objectives of the study

- To determine the perception of the library professionals about RDM.
- To find whether researchers (includes faculty members, research scholars and all other research staff) turn up to the library for their data requirements.
- Determination of the areas where the library professionals feel the necessity of training to provide RDM.
- Determination of the motivating factors for library professionals to provide RDM.
- To figure out the potential challenges for providing RDM as perceived by the professionals.

4. Methodology

The present study is an attempt to examine the scenario from the perspective of library professionals. Questionnaire method has been used for collection of data and accordingly an online questionnaire was prepared and sent to the respondents. To provide a better understanding of the questions, a brief introductory note on RDM alongwith explanatory notes were attached with a few questions to bring out the responses clearly.

5. Scope and limitation

The scope of the present study is to explore the perception of library professionals about research data management. The professionals of the central universities and institutes of national importance of North East India were included in the study. The North Eastern region of India comprises of eight states – Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.

6. Findings

The questionnaire was sent to all library professionals of all the central universities and institutes of national importance of North East India and 28 professionals from 16 institutions responded to the questionnaire while professionals from 7 institutions did not respond.

6.1 Designation of the Professionals

Table 1: Designation of the professionals

Designation	Number
Librarian	6 (21.4 %)
Deputy Librarian	4 (14.2 %)
Assistant Librarian	10 (35.7 %)
Information Scientist	1(3.5%)
Library Professional Assistant	3 (10.7%)
Library & Information Officer	1(3.5%)

Senior Library & Information Officer	1 (3.5%)
Senior Library & Information Assistant	2 (7.1%)

From table 1, it has been found that most of the respondents were Assistant Librarians (35.7%). Apart from this most of the subsequent respondents were either Librarians (21.4 %) or Deputy Librarians (14.2 %). As such most of these respondents had managerial responsibilities in the libraries which is significant as they are more likely to undertake initiative for communicating with the other institutional stakeholders for initiating RDM service. Nevertheless the responses of the other professionals are of utmost importance for successful initiation of RDM service.

6.2 Existing Research Data Management service in the institutions and intentions of professionals

It was found from the study that none of the libraries provide any dedicated RDM service. But a few responding professionals replied that they provide some sort of informational RDM service to their researchers through library orientation programmes like e.g.: how to access the open access data repositories, how to store one's own data in data repositories, etc.

Further, the respondents were asked about their intentions to provide RDM service through their institutions

Table 2: Intentions to provide RDM service through the library

Do you intend to provide RDM service through your library?	No. of responses
Yes	21 (75 %)
No	5 (17.8%)
Didn't reply	2 (7.1 %)

From table 2, it has been seen that 75 % professionals have intentions to initiate RDM service through their library while 17.8% professionals do not have any such intentions. 7.1% respondents refrained from replying.

6.3 Query about research data by the researchers in the library

The respondents were asked if they had received any query about research data from the researchers.

Table 3: Query about research data by researchers in the library

Response	No. of respondents
Yes	14 (50 %)
No	14 (50 %)

From table 3, it has been seen that half of the respondents (50 %) have received query about research data from researchers. Further these respondents were asked to mention the sources they had referred to with a few options like Indian Council of Social Science Research (ICSSR) data service, open government (India) data portal (data.gov.in), Registry of Research Data Repositories (Re3data) along with provision for them to mention the other data sources they had referred. The responses of the professionals is depicted in the table below:

Table 4: Use of some data repositories by researchers

Sources of research data	No. of respondents

ICSSR data service	14 (41.1%)
data.gov.in	12 (35.2 %)
Re3data	8 (23.5 %)

From table 4, it has been found that the professionals who have received query about research data refer the researchers to ICSSR data service, open government data portal of India (data.gov.in) and registry of research data repositories (Re3data). Also the respondents were asked to mention any other data sources referred by them and as mentioned the other sources are Economic & Political Weekly (EPW) Time series, Indstats, Figshare, etc.

Thus, it is clear that researchers are constantly in a lookout for research data from earlier research activities. This advocates for the initiation of research data management (RDM) service by the institutions.

6.4 Stakeholders to develop RDM services:

The professionals were asked about the institutional stakeholders for RDM apart from library. For this, the respondents could choose more than one option in the questionnaire.

Table 5: Other stakeholders for RDM

Stakeholders	No. of responses
Information Technology (IT) department	19 (27.5%)
Research Support Office	20(28.9 %)
Academic staff	14(20.2 %)
Researchers	16(23.1 %)

As evident from table 5, most of the professionals felt research support office (28.9%) as stakeholder for RDM services. It was followed by Information Technology (IT) department as 27.5% respondents felt it to be a prime stakeholder. 23.1% professionals felt researchers as stakeholders and 20.2% professionals felt the academic staff as stakeholders apart from the library.

6.5 Awareness about National Data Sharing and Accessibility Policy (NDSAP) of India

The professionals were asked about their awareness of the National Data Sharing and Accessibility Policy (NDSAP) of India.

Table 6 : Awareness of professionals about NDSAP

Aware of NDSAP	No. of responses
Yes	21 (75 %)
No	7(25 %)

From table 6, it has been seen that 75 % of library professionals are aware of NDSAP while 25 % were unaware of the policy.

6.6 Initiative to create an institutional RDM policy among the stakeholders

The professionals were asked about whom according to them should undertake the initiative to formulate an institutional RDM policy for imparting RDM.

Table 7: Perception of professionals about initiative to formulate an institutional RDM policy

Different stakeholders	No. of responses
Library	8 (28.5 %)
Research support office	5 (17.8 %)
Academic staff	1 (3.5%)
Collaboration of all RDM stakeholders	13 (46.4 %)
Information Technology (IT) Department	1 (3.5 %)

Table 7 shows that most of the professionals (46.4%) felt that formulating an institutional RDM policy should be a collaborative effort among all the institutional stakeholders for RDM. A collaborative initiative would involve discussion among all stakeholders and would help in arriving at a consensus among all the stakeholders about initiating RDM. It would also help in future mutual cooperation among the stakeholders towards developing RDM service.

6.7 Responsibility for curating research data

The professionals were asked about whom according to them should undertake the responsibility to curate research data.

Table 8: Perception of professionals about responsibility for curating research data
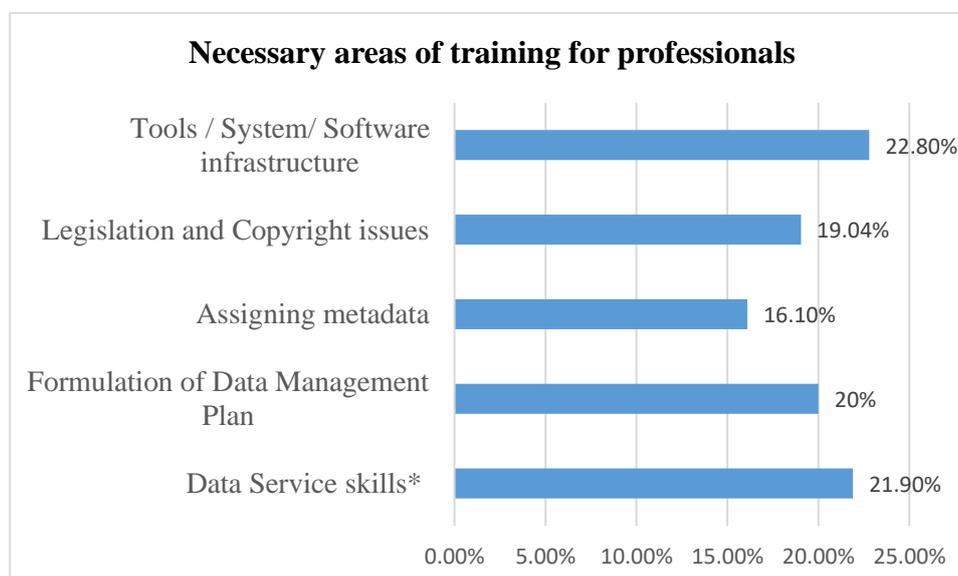
Different stakeholders	No. of responses
Library	14 (50 %)
IT department	3 (10.7 %)
Individual Researchers	4 (14.2 %)
Professional or disciplinary body	7 (25 %)

Table 8 shows that according to most of the professionals (50%), the library of the institution should undertake the responsibility to curate research data.

6.8 Necessary areas of training on RDM for library professionals

The respondents were asked about the areas they considered necessary for training on RDM for library professionals.

Fig1: Necessary areas of training for professionals

Necessary areas of training for professionals
- Tools / System/ Software infrastructure: 22.80%
- Legislation and Copyright issues: 19.04%
- Assigning metadata: 16.10%
- Formulation of Data Management Plan: 20%
- Data Service skills*: 21.90%

(* Data Service skills comprises of Data documentation, data classification, data citation, data visualization, data storage, data preservation, data sharing, data interoperability, etc.)

Fig 1 shows that to initiate RDM, most of the respondents (22.8 %) felt the need for training on tools/system/software infrastructure. 21.9% respondents felt the need for training on data service skills while 20 % respondents felt that they should undergo training for formulation of Data Management Plan (DMP) and 19.04 % respondents felt the need for training on legislation and copyright issues. 16.1 % respondents expressed the need for training on assigning metadata to datasets.

6.9 Views of Professionals on mandate set by research funding agencies to receive research data from funded researchers

At present, research funding agencies, mainly international funding agencies set the requirement of a Data Management Plan (DMP) in the grant application process from the researchers. Sometimes they also set a mandate that at the completion of the project, the research data generated has to be submitted to them. These requirements by the agencies act as a driving force for the research institutions (academic institutions in the context of the present study) to provide RDM service to the researchers. All these were explained in the questionnaire and then the library professionals were asked about their views regarding the necessity of setting this mandate by the research funding agencies for sanction of research grant

Table 9: Mandate for a DMP requirement

Do you think research funding agencies should have a mandate for DMP requirement?	No. of responses
Yes	17 (60.7%)
No	2 (7.1%)
Can't say	9 (32.1 %)

From table 9, it has been seen that most of the professionals (60.7 %) felt it necessary for setting up mandates by research funding agencies which is an implication for their intent to equip themselves for providing RDM service.

6.10 Measures that may encourage sharing of research data among researchers

The respondents were asked to select the measures which will encourage researchers to share their research data. The respondents could prefer to choose more than one measures from the ones listed.

Table 10: Measures to encourage sharing of research data among researchers

Measures to encourage sharing of research data among researchers	No. of responses
Requirement of DMP by research funder	19 (24.6%)
Explaining the significance of data citation	20 (25.9%)
Explaining the advantages of data sharing	25 (32.4%)
Publishing houses set research data as a requirement	13 (16.8%)

From table 10 it can be seen that most of the professionals (32.4 %) felt that explaining researchers the advantages of data sharing would be the most effective measure to encourage data sharing. 25.9 % professionals felt that explanation of the significance of data citation would motivate the researchers while 24.6 % professionals felt that requirement of DMP by funding agencies would foster data sharing among researchers.

6.11 Preferred benefits of providing RDM for the professionals

Some benefits of providing RDM were listed and the professionals were asked to rate these benefits as per their preference (Ranked in a scale of 4 where 4= most beneficial to 1= least beneficial)

Table 11: Preferred benefits of providing RDM support by the library

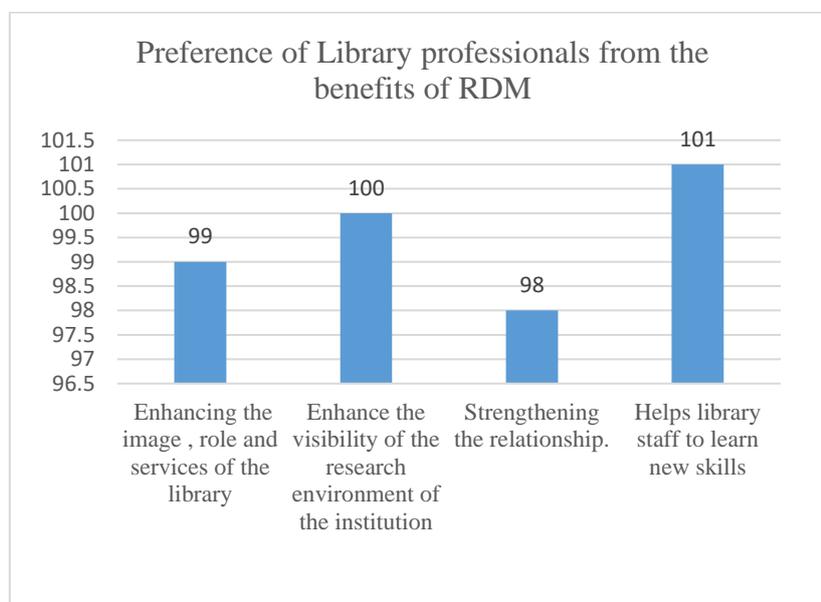| Benefits of providing RDM	Rating 1	Rating 2	Rating 3	Rating 4	Cumulative rating
Enhancing the image , role and services of the library	1	0	10	17	99
Enhance the visibility of the research environment of the institution	1	1	7	19	100
Strengthening the relationship of the researchers with the library	1	3	5	19	98
Helps library staff to learn new skills	1	1	6	20	101

Fig 2: Ranking of the preferences

Table 11 and Fig 2 depicts the rating provided by the professionals to the four listed benefits of providing RDM. It can be seen that professionals are most inclined to the benefit of learning new skills and followed by enhancement of the visibility of the research environment of the parent institution.

6.12 Perceived challenges by professionals for providing RDM through library

Table 12 :Perceived challenges by professionals for providing RDM through library

Challenges	No. of responses
Misconception of RDM and library services among researchers	17 (16.5%)
Lack of support from administration	12 (11.6 %)
Difficulty in convincing and coordinating the different stakeholders for RDM	16 (15.5 %)
Upskilling library staff	22 (21.3%)
Lack of adequate staff	18 (17.4%)
Lack of Funding	18 (17.4%)

From table 12, it can be seen that uplifting the skills of the library staff with RDM skills has emerged as the most challenging factor (21.3 %) for providing RDM service. Lack of adequate funding and lack of adequate staff have emerged to be equally challenging (17.4%). Misconception of RDM and library services among researchers appeared to be challenging to 16.5 % professionals. Meanwhile 15.5 % professionals have expressed the challenge of difficulty in convincing and coordinating the different stakeholders for RDM.

7.   Suggestions

- The Library Professionals in an institution can initiate a discussion on RDM by inviting the other stakeholders. It is necessary that all stakeholders are convinced with the benefits of RDM like enhanced research validation, better funding, wider outreach of research, etc. They can take up a pilot project at first. The administration should work out on the necessary permissions and allocation of finances.

- All stakeholders should collaborate to formulate an institutional data management policy. Guidance in this regard may be sought from other institutions with successful policies.

- Library professionals have to enhance their skills for imparting RDM service. Training programs should focus on data service skills, preparation of data management plans, tools/software for data curation, assigning metadata and unique identifiers, copyright and ethical issues, etc. Already RDM has been included as one of the modules in the Annual Refresher Programme in Teaching (ARPIT) course of SWAYAM platform in India.

- RDM and its allied skills should be incorporated into the Library & Information Science curriculum. This would make the upcoming professionals well equipped with skills to provide RDM service.

- The Information and Library Network (INFLIBNET) centre in India which has been successfully providing the ICSSR data service can play a very vital role in nourishing the professionals on RDM. INFLIBNET can design different training programmes on RDM for working professionals.

- Libraries can take up initiatives to sensitize the advantages of data sharing and RDM among the research students through orientation programmes, seminars, etc.

- Basics of RDM should also be incorporated into the curriculum of research in the disciplines where data intensive research is predominant.

8. Conclusion

The perceptions of the professionals has been found to be in an evolutionary stage and in the right direction. The findings of the present study would help in structuring the course of action to initiate RDM through a collaborative effort. The advantages of data sharing in research has already been realized and library professionals should thrive their skills on RDM. They must solicit the cooperation of the other stakeholders and thus add to their contribution to the research endeavor of the institution.

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Annexure

Table: List of Central Universities and Institutes of National Importance in North East India from where responses were received for the present study (Source: aishe.nic.in)

State	Institutions	Type of institution
Assam	Assam University	Central University
	Tezpur University	Central University
	IIT Guwahati	Institute of National Importance
	IIIT, Guwahati	Institute of National Importance
	NID, Jorhat	Institute of National Importance
Arunachal Pradesh	Rajiv Gandhi University	Central University
	NIT, Arunachal Pradesh	Institute of National Importance
Manipur	Manipur University	Central University
Meghalaya	NEHU , Shillong	Central University
	IIM Shillong	Institute of National Importance
	NIT Shillong	Institute of National Importance
Mizoram	Mizoram University	Central University
Nagaland	Nagaland University	Central University
Sikkim	Sikkim University	Central University
	NIT Sikkim	Institute of National Importance
Tripura	Tripura University	Central University

IIT – Indian Institute of Technology, NIT – National Institute of Technology, IIIT – Indian Institute of Information Technology, NID – National Institute of Design