

EVALUATION REPORT

EVALUATION REPORT PREPARED FOR THE
MINISTRY OF EDUCATION
OF SCHEMES UNDER THE NATIONAL MISSION ON
EDUCATION THROUGH INFORMATION AND
COMMUNICATION TECHNOLOGY, SWAYAM AND E-
SHODH SINDHU

OCTOBER 22, 2020

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Reference: Assessment of the schemes under Ministry of Education

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I. FOREWORD

Technology has been a trigger for growth as well as a continuous catalyst in enabling citizen centric services made available to the right persons at the right time and at the right value. In fact, the level of digital growth achieved in the past decade has allowed citizens to have ease of access to most Government of India (GOI) and/or Government of India aided services.

The Ministry of Education, in its part continues to take the lead in establishing students, scholars and teachers as Digital Masters in their area of subject interest while ensuring that the prestigious Indian Institutes of Technology (IIT) got the best available support from the Government. This unflinching support has enabled the creation of technology options and solutions that allow students from the remotest corners of the country to get access to the best available online resources.

The digital development agenda continues to bring Government, Industry and Academia together and work in tandem to create an innovation cluster around digital technology operating as both a platform and an enabler. More importantly, active measures being taken by the Government to address a shortage of talent in the current digital technology ecosystem including its application to other sectors needs to be bolstered further.

The presence of digital savvy competitors is also being addressed by the Ministry of Education through various initiatives of partner institutions by opening gates through various digital solutions. Cost effective, high-performance and easy to access applications being offered through these initiatives have ensured an improvement in the user-experience apart from making users contribute with a sense of belonging to the overall eco system.

Taking queue and following on with the evaluation exercise undertaken by NASSCOM in August 2017, the National Institute of Smart Governance (NISG) in conjunction with Ministry of Education was tasked with evaluating the set of projects under NMEICT along with other Government of India's initiatives SWAYAM and e-Shodh Sindhu. These projects were undertaken and executed by various technological, research and educational institutions addressing diverse requirements, extending from the creation of IT infrastructure, formation of e-Content, setting up connectivity to universities and colleges and more. As part of this exercise, the NISG team connected with relevant stakeholders including Project Investigators (PI) and evaluated 14 major projects that are approximately 90% of the overall budget for these initiatives. The evaluation report offers direction to policy makers to formulate a long-term policy on the inclusion of Information & Communications Technology (ICT) in higher education while also triggering the way forward.

II. ACKNOWLEDGEMENT

We would like to place on record, our gratitude and acknowledgement to each & every one of the Project Investigators who made the effort to be available and offered their valuable inputs in the quickest possible time.

Furthermore, this effort would have not been possible without the guidance and support of Mr. Vishwajeet Kumar, Mrs. Malathi Narayanan, Mr. N Parameswaran, Mrs. Pushpa Gautam and Mr. G S Malik, the pillars of these critical projects, who were more than instrumental in the realization of this evaluation report. They ensured the facilitation of all necessary connects with project teams in order to collect & compile the critical information required for this evaluation process.

We are indebted to thank the project investigators and their respective team members who were the primary source of information on operational challenges. Their inputs on assisted us in arriving at recommendations

III. INTRODUCTION

For India to emerge as a globally recognized knowledge superpower in the shortest possible time, it is imperative that we drive home our demographic advantage by nurturing our working population and helping the nation become a knowledge powerhouse. In line with this vision, the use of Information and communication technology (ICT) has great potential in improving the quality of education imparted and widening the access of education throughout the country.

Efforts put in thus far for developing and disseminating digital content for educational purposes need to be harnessed into an entity that is a living repository of knowledge, tools and enablers. This can not only provide quality education to a billion minds but also excite creativity and innovation, by catalysing a population into attaining its true potential.

To realize this, the Ministry of Education launched a Mission titled 'National Mission on Education through Information and Communication Technology (NMEICT) in February 2009 with a budgetary allocation of Rs. 4612 crores for five years, envisaged as a Centrally Sponsored Scheme to leverage the potential of ICT in the teaching and learning process for the benefit of learners in Higher Educational Institutions in any-time any-where mode.

Under the Mission, a proper balance between generation of content, research in critical areas relating to imparting of education and connectivity for integrating our knowledge with global advancements has been attempted. There are three guiding philosophies of the mission:

- No talent of the country should be allowed to go waste
- All services available through the content delivery portal Sakshat should be free and.
- Freely available online material to be utilized to avoid reinventing the wheel.

The mission redefines the educational trajectory of India with various initiatives taken up by the Government of India to realize a larger vision. Two such initiatives are SWAYAM and E-Shodh Sindhu (ESS) and along with NMEICT are together referred to as 'NMEICT plus 2' and may be conceived as different parts of a whole with discussions on SWAYAM and ESS included in the present report. The overarching vision of NMEICT plus 2 is for the democratization of education and dissemination of knowledge among the wider base of population by effectively using advancements in ICT.

The schemes under the scope of assessment are:

National Mission on Education through ICT (NMEICT)

E-Yantra · NDL · Spoken Tutorial · FOSSE · PDS · Virtual Lab · IRINS · Samarth · BAADAL

SWAYAM

SWAYAM · SWAYAM Prabha

E-Shodh Sindhu (ESS)

E-Shodh Sindhu

As part of the scope, the evaluation team studied the each of the projects in their entirety, including vesting project sites to assess the following parameters:

- Technical efficiency of the project
- Financial outlay (excluding fund utilization data)
- Functional efficiency
- Public outreach

Individual projects were evaluated based on available data and input from consultative meetings with relevant stakeholders, individual project investigators & teams. Here, the area of education technology refers to the projects where application of technology is primarily in the domain of education or pedagogy.

Emerging technology refers to a broader area where the application of technology can be widened to other areas as well. Many of the projects within emerging technology category have the potential of carrying it from lab to land. The evaluation was carried out at the functional level, while the consumption at use end was evaluated based on the database inputs.

A. Our Approach

- Evaluate individual projects by reviewing current information including project framework, features, implementation and overall awareness.
- Conduct an analysis at the implementation level to determine how the project has taken shape.
- Provide recommendations with respect to how the project can be continued in the future.
- Submittal of a draft Evaluation Report based on the study to the Ministry of Education,
- Data collection from PI of all projects and revised report submitted to Ministry of Education.
- Collect user feedback.
- Submission of final report with recommendations.

B. Methodology

- Consultation Kick-off meeting with Ministry of Education officials & stakeholders.
- Review available project information with regards to objectives, scope, features, finances & geographical distribution etc.
- Visit specific locations to meet with designated Project Investigators (PI) & their teams.
- Consolidate observations & draft report.
- Collect data from PI and include sections on data analysis
- In order to collect the user feedback, a questionnaire was designed, containing not more than 9 questions.
- A 5-point Likert scale was used, with options ranging from 'Strongly Disagree' to 'Strongly Agree,' with the middle point representing a neutral opinion.
- Users were also given an option to provide additional feedback.
- Submission of Final Evaluation Report to Ministry of Education.

C. Limitations of the Assessment

Broad assessment of information related to the projects with respect to funds used and efficiency of the scheme is limited to the budget data and the funds disbursed for the project.

The data related to utilization of funds is made available for the study by PI and is assumed to be accurate for the project.

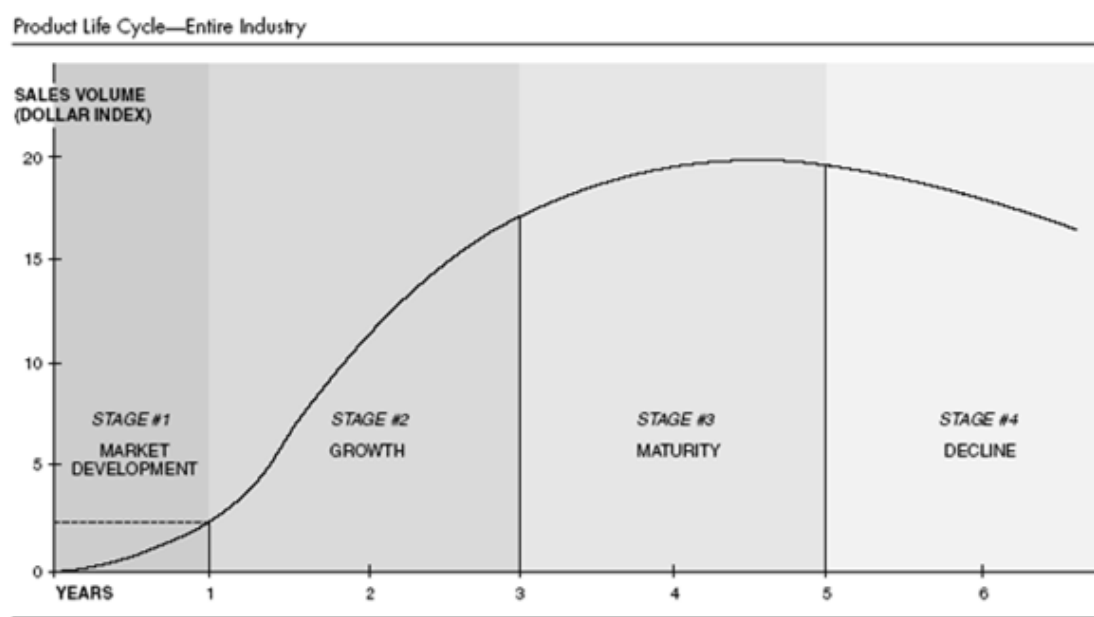
IV. OVERALL STRATEGIC RECOMMENDATION

Based on the high-level assessment of the macroeconomic environment, the industry and the technical capability level analysis, the strengths and weaknesses were identified for each initiative under NMEICT, and the external opportunities and threats were listed.

The participating institutes are at the forefront of development of new technology & innovation and play critical role in the economic transformation through new foundational & disruptive technologies. However, they seem to have limited expertise in other business areas that are critical for a sustained scalability and value discovery & creation.

While it is crucial to move the initiatives from the research stage to the market development/introduction, it is also important to build a framework that would also ensure interweaving of the various initiatives at strategic level to leverage strengths of each other.

From a strategic perspective, NISG would recommend that Ministry of Education creates one or more special purpose vehicle (SPVs) through public private participation with the government holding 49% equity in the SPV(s). The SPV(s) would operate like IT product companies under the strategic guidance from Ministry of Education



The geographic scope of the various initiatives should be expanded to developing nations such as African countries.

V. SUMMARY OF RECOMMENDATIONS

While each project is reviewed and recommendations for each project is placed under separate chapters, the summary of recommendations is placed below.

A. Project - Virtual Labs

- It is recommended to align the VL experiments with the curriculum at the institutions to drive adoption. VL based experiment labs should be acceptable by UGC, AICTE, NABET, etc.
- To improve student experience, VL to move to 3D framework for most experiments – this would also enable use of VL in medical education e.g. dissection of a virtual cadaver for the anatomy classes
- Migrate to a Virtual Lab 2D/3D platform (open source or commercial but with an open architecture) to mitigate the risks of technology obsolescence.
- There is a huge gap between funds allocated and released (only ~30%). the data related to fund utilization to be correlated with the allocated and released fund data to enable timely decision.

B. Project - BAADAL

- This project infrastructure is nearing obsolescence. To enable BAADAL to continue its offer of services, Hardware refresh is recommended alongwith requisite software licenses & support.
- If GoI intends to utilize BAADAL for offer of services towards education and research, the technical support base (inclusive of manpower) will require continuous funding.

C. Project - Samarth

- Institutionalization of Samarth is required where key ministries like MEITY, Ministry of Education & Department of Science & Technology are part of the institutionalization effort to leverage synergies in deployment.
- Identify select system integrators at local level with focus on education sector and build partnerships to increase capacity to implement Samarth at Educational Institutions.
- Invest into a standardized implementation methodology to ensure successful deployment at sites (universities/educational institutions)

D. Project - E-Yantra

- The established e-Yantra labs from a college to work as a Nodal Centre, to mentor local engineering colleges and consider offering the e-Yantra Internship program in a de-centralized manner.
- The existing format of e-Yantra robotics competition and the e-Yantra Ideas Competition is an annual affair. To promote innovation and give boost to entrepreneurship, the e-Yantra Lab Setup Initiative should be activated to build solutions to real world problems and work on larger themes such as health, education, agriculture, defence etc. Instead of a time-bound event for competition, the ecosystem should be made open to allow innovative solutions and be awarded with a decent prize money, if selected for production. In the current scenario of COVID-19, expertise from network of e-YLSI colleges can be drawn to build low-cost ventilators, patient-care robots, telemedicine applications, robot scrubbers/cleaners in managing public health and infectious diseases.

E. Project - Free and Open Source Software for Education

- Active involvement of faculty be encouraged for research and development of tools and software in education on FLOSS platform.

- Incubation labs should be setup for evaluation of solutions that can be widely used for the purpose of education.
- Basis the fund utilization and need to promote FOSSEE based product development, build an institutional mechanism to scale the use of successful software solutions across educational institutions for benefit realization in the long run.

F. Project - Spoken Tutorial

- It is recommended to build & expand collaboration with the future skills partners like NASSCOM and working/retired professionals, research scholars, developers to be part of the industry driven learning eco-system.
- Maintain the quality of tutorials by having frequent reviews of content while parallel developing new content. It should be such that audiences are able to rank spoken tutorials on par with the best courses being offered.
- Mapping and integration of FOSS and Spoken Tutorial into course curricular subjects
- Need for separate infrastructure & budget for centrally funded institutions to setup separate labs for Spoken Tutorials as usually the existing syllabi are oriented towards the proprietary software

G. National Digital Library

- NDLI infrastructure is reaching end-of-life and will need additional investment. It is recommended that this must be taken care/invested every 4 years. PI is recommended to write to Ministry of Education giving all the details on the current infrastructure, how it will be dispositioned and what would be needed in its place, latest date by which it would be needed to continue the show without any interruptions and how much it would cost.
- It is recommended to make available regularly used text and reference books and learning contents for school and under-graduate students free through NDLI by national licensing of these contents

H. Indian Research Network Information Systems

- It is observed that there is a good number of requests for IRINS coming from non CFTI & CFU institutes. On this basis, it is recommended that calendar based promotional schedule be developed for other schools and get them on board in a phased & orderly manner.

- It is recommended that promotional activities and material be made available in selected regional languages. This helps make targeted users more comfortable with getting to know the system, since English may be difficult to fully embrace & grasp.
- IRINS does not currently offer itself in a language other than English. To fully realize the potential of this initiative, it is recommended that a pilot project for a selected regional language (Hindi for example) be introduced to users

I. Plagiarism Detection Software

- It is recommended that individual orientation programs be conducted at centrally funded technical institutes (CFTI's) to create awareness & ensure total implementation of plagiarism detection software. Since CFTI's form the bulk of quality education imparted nationwide, it is important for them to fully embrace PDS and set an example for less developed institutes.
- It is recommended that registration for this service be linked with usage statistics in order to ensure usage i.e. a mandatory number of papers need to be submitted in a time period with subscription being rescinded if not complied with.
- Current PDS system does not allow for regional language documents to be validated. It is recommended that data representing potential regional research papers be collected so that a like for like comparison option can be visualized for the future based on demand.

J. Project - E-Shodh Sindhu

- Ministry of Education should critically discuss the business model and analyze the revenue model of Researchgate.net (16 million scientists) and Academia.edu (120,688,116 Academics and Researchers) that have successfully built research resources
- E-Shodh Sindhu access be made available in each of the Centrally Aided Universities' library for their research scholars. Private institutes should also be encouraged to subscribe to E-Shodh Sindhu
- For research initiatives funded by the government, a percent of the funding could be made subject to uploading of the final version of the research paper on ESS
- Users have requested for more data bases like Science Direct, SciFinder, etc. to be added.
- Some users have suggested for a mobile application of ESS to be made available.

K. Project - Swayam

- Swayam as a program has outgrown the team deployed to manage and run it. A dedicated Program Management Office (PMO) under NMEICT be setup to manage day-to-day operations, support course offerings and aid the decision-takers in timely manner.

- Data suggests that most users log onto Swayam to support their learnings while in school or college. Hence there is a limited impact of Swayam in employment generation. We suggest the following to increase the impact of Swayam and improve employability in India:
 - Align and restructure the online courses to lead to a diploma in various streams such as management or offer certificate courses in IT like courses offered by institutions such as NIIT
 - Combine virtual labs and Swayam courses to package a e-Diploma in certain engineering streams like electrical or electronics
 - Recognize certificates/diploma issued through Swayam for permanent or temporary jobs in central & state governments
 - Projects like Spoken Tutorial, Virtual Lab, FOSSE etc., should connect with industry leaders like NASSCOM, CII, Ministry of Skill Development, MSME and enable a platform to promote skilled/certified users to venture for suitable jobs.
- Swayam to focus on delivery pedagogy and develop capabilities in gamification and simulation-based e-learning. In addition, verbal & non-verbal communication and facilitation skills of the professors needs to be evaluated and improved.

L. Project - Swayam Prabha

- A few suggestions that could increase the impact of Swayam Prabha:
 - Translation & Subtitles: While the channels are available in English & to some extent in other languages, technology initiatives from NPTEL be leveraged for the Swayam Prabha to enable machine aided translation to be available for the content being broadcast.
 - The remote universities, colleges and higher education schools could download the video content on the set-top box. The professors & teachers could use the downloaded content to supplement their classroom teaching. In addition, given the quality of the knowledge, their professors and teachers could also use this for self-improvement.
 - The downloaded content can be made available to students post normal hours as refresher sessions
- Ministry of Education to identify business models under specific project like the ESS, PDS, SWAYAM etc., where monetization and self-sustainability can be made feasible.

PROJECT REVIEWS & RECOMMENDATIONS

A. PROJECT- VIRTUAL LABS

The vision of the Virtual Labs project is to develop a fully interactive simulation environment to perform experiments, collect data, and answer questions to assess the understanding of the knowledge acquired. In order to achieve the objectives of such an ambitious project, it is essential to develop virtual laboratories with state-of-the-art computer simulation technology to create real world environments and problem handling capabilities.

Project Coordinator - Prof. Ranjan Bose

Project Implementer - IIT, Delhi

Participating Institutions - IIT Bombay, IIT-Kharagpur, IIT Roorkee, IIT-Guwahati, IIT Kanpur, IIIT Hyderabad, IIT Madras, COE Pune, NIT Karnataka, Dayalbagh Educational Institutes & Amrita Vishwavidyapeetam

Operating Location - Wireless Research Lab, Room No - 206/IIA, Bharti School of Telecom, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

OBJECTIVES OF THE PROJECT

- 1.To provide remote access to labs in various disciplines of science and engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.
- 2.To enthuse students to conduct experiments by the arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- 3.To provide a complete learning management system around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self-evaluation.
- 4.To enable sharing of costly equipment and resources, which are otherwise available to a limited number of users due to constraints on time and geographical distances.
- 5.Bridge the digital divide between urban and rural teachers and learners, and empower those who have remained untouched by the digital revolution.

KEY FEATURES

- State-of-the-art laboratory facilities remotely accessible to all science and engineering institutions across the country.

- The project can facilitate experiments in 97 fields across nine disciplines of science and engineering including electronics and communications, civil engineering, computer science, engineering, biotechnology and biomedical engineering.
- Aspiring students can visit the lab of their choice and study at any time convenient to them while having access to supporting material like lecture notes, previous exams and study materials.
- Additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment are available.
- Graduate and undergraduate college and university students can perform required laboratory experiments using only the World Wide Web, a standard computer, and an Internet connection.

FINANCIAL SUMMARY OF VIRTUAL LAB

All amount in Cr.

Financial Year	Approved Budget	Sanction Date	Fund Released
2017-18	3.0	24.01.2018	1.5
		28.02.2018	1.5
		0	0
2018-19	4.5	0	0
2019-20	7.5	28.08.2019	1.875
		19.03.2020	1.875
		0	0
Total	15.0		6.75

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Usage and outreach are scaling with near 35 lacs lab experiments having been conducted as of April 2019
- Availability of virtual labs on open medium through internet with 24x7 availability
- Ease of access across multiple devices
- Inherent knowledge of the domain/experiments is available with the participating institutions

WEAKNESSES

- Lack of a mechanism to institutionalize the virtual labs
- Number of experiments covered are very low
- 30% of users feel that virtual lab is more difficult to perform than a real lab
- Other branches of sciences like medicine are not in scope of the virtual experiments
- The virtual lab experiments are not included in the regular curriculum of regular colleges/schools & universities
- Users (~10% or more) are not happy with "accuracy of the result" and "virtual lab experiments meeting expectations"
- Many labs are still under the beta version

OPPORTUNITIES

- The digital native population (up to K12) of the country will adopt virtual labs faster
- Fixed & variable infrastructure cost and other conflicting human rights. (Example: Cadaver requirement at private colleges can be addressed with virtual dissection experiments)
- Improved connectivity across urban & rural sector

THREATS

- Technology obsolescence and impact on long term support
- Emergence of private sector platforms offering 2D & 3D Virtual lab capabilities in future

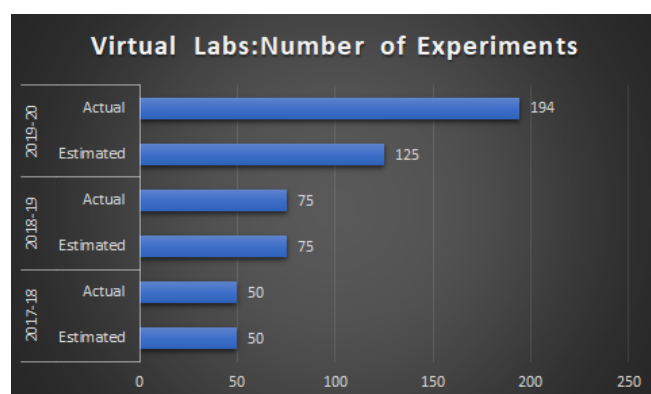
DATA ANALYSIS

Virtual labs provide a complete learning management system where students can use various tools for learning including use of sophisticated equipment in addition to web resources, video lectures, animated demonstrations and self evaluation. The note from Standing Finance Committee mentions that the costs were estimated considering the target to develop 250 new virtual labs for engineering and science education which can be used for teaching anywhere in the country, especially in the institutions without adequate lab facilities @ Rs. 5 to 10 lakhs per lab. However the data received from IIT-Delhi assumes base line for Virtual Labs in terms of 'number of experiments' and not in terms of 'number of labs'. Hence, for the analysis mentioned in this report, we are considering the 'number of experiments' as the unit of measurement.

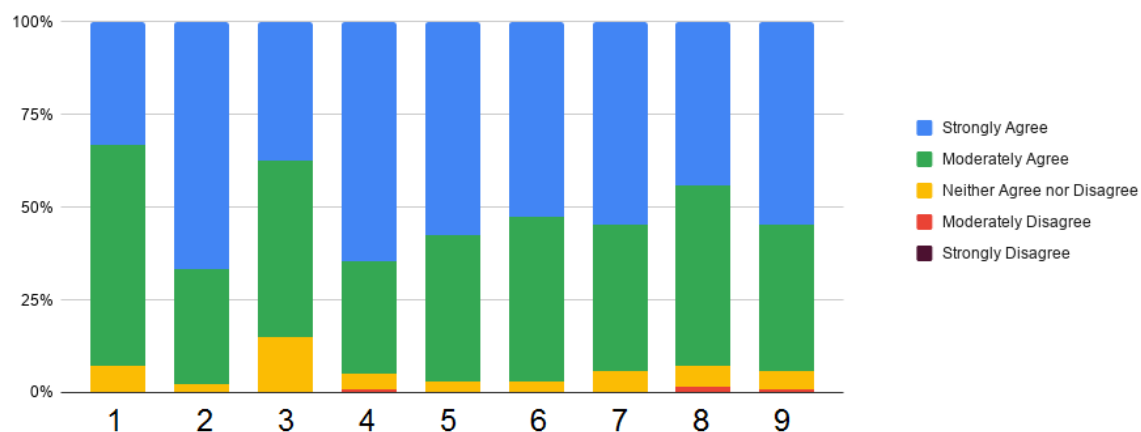
Virtual Labs Data						
Financial Year	Physical		Financial (amount in crores)			
	Estimated No. of Experiments	Actual Number of Experiments	Non-Recurring		Recurring	
			Estimated Cost	Actual Cost	Estimated Cost	Actual Cost
2017-18	50	50	-	-	₹3	₹3
2018-19	75	75	-	-	₹4.5	₹1.875
2019-20	125	194	-	-	₹7.5	₹1.875

NUMBER OF EXPERIMENTS

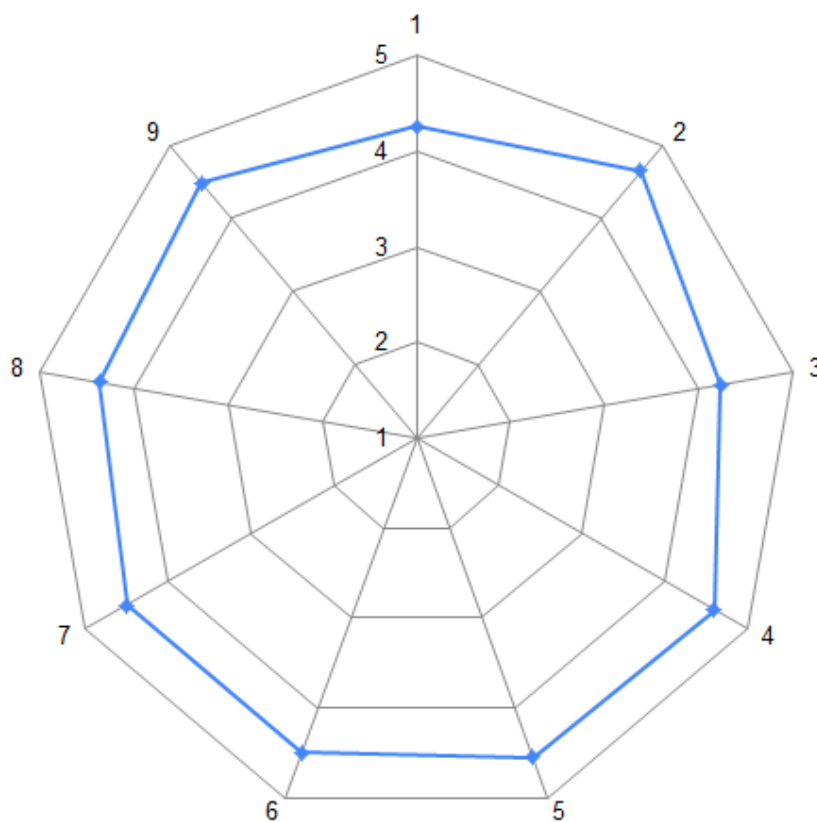
In the year 2017-18, the number of actual experiments conducted converge with the number of estimated number of experiments. The trend continued in the year 2018-19 also after which the year 2019-20 saw a sharp increase in actual experiments. The actual number of experiments conducted in this year were 55% greater than the estimated number of experiments for the year. This indicates a positive growth in the degree of execution of the initiative since 2017.



Virtual Labs



S.No	Question	Strongly Disagree	Moderately Disagree	Neither Disagree, nor Agree	Moderately Agree	Strongly Agree
1	The Virtual Lab experience was similar to that of a real lab	0%	0%	7.10%	59.60%	33.30%
2	The Virtual Labs interface was easy to use	0%	0%	2.10%	31.20%	66.70%
3	Virtual Labs has sufficient amount of experiments to perform	0%	0%	14.90%	47.50%	37.60%
4	It is easy to learn on Virtual Labs.	0%	1%	4.30%	30.50%	64.50%
5	The required study material is available in the Virtual Labs	0%	0%	2.80%	39.70%	57.40%
6	The results generated in Virtual Labs via experiments is acceptable	0%	0%	2.80%	44.70%	52.50%
7	I feel excited to conduct experiments on Virtual Labs	0%	0%	5.70%	39.70%	54.60%
8	My area of interest is available on Virtual Labs	0%	1.40%	5.70%	48.90%	44.00%
9	The server responsiveness of Virtual Labs is satisfactory	0%	0.70%	5.00%	39.70%	54.60%

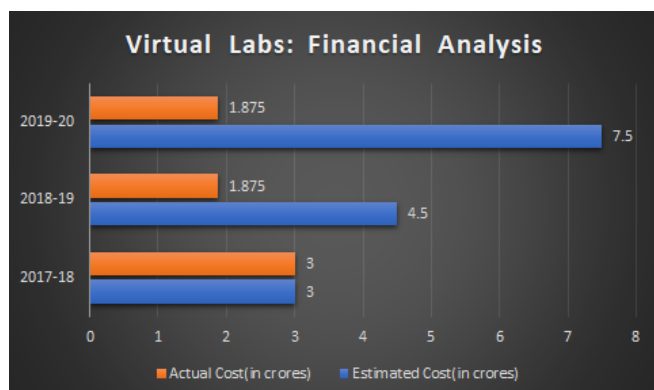


Virtual Labs - Radar Chart

USER COMMENTS & TESTIMONIALS

- "Virtual Labs helped a lot in this Covid -19 Pandemic situation. This alternate is now become the necessity of the today's time."
- "Virtual Lab is providing excellent learning experience."
- "Best platform because of no restrictions of time."
- "Flexible access and repeatability of the exercises."
- "It is very easy to use. No boundaries for performing experiment."
- "Virtual labs experiments are really interesting and easy to learn."
- "It is the great environment of anytime anywhere lab. During the COVID-19 pandemic Virtual Labs offered the great help toward teaching learning."

FINANCIAL ANALYSIS



In the year 2017-18, the actual cost incurred was equal to the cost that was estimated. The actual and estimated number of experiments also converged for this period. For the year 2018-19, though the actual and estimated number of experiments converged, the actual cost incurred was 58.3% less than the estimated cost for same number of experiments. The reduced cost per experiment continued in the year 2019-20.

Though the number of experiments conducted in the year 2019-20 were 55% greater than the estimated value, the cost incurred was actually 75% less than the estimated value. This reduction in cost even after conducting greater number of experiments points at the below possibility.

The new experiments conducted might have used the existing labs only which didn't need any new investment in establishing the labs, leading to reduction in cost incurred. The recommendations on this analysis are mentioned below.

PROJECT RECOMMENDATIONS

1. VL concept should be extended to experiments in the curriculum till K12. The digital natives will be fast adopters and provide learnings that could be implemented for college curriculum as well.
2. VL should be deployed in a hierarchical architecture, one instance on a MeitY empanelled cloud service provider and 2nd level instances at zone/university/college or school level to increase geographic coverage and address last mile connectivity issues. Level 2 to sync with level 1 instance periodically.
3. It is recommended to align the VL experiments with the curriculum at the institutions to drive adoption. VL based experiment labs should be acceptable by UGC, AICTE, NABET, etc.
4. Migrate to a COTS platform (open source or commercial but with an open architecture) to mitigate the risks of technology obsolescence.
5. To improve student experience, VL to move to 3D framework for most experiments – this would also enable use of VL in medical education e.g. dissection of a virtual cadaver for the anatomy classes.
6. VL may be considered for offering to end-users from BAADAL facility.

B. PROJECT - BAADAL

Baadal is a cloud orchestration and virtualization management software developed at IITD that can work with multiple virtualization technologies like KVM, Xen and VmWare. This was initiated by Ministry of Education for academic purposes – for hosting and research needs; developed and maintained by IIT Delhi. It is an open source academic cloud with prime focus to provide Infrastructure as a service to various central organizations across the country. It ensures optimum utilization of the infrastructure and speeds up the development and deployment of e-Gov applications for academic needs.

Project Coordinator - Prof. Huzur Sharan

Project Implementer - IIT, Delhi

Participating Institutions – IIT-Delhi

Operating Location – IIT-Delhi, Hosted on NICSI & operated

OBJECTIVES OF THE PROJECT

1. Setup of Cloud based Services at NIC Data Centers
2. Develop a framework for managing cloud services in a scalable manner
3. Extend the framework and formulate a general prototype academic cloud solution.

KEY FEATURES

- Dynamic resource scheduling and power management.
- Integrated workflow system for request and commissioning of virtual machines.
- Facilities for suspend, resume, shutdown, power off, power on and specifying resource requirement of virtual machines.
- Dynamic resource utilization monitoring with Integrated Dashboard for Seamless Management.
- Secure infrastructure.
- Robust Fault Tolerance.
- Administrative Console for each Organization.
- Comfort of multi-tenant implementation
- Enables different organizations to remain isolated from each other against
- Network and Security intrusions
- Simple workflow that supports multiple levels of approval & ensures optimum resource utilization.

Baadal has been developed by Abhishek Gupta, Jatin Kumar and Daniel J Mathew under the supervision of Sorav Bansal, Subhashis Banerjee, Huzur Saran and the CSC cloud team, IIT Delhi.

FINANCIAL SUMMARY

(all amounts are in Rs. Lacs)

Financial Year	Approved budget	Sanction date	Fund released
2017-18	₹ 300	24.01.2018	₹ 150
		28.02.2018	₹ 150
		Total	₹ 300
2018-19	₹ 450		₹ 0
2019-20	₹ 750		₹ 0
	₹ 1500	28.08.2019	₹ 187.50
	Total amount released till date		₹ 487.50

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Successful pilot of Infrastructure as a Service (IaaS) – virtual servers
- A few active workloads running on Baadal

WEAKNESSES

- Only limited & predefined configurations are available
- Only supports Ubuntu & Windows OS
- Hardware reaching obsolescence
- SLAs are unclear
- Infrastructure security & redundancies in the infrastructure are unclear
- Compliances to global & industry standards are unclear

OPPORTUNITIES

- Numerous e-governance initiatives across various ministries and states

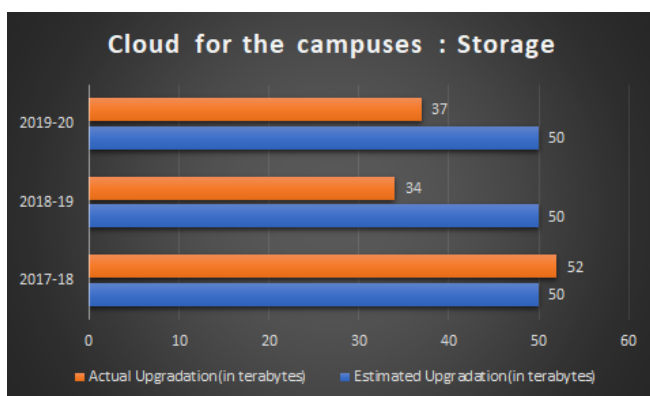
THREATS

- Advanced and AI enabled IaaS offerings from the private sector – AWS EC2, Azure, etc.
- IaaS as a service is almost a commodity with customers service as a differentiator

DATA ANALYSIS

Baadal ensures optimum utilization of the infrastructure and speeds up the development and deployment of eGov applications for academic needs. Thus, in the note by Standing Finance Committee, an increment of 50 TB each year was envisioned for the storage capacity of cloud services at IIT Delhi, aiming to serve all the campuses for their IT related activities.

Baadal Data						
Financial Year	Physical		Financial (amount in Rs. Lacs)			
	Estimated increment in storage (in TB)	Actual increment in storage (in TB)	Non-Recurring		Recurring	
			Estimated Cost	Actual Cost	Estimated Cost	Actual Cost
2017-18	50	52	₹500	₹1.1328	0	₹26.8974
2018-19	50	34	₹500	0	0	₹15.1595
2019-20	50	37	₹500	₹1.31005	0	₹20.0588

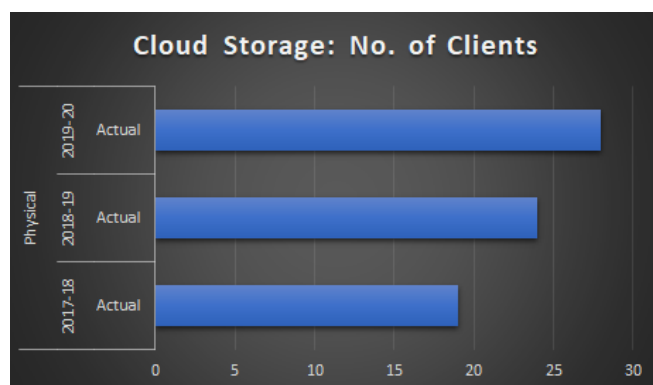


STORAGE UPGRADATION

In the year 2017-18, an up-gradation of cloud storage by 52 TB was achieved, surpassing the estimated value of 50 TB. However, in the year 2018-19, an up-gradation of 34 TB, which is less than the estimated value, was achieved. In the last year 2019-20 the storage was increased by 37 TB. Thus, in the period 2017-2020, an up-gradation of 123 TB against the estimated value of 150 TB has been achieved.

NUMBER OF CLIENTS

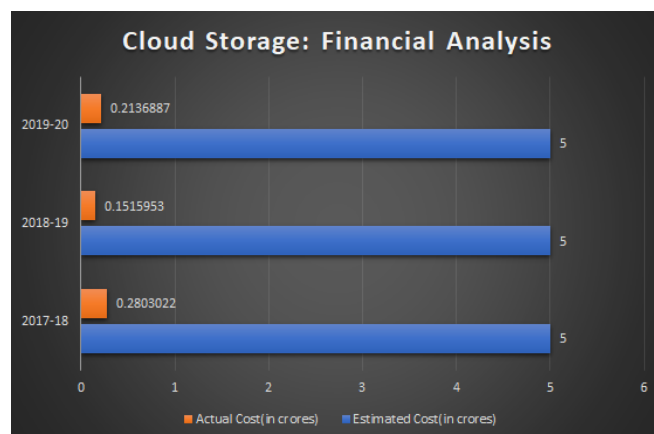
In the year 2017-18, the number of institutions served by cloud services were 19. The number rose to 24 in the year 2018-19 and the trend was followed in the next year when the total number of clients increased to 28. Thus, there has been a healthy increase in the reach of the project. However, looking at the large number of government and semi-government institutes with infrastructure needs, the increase of 47% in the number of clients in the period of 2017-2020 is less.



FINANCIAL ANALYSIS

Since the estimated costs were not received in the data received from IIT-Delhi, the estimated costs as mentioned in SFC report have been used for this analysis. In the year 2017-18, even though the storage was updated to an amount greater than the expected amount, the actual cost incurred was approximately 5.6% of the estimated cost. In the year 2018-19, the cost incurred was again 3.0% of the estimated cost, however, the storage expansion was just 68% of the estimated value. Similarly, in the year 2019-20 the cost incurred was 4.3% of the estimated value, which was attributed to a storage expansion of 74% of the estimated value.

Though the storage expansion achieved is 82% of the estimated expansion, the up-gradation has been achieved at just 4.3% of the estimated cost. This points out at the low-cost of the project implementation in practical situation. Hence, we make the below recommendations for the project.



PROJECT RECOMMENDATIONS

1. Although advances in IAAS infra and various mature offering from private sector are available at competitive prices, research level offering needs funding from Government. Accordingly, BAADAL infra may be upgraded or refreshed. The supporting software licences if any, will need commensurate upgradation.
2. Should be offered to other Ministries / educational institutions, as development or test infrastructure apart from being used as infrastructure for Proof of Concepts (PoCs) for Government Projects.
3. To enable BAADAL to continue its offer of services, Hardware refresh is recommended alongwith requisite software licenses & support.

C. PROJECT - SAMARTH

Project Samarth is an Open Source, Open Standard (enabled) Robust, Secure, Scalable and Evolutionary Process Automation Engine for Universities and Higher Education Institutions, an ERP which caters to faculty, students and staff at a university. This project has taken care to include all the key stakeholders as part of the project scope.

Project Coordinator - Prof. Dr. Sanjiv Singh

Project Implementer – Institute of Informatics & Communication, Delhi University

Participating Institutions – Delhi University

Operating Location – Delhi University

OBJECTIVES OF THE PROJECT

1. Develop and maintain consistent data definitions.
2. Increase data Security, Integrity, Validity and Reliability.
3. Assure system-wide security and protection of confidential information.
4. Seamless integration between technology and education delivery by providing a Single Platform based on New Technologies and Open Standards.
5. Access Control/ role-based access to data in real time to all stakeholders.
6. Provide Students user friendly and administrative support services.
7. Reduce the need for back-up or shadow systems.
8. A platform suitable for Process Reengineering and Continuous Improvement.
9. The final goal is to have a 100% Automation Engine for University of Delhi and 40 Central Universities, for all its stakeholders.

KEY FEATURES

- This ERP system which is being developed is based on Open Standard Open Source Architecture as per government's policy.
- Driven by UGC policy, Online Recruitment System has been offered as a turnkey solution to 20 Central Universities (CUs) and 1 state university aligned with 100 Days Campaign to fill the vacant posts at Universities. More CUs are being on boarded now.
- Admissions (Direct/Entrance) have been automated for CU in Jammu, CU in Tamil Nadu and IGNOU.
- CU staff is being trained on using web-based automation systems aimed at standardizing operative procedures.
- Development of multimedia rich knowledge base and training modules based on live training sessions and interactions with diverse teams of different CUs.
- Single dashboard for Ministry of Education to tracking and monitoring project implementation and outreach.
- The Complete system is expected to be offered to other universities/institutes in a SaaS (Software as a Service) model
- The major functionalities in the Samarth system mentioned below will be made available in 3 phases:

STUDENT SERVICES	ACADEMICS	ADMINISTRATATION	ESTABLISHMENT
Student Lifecycle Grievance Management Alumni Portal Training and Placement	Programme Management Academic Management Evaluation and Grading	File Management and Tracking System Research Project Management System Affiliation Management Content Federation System (CFS) Endowment Portal	Estate Management System Inventory Management System
HUMAN RESOURCES	ACCOUNTS & FINANCE	KNOWLEDGE MGMT.	GOVERNANCE
Recruitment System Employee Management Leave Management Residence Allocation Management	Fee Management Payroll Management Budget and Accounts Procurement of Goods Bill Tracking System	Research Management Knowledge Management ToT Management	RTI Management Legal Case Management System Central Data Unit University Web Portal Third-Party University Ranking Systems Minutes Archive & Retrieval System

FINANCIAL SUMMARY

(all amounts are in Rs. Lacs)

SAMARTH - University of Delhi South Campus (File Number: 8-4/2018-TEL)			
Financial Year		Sanction date	Fund released
2017-18	NIL	NIL	
2018-19	₹ 117	20.03.2019	₹ 117
		Total	₹ 117
2019-20	NIL	06.05.2019	₹ 587
		28.11.2019	₹ 267.12
		Total	₹ 854.12
Total amount released till date			₹ 971.12

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Ease of use of the ERP system that helps drive user adoption
- Most of the processes of an educational institution is part of the process coverage
- Modular approach
- Highly scalable to manage workloads (even in lakhs) – but benchmark report not available
- Built in business intelligence within Samarth

WEAKNESSES

- Project delay with limited success on admissions and recruitment module
- IT Policy compliance and adherence to security architecture is not formalized
- Implementation methodology does not adhere to best practices and doesn't encompass all possible scenarios
- Non availability of capacity to Implementation the solution on ground (example: if an education institution prefers to implement Samarth, the institutions must depend solely on DU team for the same)
- Capacity building (training material) yet to be made available
- Concerns by Indian institutions on the "Best Practices" embedded in an ERP system
- No case studies of successful implementations
- Limited integration capabilities of the current version of Samarth
- Information security compliance for Samarth on a SaaS model is unverified

OPPORTUNITIES

- Education ERP expected to grow three-fold by 2028 (Persistence Market research 2018) with India expected at 15% annual growth.
- ERP implementations across central institutions in India have had mixed successes with ERP implementations
- Scalability (No of students), cost optimization and data analytics to be the key drivers for success of education institutions

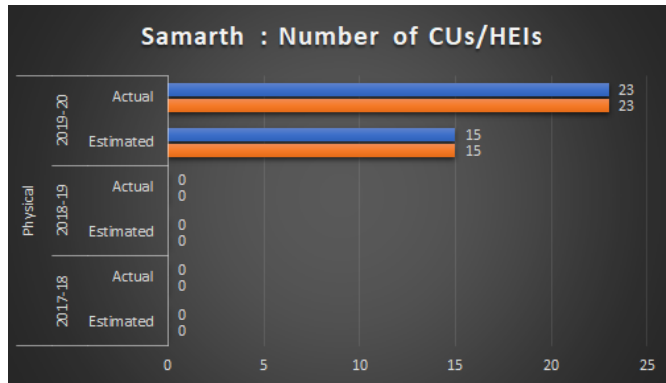
THREATS

- Competition from other college and school management systems
- Technology obsolescence

DATA ANALYSIS

The final goal of Project Samarth is to have a 100% automation engine for University of Delhi. Thus, one of the important parameters to measure the outcome of the project will be the number of institutions that have implemented Samarth.

Samarth Data						
Financial Year	Physical		Financial (amount in Rs. Lacs)			
	Estimated no. of CUs / HEIs	Actual no. of CUs / HEIs	Non-Recurring		Recurring	
			Estimated Cost	Actual Cost	Estimated Cost	Actual Cost
2017-18	0	0	-	-	-	-
2018-19	0	0	-	-	₹117.4	₹117
2019-20	15	23	₹587	₹587	₹356.16	₹356.56

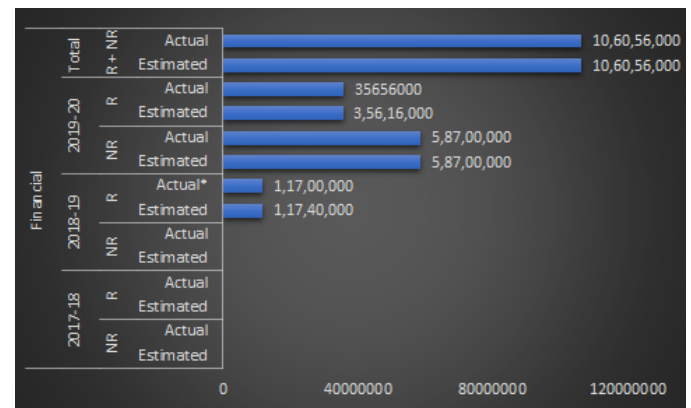


NUMBER OF INSTITUTES

As per the data received from the Delhi University, Samarth has been implemented in 22 Central Universities and 1 National Institute of Technology. The estimated number of institutes to implement the project was 15. Thus, the project has shown a commendable reach, surpassing the targeted reach.

FINANCIAL ANALYSIS

In the year 2018-19, there were no non-recurring expenses and the actual recurring expenses have converged with the values estimated for the same. For the year 2019-20, the non-recurring and the recurring expenses were approximately equal to the values estimated for the same. Thus, financially the project has been run as estimated.



The analysis done above has been used to make the following recommendations.

PROJECT RECOMMENDATIONS

1. We recommend Ministry of Education to form a core process team comprising of subject matter experts, internal and external stakeholders, to review the process scope and incorporate global best practices in Samarth.
2. Samarth should be benchmarked against leading college and campus management software solutions and should also incorporate collaborations tools that enable virtual classrooms and knowledge management.
3. Compliance to open APIs, SaaS compliances and data security need to be strengthened
4. Institutionalization of Samarth is required where key ministries like MEITY, Ministry of Education & Department of Science & Technology are part of the institutionalization effort.
5. Identify select system integrators with focus on education sector and build partnerships to increase capacity to implement Samarth at Educational Institutions
6. Conduct workshops / seminars with institutions that had already implement any ERP system to share their learnings that can be included in Samarth (in phases)
7. Samarth should better understand change management issues in driving adoption and possibly limit functionality to non-financial processes with integration to reputed “financial systems” being used in India.
8. An automated Decision Support System (DSS) for Ministry of Education and regulatory bodies, including core analytics and report generation in view of the time to time requirements of Ministry of Education. “Samarth Portal” shall eventually become the gateway to Ministry of Education policy, schemes and benefits. At the same time, it will be the single interface for the universities to provide any information or report as required by the Ministry or regulatory bodies. This will help seamless aggregation of present and future information and policy preparation would take lesser time. Ministry of Education Grants, projects and schemes to all CUs may be launched and monitored and managed through Samarth.
9. Invest into a standardized implementation methodology to ensure successful deployment at sites (universities/educational institutions)
10. Launching initiatives such as “Smart Institutes” could drive adoption of Samarth

D. PROJECT - E-YANTRA

Engineering schools currently offer courses on embedded systems and robotics in the 3rd and 4th year across many disciplines including computer science, electronics, information technology & mechanical engineering. These courses being mostly theory-oriented do not however encourage a practical approach i.e. being hands-on.

Project Coordinator – Prof Kavi Arya

Project Implementer – IIT Bombay

Participating Institutions – All technical education institutes, colleges

Operating Location – IIT Bombay

OBJECTIVES OF THE PROJECT

1. Develop a scalable and sustainable embedded systems MOOC that helps create next generation of engineers armed with hands on experience and the ability to develop practical solutions to real world problems.
2. Create an ecosystem that includes teachers who can mentor students interested in robotics and embedded systems as well as provide lab infrastructure where aspiring engineers can execute projects.
3. Provide resources - robot, accessories, and a project - by way of a competition that is accessible to participants from the remotest parts of India.
4. Encourage Project Based Learning (PBL) approach that involves training students, providing those with a project implementation platform and digitally imparting knowledge through distance learning.
5. Bridge the gap in engineering education and bring up the quality of engineers graduating from second and third tier engineering colleges

KEY FEATURES

- Competitive Project Based Learning (PBL) methodology that encourages participants to learn & compete, while promulgating a practical approach to engineering education to students across the country.
- Includes inter-related initiatives that target students, faculty & institutions to train & create awareness in embedded systems and robotics, while promoting robot enhanced education in undergraduate engineering colleges.
- Other initiatives include:
 1. Robotics competition
 2. Summer training camps
 3. E Yantra Lab setup initiative
 4. Ideas competition
 5. Symposium

FINANCIAL SUMMARY OF E- Yantra

All amount in Cr.

Financial Year	Approved Budget	Sanction Date	Fund Released
2017-18	6.0	30.12.2017	6.0
2018-19	9.0	NIL	0
2019-20	15.0	18.06.2019	3.0817
		28.02.2020	3.5
		0	
Total	30.0		12.6

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Reach to every college – more than 500
- Opportunity for any student who has interest and its completely free for students
- Ability to assess and access proposals
- Led by students – supported by the colleges
- Since inception till last year there are 370+ e-YLSI labs that have been established and another 125+ labs in pipeline out of total 10,000+ engineering colleges in India

WEAKNESSES

- Dissemination is weak for e-YLSI; scalability and sustainability for outreach to colleges and participating institutes is yet to achieve peak levels
- Staff Strength at e-YANTRA group is low. (needs enhancement)
- Need for continuous evaluation for effective use of robotics lab infrastructure and embedded systems of institutions to execute projects which are currently being addressed through the e-Yantra Symposium.
- Availability of limited hardware, robotic kits in e-YRC; due to their associated costs that need to be provided to teams

OPPORTUNITIES

- Expand to higher secondary and schools at under 18 years category
- Digital native student's interest in robotics
- Make in India initiative

THREATS

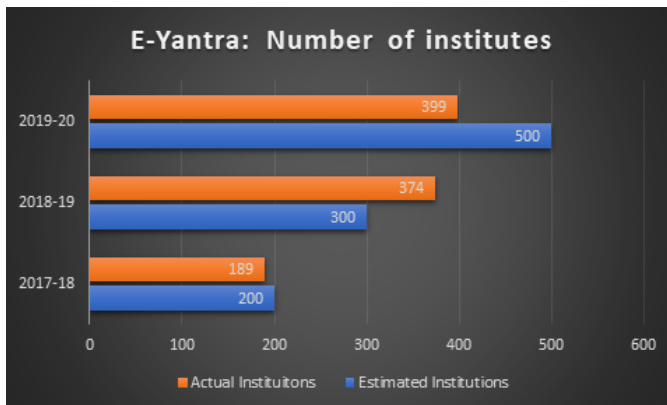
- Difficulty to accommodate larger volumes
- The nominations/submissions should have larger acceptability.

DATA ANALYSIS

E-Yantra aims to create the next generation of embedded systems engineers with a practical outlook to help provide practical solutions to some of the real world problems. Thus one of the important parameters to measure the outcome of the project will be the number of institutions that have implemented E-Yantra.

Financial Year	E-Yantra Data					
	Physical		Financial			
	Estimated Institutes	Actual Institutes	Non-Recurring		Recurring	
			Estimated Cost in ₹.	Actual Cost in ₹.	Estimated Cost in ₹.	Actual Cost in ₹.
2017-18	200	189	₹2,02,49,993	₹6,67,795	₹3,97,51,537	₹3,75,72,341
2018-19	300	374	₹3,03,74,215	₹16,86,006	₹5,96,25,785	₹3,79,05,562
2019-20	500	399	₹5,64,14,468	₹10,82,843	₹3,60,62,843	₹3,60,62,843

NUMBER OF INSTITUTES

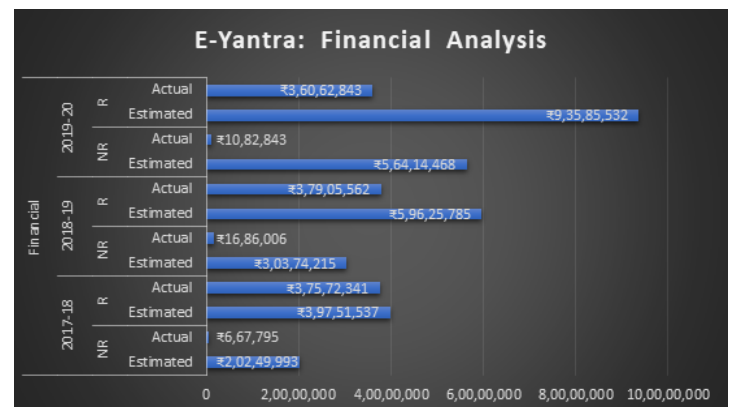


As per the data received from IIT-Bombay, in the year 2017-18, the number of institutions trained by IIT-Bombay were 189 while the estimated number of institutes were 200. In the following year 2018-19, the actual number of institutes trained rose up to 374, surpassing the estimated value of 300. However, in the year 2019-20, the trend was broken, when the actual number of institutes trained were just 399 against the estimated value of 500.

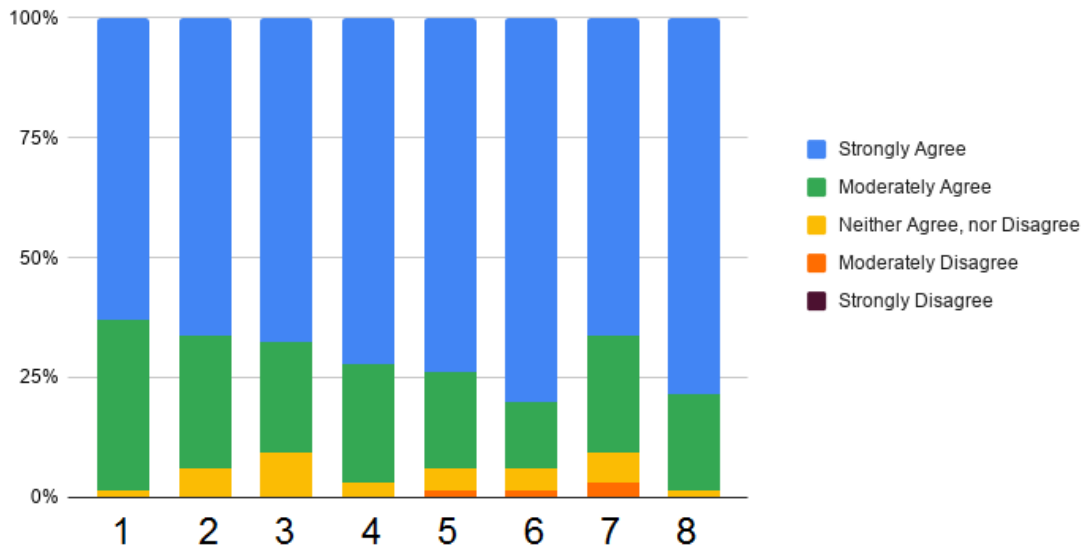
Despite the adaption rate of the year 2017-18 and 2019-20 being less, the data of the year 2018-19 where the adaption rate exceeded the expectations by 25% points at the need to re-look the 2018-19 model for increasing the adaptation across the country.

FINANCIAL ANALYSIS

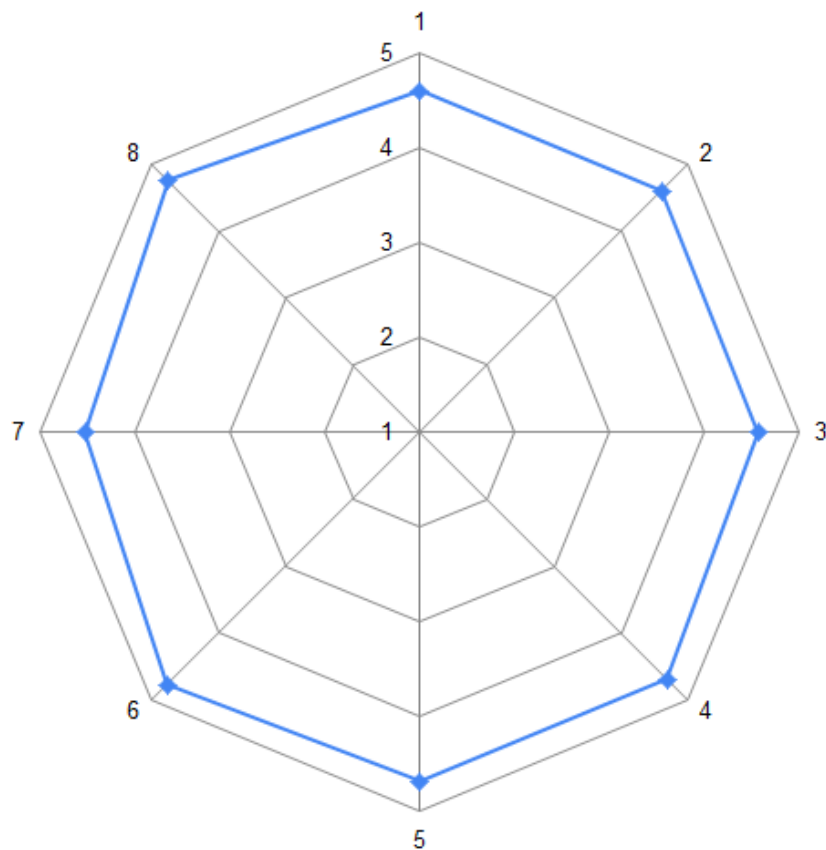
The data shows that the actual non-recurring costs have been substantially less than the expected non-recurring costs throughout the period of the project. The recurring costs actually incurred have also been less than those estimated for the period, but the difference is marginal. Also, the amount approved by the Standing Finance Committee for the period 2017-20 for E-Yantra scheme was 30 Cr and the actual cost incurred so far is approximately 11.5 Cr which also reflects at the adaption level. We make the below recommendations on the basis of this analysis.



E-Yantra Response



S.No	Question	Strongly Disagree	Moderately Disagree	Neither Disagree, nor Agree	Moderately Agree	Strongly Agree
1	The equipment and instruments provided to us function properly & efficiently	0%	0%	1.50%	35.40%	63.10%
2	The instruments provided are up to date	0%	0%	6.20%	27.70%	66.20%
3	The instruments are sufficient in number	0%	0%	9.20%	23.10%	67.70%
4	The learning process is engaging and exciting	0%	0%	3.10%	24.60%	72.30%
5	The mentors are knowledgeable & well-versed with their subjects	0%	1.5%	4.60%	20.00%	73.80%
6	The competitions are healthy and encouraging	0%	1.5%	4.60%	13.80%	80.00%
7	Sufficient time is provided regarding the preparation for competitions & projects	0%	3.1%	6.20%	24.60%	66.20%
8	The evaluation is continuous and timely	0%	0%	1.50%	20.00%	78.50%



E-Yantra - Radar Chart

USER COMMENTS & TESTIMONIALS

- "The overall e-Yantra provided a very good platform to showcase our technical, hands-on knowledge. Even the internship program has been very well organized with lots of talks, educational and fun trips."
- "E-Yantra is the best, amazing, motivating, helpful, giving a lot experience and knowledge at the same time. Focuses on overall development, so eYantra is the best. 5 out of 5 stars."
- "The Project tasks are well thought and properly scheduled. So it is easy to learn and do the work in the given time frame. The process is good and I learnt a lot.It was a good experience."
- "Very good structure of learning. It is the best example of project based learning. e-yantra is updating their hardware and software part also to meet the future requirements."
- "Awesome teaching learning process. Really changing lives."
- "Very good learning approach for both students and teachers."
- "E-Yantra has given me opportunity to grow in the field of robotics. Also I had one of the wonderful times in my life in the field of the robotics and also it gave me best experience in the field of web development. It became one stop solution for learning all the technologies and it also gave me opportunities to increase my confidence.."

PROJECT RECOMMENDATIONS

1. Emphasis to be laid on tackling real world issues that are faced by the general public by fostering ideas that are both cost-effective & robust. In addition to the e-YIC initiative, which solicits projects from teams of eLSI colleges only it is recommended that idea generation workshops be conducted country-wide so that budding technical minds can propose solutions & have them validated. Selected solutions can then be used towards developing themes for the e-YRC competition. Such workshops will only help students think innovatively, expand their horizon & work towards the betterment of society.
2. It is recommended that e-Yantra connect with the start-up India ministry (or) Start-up funding banks to add value to the project in long run. Breakthrough ideas sourced from eYIC should be showcased & encouraged to be developed further.
3. To have sustainable impact in improving engineering education, lower tier institutions should be targeted as priority, invest money in infrastructure creation, aim at enrolment to e-Yantra Lab Setup Initiative, as e-Yantra aims to influence engineering minds all over the country. Regional level institutions have a large pool of talented minds that often graduate as unfinished products. It is in India's best interests to properly guide & equip these students with a mixed skill set that is in sync with 21st century requirements. The current selection process has evolved to allow for greater participation, and this should only be encouraged to increase further.
4. Success stories of e-Yantra Project should be made as part of engineering curriculum as case studies for forthcoming batches of engineering students. In addition to regular classroom activity, faculty members should be tasked with presenting e-Yantra case studies that encourage out-of-the-box thinking, bring innovation & build awareness.
5. For colleges that are not yet part of the e-YLSI, to be allowed for taking up courses on embedded systems and robotics, through e-yantra labs using existing infrastructure and teach advanced skills through e-Yantra MOOC paradigm.
6. Significantly increase e-Yantra's engagement with the industry by collaborating with like NASSCOM, CII, Alumni, ex-participants & beneficiaries etc., thereby allowing for interns to access local opportunities in industries for placements. It is recommended that an online forum be created that allows individuals to interact & connect and build a community that can feed off each other's suggestions & build for stronger resources.
7. It is recommended that e-Yantra explore tie-ups with other parallel projects like Virtual Labs & Spoken Tutorial & Swayam etc. in order to have far-reaching impact. Also, greater interaction with the government to understand their available resources & initiatives should be undertaken to expand reach.
8. Encourage established e-Yantra labs from a college to work as a Nodal Center, to mentor local engineering colleges and consider offering the e-Yantra Internship program in a de-centralized manner.
9. It is recommended that on Campus Ambassador Programs be set-up to improve engagement with colleges and ensure greater participation & buy-in.

10. Build on scalable training resources by certifying teachers to take e-Yantra workshops (e-Yantra Training for Instructors Program - eYTIP)
11. Push for establishing e-Yantra in SAARC member countries and help Indian students engage with neighbours.

E. PROJECT - FREE AND OPEN SOURCE SOFTWARE FOR EDUCATION

Engineering schools currently offer courses on embedded systems and robotics in the 3rd and 4th year across many disciplines including computer science, electronics, information technology & mechanical engineering. These courses being mostly theory-oriented do not however encourage a practical approach i.e. being hands-on.

Project Coordinator – Prof Krishnan M

Project Implementer – IIT Bombay

Participating Institutions – IIT Bombay

Operating Location – IIT Bombay

OBJECTIVES OF THE PROJECT

1. Eliminate the usage & dependency on proprietary tools in education across India and replace them with inexpensive Free/Libre Open Source Software (FLOSS).
2. Promote the use of FLOSS in educational institutions and encourage them to start using open source resources in academia.
3. Train students & teachers to use FLOSS while parallelly working towards the development & promotion of open source resources.

KEY FEATURES

- Textbook companions port solved examples from standard textbooks using FLOSS. Objectives include making individuals learn FLOSS through a practical approach, providing a database of Textbook Companions learning resources, make it easy for users of such textbooks to start using FLOSS and Improve available FLOSS documentation. This is a place where one can post all their doubts and questions which users / developers may get while using any FLOSS.
- This team will help colleges to shift labs based on proprietary tools to FLOSS. More than 60 lab migrations have been completed. The lab migration team helps in:
 - a) Coordinating lab migration to FLOSS only labs
 - b) Providing solutions based on lab's problem statements
 - c) Supporting workshops for faculty, students and staff
- The FOSSEE team conducts conferences for students and faculty, to promote FLOSS in education. FOSSEE also have conducted events in Scilab, Osdag, and OpenFoam etc.
- The FOSSEE team conducts workshops for Faculty to promote FLOSS in education. These are screencast sessions with running commentary of recorded computer sessions created for self-learning. Through these SELF (Spoken Tutorial based Education and Learning using FLOSS software) workshops are enabled

FINANCIAL SUMMARY OF FOSSEE			
All amount in Cr.			
Financial Year	Approved Budget	Sanction Date	Fund Released
2017-18	3.0	15.01.2018	3.0
		0	0
		0	0
2018-19	5.0	23.10.2018	3.0
		0	0
		0	0
2019-20	7.0	17.06.2019	1.52
		17.09.2019	2.386
		05.11.2019	3.094
Total	15.0		13.0

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Large user audience
- Availability for free usage by students outside their institutions
- No dependency unlike commercial packages for academic licenses

WEAKNESSES

- Beyond IIT-B knowledge of this project is not much known
- Support to Open source subjects is not as stable as that of other licensed versions of software in the market
- Active involvement of faculty on FLOSS platform required
- Knowledge drain

OPPORTUNITIES

- Expand to local language users
- The outcomes can become a material for study to become certification through Swayam, if offered by any institution
- Inclusion of Speech-to-Text tools to the extent possible to enable Indian Language usage
- Access to basic tools through hand-held devices
- Certification /courses on specific specialties under FOSSE [Swayam may be considered for a larger outreach]

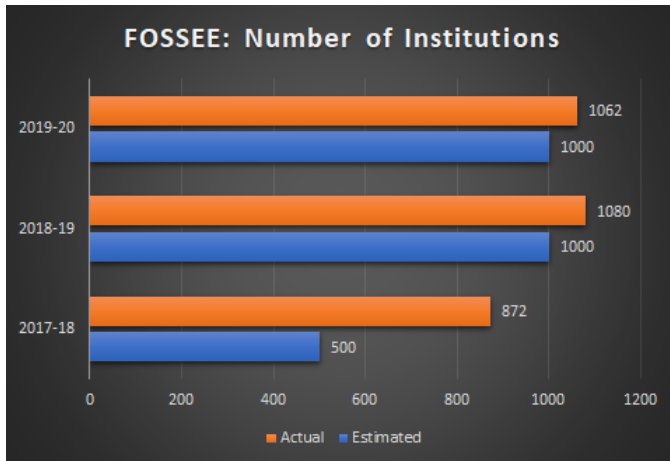
THREATS

- Lack of business opportunities
- Weak propagation
- Ownership & licensing in Free & Open sources cannot be standardized

DATA ANALYSIS

The purpose of FOSSEE is to promote the use of open source software in educational institutions. For meeting the goal, the project also envisioned to help the institutes in developing open source software. Thus, the number of institutes where the software has been successfully implemented will be a measure of the level of outcome of the project.

FOSSEE Data						
Financial Year	Physical		Financial (amount in Rs. Lacs)			
	Estimated Institutes	Actual Institutes	Non-Recurring		Recurring	
			Estimated Cost	Actual Cost	Estimated Cost	Actual Cost
2017-18	500	872	0	0	₹300	₹150
2018-19	1000	1080	0	0	₹500	₹531
2019-20	1000	1062	0	0	₹700	₹553



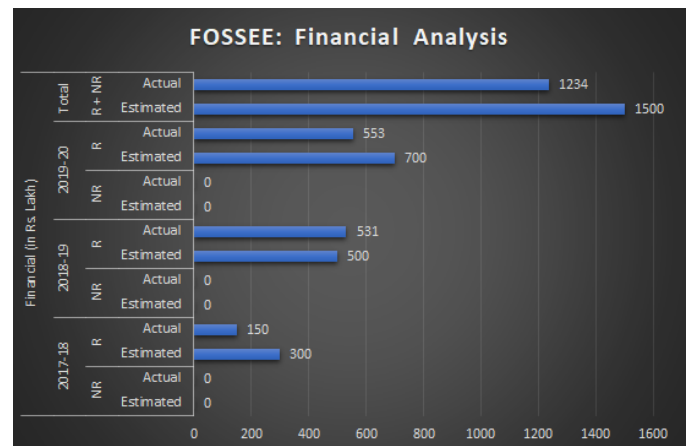
NUMBER OF INSTITUTES

The Standing Finance Committee aimed to help 2,500 institutions in developing open source software required in academic projects. For the year 2017-18, though 500 institutes were estimated to be on boarded for the project, the actual number of institutes on-boarded was 872. In the year 2018-19 and 2019-20, the trend continued, and the actual number of institutes added again surpassed the estimated number.

The trend has been on a continuous increase and till the end of the project duration, in contrast to the estimated number of adding 2500 institutes, a total of 3014 institutes had been added to the project. This indicates a positive growth in the degree of execution of the project.

FINANCIAL ANALYSIS

In the year 2017-18, the actual costs incurred were just half of the estimated costs for the year, even though the actual number of institutes added were 74% greater than the estimated number. This points at exemplary performance in the year 2017-18. In the following year 2018-19, the actual costs were marginally greater than the estimated costs, but the number of institutes added were also marginally more than the estimated value. The last year showed an achievement of a greater number of institutes with costs lesser than the expected ones.



Thus, the overall project performance is positive and with expansion of scope the project can help eliminate the dependency on proprietary tools in education across India. This analysis has been used to make the recommendations listed below.

USER COMMENTS & TESTIMONIALS

- "I really enjoyed my internship of approximately two months. Apart from technical knowledge soft skills such as Team work, Self-Discipline, Time-management and Professionalism were the key skills gained. There was smooth on-boarding process into the internship and very Happy to successfully complete it..."
- "Good experience. Even though in-person would have been a better experience, I thank the FOSSEE team for undertaking the challenges and providing this fellowship virtually..."
- "The overall experience was 8/10. The idea behind the work assigned is extremely helpful for students, and even helps the fellows attain more knowledge and understand how many complex topics can be explained in such a simple manner..."
- "I was always keen to be a part of the FOSSEE Summer Fellowship, it allowed me to gain a new skill-set with DevOps and work on several Open-Source projects at the same time..."
- "The whole experience of learning and implementing to finish our work was great. Our mentors were there helping and clearing our doubts throughout the day..."

PROJECT RECOMMENDATIONS

1. The project for promotion of use of open source software needs continuous support from Government (Ministry of Education) with funds required to be released in a timely manner. Also, coordination with local administrators & technical education officials should be part of outreach efforts to proliferate open source technologies across all educational institutions and focus towards training teachers and students to use FOSS tools.
2. Need to encourage faculty to undertake more trainings/workshops to support schoolteachers in the use of Python and computational tools in educational institutions and make them familiar with the latest open source software.
3. Educational institutions can coopt trained college students as developers/ administrators/ ambassadors who can support in managing open-source software and shall also help promote entrepreneurship.
4. Active involvement of faculty should be encouraged for research and development of tools and software in education on FLOSS platform. These institutions can then serve as incubation labs for evaluation of solutions that can be widely used for the purpose of education.
5. With the success & ease of use of software's like R and QGIS, FLOSS can be introduced at school level to promote a scientific mindset amongst the young generation. In line with many "State Governments" offering Free Laptops to students, including open source tools on here thereby helping in transforming the mindset of end-users and building towards a FLOSS culture.
6. FOSSEE intends to provide internship opportunities to college students in a big way. This should be supported in a big way by making sure most students graduating are employable and gain employment immediately. It is recommended that partner institutions be identified to collaborate & promote while helping students access opportunities that lie ahead.

F. PROJECT - SPOKEN TUTORIAL

Engineering schools currently offer courses on embedded systems and robotics in the 3rd and 4th year across many disciplines including computer science, electronics, information technology & mechanical engineering. These courses being mostly theory-oriented do not however encourage a practical approach i.e. being hands-on.

Project Coordinator – Prof Krishnan M

Project Implementer – IIT Bombay

Participating Institutions – IIT Bombay

Operating Location – IIT Bombay

OBJECTIVES OF THE PROJECT

- 1.Improve programming skills, and employment opportunities by providing online tutorials in niche subject areas including open source software.
- 2.Provide a means for IT training of teachers and students thereby fostering skill development in technology. Offer tutorials in regional & foreign languages to learners not fluent in the English language or learners looking to add more languages their existing repertoire.

KEY FEATURES

- 10-minute-long, easy to learn audio-video content released under creative commons is accessible for non-registered users both online & offline. Tutorials employ side-by-side methods of learning and are created using screencast.
- Tutorials are being offered in 22 regional languages as well for a selection of international languages including Spanish, Portuguese, Thai, Khmer, Arabic, Persian, Burmese & Vietnamese.
- Currently, more than 10,000 tutorials are available for learners, with close to 1000 being offered in the English language.
- Content is available offline as well - audiences can download an entire tutorial series as a zip file and access it locally on their system.
- There are 75 different courses being offered with content in Basic Computing, Programming, Advanced Programming, database management systems, Simulation & Graphics, with an emphasis on Open Source.
- There is now a paid model for online tests & certifications that are administered by individual colleges on an annual subscription basis. The options allow for an unlimited number of test takers, with the invigilators name appearing on each certificate. Job Fairs are then conducted for qualified test-takers.

FINANCIAL SUMMARY OF Application of Spoken Tutorial

All amount in Cr.

Financial Year	Approved Budget	Sanction Date	Fund Released
2017-18	0.0	0	0
2018-19	4.28	21.12.2018	4.28
2019-20	4.2	12.12.2019	3.165
Total	8.5		7.445

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Assistive for any local language user
- Available free of cost for academia and industry
- Created for self-learning
- High acceptance level
- ST dubbed into 22 languages
- High Demand from end-users
- Available under Creative Commons Attribution Share-Alike (CC-BY-SA) where one can modify and use for commercial purposes
- More than 75 lectures beyond Indian borders is a testimony to the acceptance of this initiative world-wide.
- Work on low bandwidth and small screen devices
- Workshops can be conducted without domain experts

WEAKNESSES

- Lack of propagation
- Maker-Checker mechanism is not visible
- Lack of partnership with industry bodies
- Recognition & placement opportunities for students trained

OPPORTUNITIES

- Can reach grassroot level at school phase itself
- Spoken Tutorial can relate to the experiments at Virtual Lab (to enable end-user access in local languages).
- Possibility of a centralized tool to enable speech to text inclusion (saves time)
- Extend tutorial to other projects through a centralized hub (like Learners Gateway)
- Spoken tutorial to consider a 3rd party certification agency (for standardization of content & content quality)

THREATS

- Lack of moderation may bring in weak content and wrong tutorial

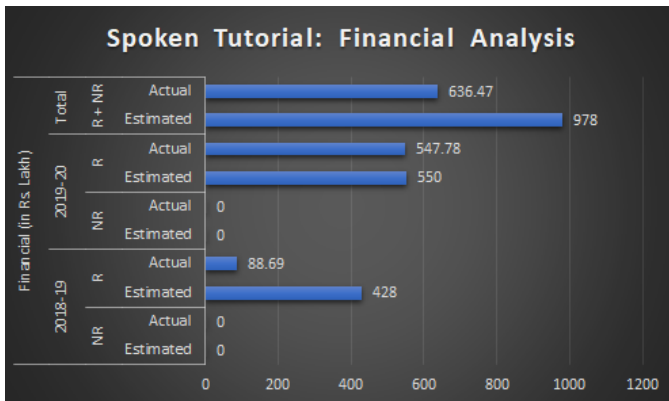
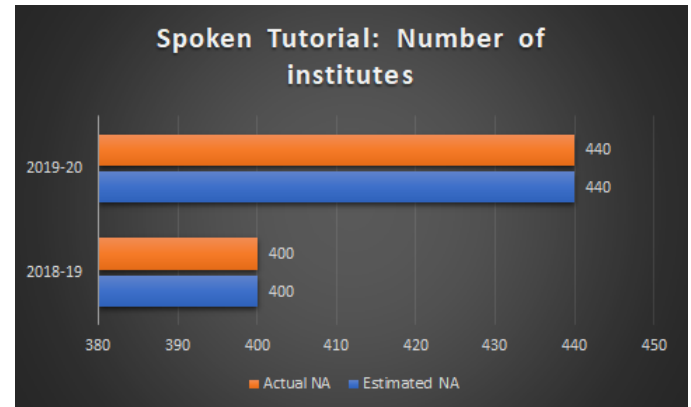
DATA ANALYSIS

The analysis has been conducted considering the physical and financial parameters. The physical parameter of the measure of outcome is the number of institutions.

Spoken Tutorial Data						
Financial Year	Physical		Financial (amount in Rs. Lacs)			
	Estimated Institutes	Actual Institutes	Non-Recurring		Recurring	
			Estimated Cost	Actual Cost	Estimated Cost	Actual Cost
2017-18	-	-	-	-	-	-
2018-19	400	400	0	0	₹428	₹88.69
2019-20	440	440	0	0	₹550	₹547.78

NUMBER OF INSTITUTES

For the year 2018-19, the estimated number of institutes to be added were 400 and by the end of that year, the targeted number of institutes had been added. In the year 2019-20, the trend continued and the target number of 440 institutions were actually added. Thus, the scheme has done a good job in meeting the targets.



FINANCIAL ANALYSIS

For the year 2018-19, the actual cost incurred was just 21% of the estimated cost for the year. However, for the year 2019-20, the actual cost was only marginally less than the estimated cost. The total cost incurred is significantly less than the estimated cost.

The data shows that the estimated and the actual physical values are equal. This implies that the project met the estimated targets within significantly less costs. Thus, it is an indication at positive execution of the scheme.

The above analysis has been used to make the recommendations mentioned below.

PROJECT RECOMMENDATIONS

1. Spoken Tutorial has grown from strength to strength ever since its inception the project has trained more than 26 lakh students. It is recommended that it be continued with the Ministry of Education support schemes and kept going until we meet our country's objective of 100% IT literacy including training of all the teachers for both colleges and schools in the country. Spoken Tutorial team is all ready to implement their vision and can surely be realized with necessary funding from the Government.
2. In order to fully realize potential and expand reach, it is recommended that the Spoken Tutorial team collaborate on a wider scale with national ministries, state governments & local administrative resources that are already part of the eco-system. Telangana & Odisha both officially use spoken tutorial to train and equip educators – a testament to the project. In addition, it is important that Ministry of Education help connect the initiative with Government officers who can bring change to the education system.
3. The impact this initiative has had on rural based society is there for people to see. It is a known fact that indicators of advancement for a country are broadly influenced by how much education has penetrated lesser developed regions. It is recommended that Spoken Tutorial continue tackling more social issues in addition to the ones already going on so that all our citizens can look towards a brighter future.
4. Build & expand on the collaboration with future skills partners like NASSCOM and working/retired professionals, research scholars, developers to be part of the industry driven learning eco-system.
5. Conduct more job fairs & employment sessions that help successful test takers get placed. Employability is a measurable indicator for this initiative and more success stories can only be mutually beneficial to both India and its citizens.
6. Maintain the quality of tutorials by having frequent reviews of content while parallel developing new content. It should be such that audiences are able to rank spoken tutorials on par with the best courses being offered.
7. Promotion & awareness on open source & home-grown software is lacking. Encouraging open-source usage at the institutional level via curriculum is beneficial for the propagation of FOSSEE, automatically resulting in the popularity of spoken tutorial.
8. To continue to expand the plan of bringing in 400 fee paying colleges in the first year and 440 fee paying colleges in the second year, thereby demonstrating the acceptability of Spoken Tutorials, which in turn reflects the effectiveness and of Spoken Tutorial to the main target audience, namely students.
9. The existing team is well established, mature & trained in project methodology. In order to be prepared for a planned & eventual increase in program scope both internationally & nationally, a concerted effort must be made to further develop this team and train future team-members so that the project continues to be on track.
10. It is recommended to consider Internships and Employment for Students from varied backgrounds in the future while setting-up a methodology to evaluate how the Project is doing on this metric.
11. A dedicated effort to collecting project data including beneficiary feedback should be a priority. It is in the projects continued interests to have an integrated evaluation mechanism in place so that content, targets & future expansions are regularly evaluated to ensure that the program is in good health

G. PROJECT - NATIONAL DIGITAL LIBRARY

National Digital Library of India (NDLI) is a National Mission on Education through Information and Communication Technology (NMEICT) Project developed by the Indian Institute of Technology Kharagpur (IIT KGP), under the aegis of the Ministry of Education, Govt. of India. It is a single window platform providing learning resources that make e-Learning and education accessible to all, bringing to users of all demographics, digital repositories from India and the world. NDLI is envisioned to be turned into a National Knowledge Asset; this library serves to function as a key driving force for education, research, innovation, and knowledge.

Project Coordinator – Prof Partha Pratim Chakravarti

Project Implementer – IIT Kharagpur

Participating Institutions -- IIT Kharagpur, Kharagpur Campus & Kolkata Extension Centre, IIT Guwahati for NDLI North East Regional Centre (NDLI-NERC) & Anna Centenary Library, Kotturpuram, Chennai for NDLI South Regional Centre (NDLI-SRC)

Operating Location – IIT Kharagpur

OBJECTIVES OF THE PROJECT

1. Educational materials are available for users ranging from primary to post-graduate levels.
2. NDL has been designed to benefit all kinds of users like students (of all levels), teachers, researchers, librarians, library users, professionals, differently abled users and all other lifelong learners.
3. Information can be personalized based on the education level, choice of language, difficulty level, media of content and such other factors. This is thus like a 'customized service' provided in a 24x7 integrated environment where learners can find out the right resource with least effort and in minimum time.
4. Repository hosts contents from multiple subject domains like Technology, Science, Humanities, Agriculture and others.
5. More than 60 types of learning resources are available - books, articles, manuscripts, video lectures, thesis, etc.
6. Items are available in more than 70 languages.
7. Repository integrates contents from different Indian Institutional Repositories.

KEY FEATURES

- Integration of national services like Shodhganga, Shodhgangotri and N-LIST, along with metadata contents of publishers under E-SS

- User interface in 9 Indian languages.
- Providing access to licensed contents of World E-Book Library and South Asia Archive to any user of the country through a national licensing service.
- Completely in-house managed data center and off-site disaster recovery system comprising 85 servers and 220TB storage.
- Service uptime (365 days, 24 hours): Better than 99.9%.
- Provision for cloud services for other Digital Libraries.
- Standardizing metadata schema for academic digital libraries/ repositories.
- 100-fold improvement in productivity of metadata work through automation of metadata curation workflow, tool-assisted metadata curation and extraction.
- Indian language OCR for development of production-grade OCR tools for Indian languages - IIT-KGP is exploring Filing of Patent for OCR technology developed.
- Application of artificial intelligence technologies for development of enhanced Search Optimization and Semantic Search.
- Development of a Pilot Medical Image Databank as a repository of research data and information for cancer research.
- 31 workshops across the country. 50+ lakh registered (22+Lakh active). 10 Research papers presented globally.
- Conducted International Symposium on Knowledge Engineering for Digital Library Design.
- National Copyright Workshop and a National Workshop on Rights Statements in collaboration with European and Digital Public Library of America.
- The project team has 1 Post-Doctoral Fellow and 6 PhD's.
- Invited in World Digital Library Planning Session in Amsterdam as one of the 4 emerging digital libraries of the world and to participate in the session of Global Digital Library.
- Set up collaboration with more than 10 large international digital libraries/repositories and sourced their contents or obtained their guidance.
- Won mBillionth Award for NDLI Mobile App. & awarded Gems of Digital India Award.

FINANCIAL SUMMARY

National Digital Library			(Rs. In crores)	
	BE	RE	As per SFC	Released
FY 2017-18	10		6	10
FY 2018-19	10	7.8	22	7
FY 2019-20	10	20	22	15.6

2018-19	₹ ₹ 220	22.10.2018	₹ 250
		25.01.2019	₹ 200
		25.01.2019	₹ 50
		26.02.2019	₹ 200
		Total	₹ 700
2019-20	₹ 2200	11.06.2019	₹ 600
		06.11.2019	₹ 200
		18.11.2019	₹ 200
		Total	₹ 1000
Total	₹ 850	TOTAL	₹ 744.5

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Exhaustive Resource availability
- Virtual repository of resources
- Open Reach to all users
- Accepted by all research and educational bodies
- A multilingual knowledgebase
- Ability to accept resources and moderate
- Possesses features including metadata search and mobile platform
- Availability on 24x7 mode

WEAKNESSES

- Assignment is temporary in nature
- Creation of multiple digital libraries by different organizations leads to difficulty in sustainability

OPPORTUNITIES

- Can be hooked with all centers of learning
- Subscription model will enable traceability of usage
- Can be linked with SWAYAM for content usage
- A helpdesk + Call Centre to boost access [Helpdesk may be initially in English, Hindi and a few popular languages, which may be extended to all Indian Languages in future]

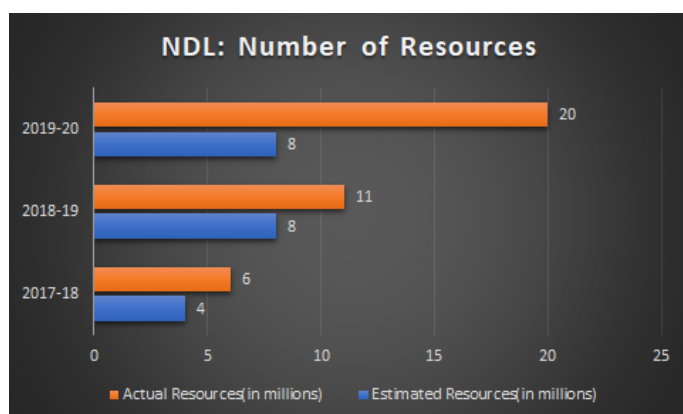
THREATS

- Efficiency may weaken, if this is opened free for use
- Multiple digital libraries under various instantiations of Govt

DATA ANALYSIS

As per the note of the Standing Finance Committee, National Digital Library aims to collect, preserve and disseminate entire intellectual output of our country and provide on-line access from school level to post-graduate level including technical education. With a base of already existing 10 million resources, the SFC aimed that the content be raised from 10 million resources to 30 million digital resources.

NDL Data				
Financial Year	Physical		Financial (amount in crores)	
	Estimated Resources (in millions)	Actual Resources (in millions)	Estimated Cost	Actual Cost
2017-18	4	6	₹6	0
2018-19	8	11	₹22	₹9.274224
2019-20	8	20	₹22	₹15.96995

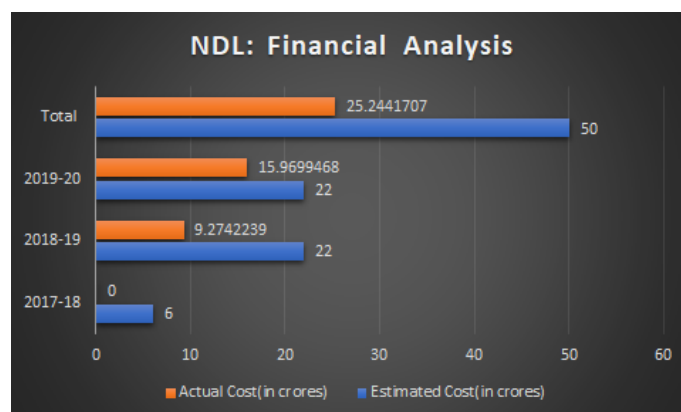


NUMBER OF INSTITUTES

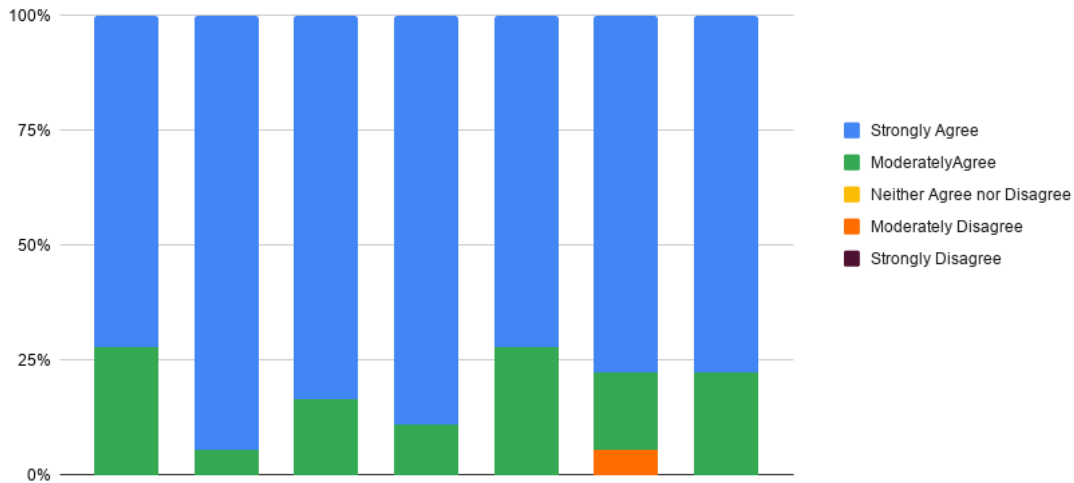
As per the data received from IIT-Kharagpur, in the year 2017-18, though the estimated resources to be added were 4 million, the project flared well by adding 6 million resources. In the subsequent years too, the resources added were substantially greater than the estimated values. In the overall period, 37 million digital resources were added against the targeted number of adding 20 million resources, which is 85% greater than the target. This is a clear indication to the positive growth towards achieving the vision of turning NDL into a National Knowledge Asset.

FINANCIAL ANALYSIS

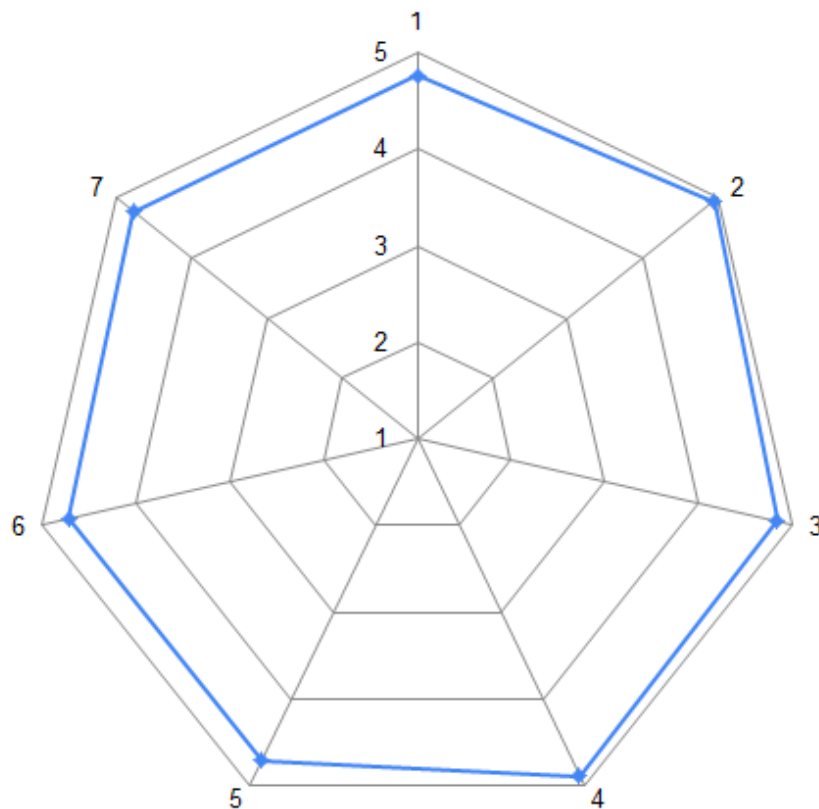
The financial data clearly shows that the actual costs incurred are significantly lesser than the estimated costs over the period. In the SFC report, the costs were estimated for three main purposes namely, to increase the content, setting up Disaster Recovery System and increasing the storage to serve the increasing number of users from 10 lacs to 100 lacs. Out of these tasks, the data shows that the resources have been added and for the remaining two tasks, the response received from IIT-Kharagpur (find snapshot of response) states that the Disaster Recovery System has been set up and is operational. However, the increase of storage could not be done.



National Digital Library



S.No	Question	Strongly Disagree	Moderately Disagree	Neither Disagree, nor Agree	Moderately Agree	Strongly Agree
1	The material available on National Digital Library is satisfactory	0%	0%	0%	27.80%	72.20%
2	National Digital Library has books available in various languages	0%	0%	0%	5.60%	94.40%
3	The interface of National Digital Library is simple and easy to use	0%	0%	0%	16.70%	83.30%
4	National Digital Library is easily accessible	0%	0%	0%	11.10%	88.90%
5	The servers of National Digital Library are responsive enough	0%	0%	0%	27.80%	72.20%
6	The material available on National Digital Library is useful for me	0%	5.6%	0%	16.70%	77.80%
7	I'm satisfied with the variety of material available on National Digital Library	0%	0%	0%	22.20%	77.80%



National Digital Library - Radar Chart

USER COMMENTS & TESTIMONIALS

- "This is a very helpful initiative. In future, more coverage and more user friendliness is expected."
- "Staffs are very responsive and they helped a lot to the common people in Kolkata book fair stall."
- "It is indeed one of the pillars of Digital India."
- "The NDL website will help reseacher, teacher, student and other interested persons for their some specific purposes."
- "This is one of most helpful library for academicians."
- "I found National Digital Library is very informative and easy to handle."

NDL Data from IIT-Kharagpur			
S.No.	Project Area	Target	Actual Status
1	NDL	Setting up Disaster Recovery System	Disaster Recovery System - set up and operational
2	NDL	Increase the storage to serve increasing number of users from 10 lacs to 100 lacs	Could not be done as the Purchase Order could not be released after the tendering process due to non-release of Non-Recurring fund by MHRD

The above analysis has been considered to make the recommendations given below.

PROJECT RECOMMENDATIONS

1. Unable to attract good quality human resources due to temporary nature of the assignment. If this is for NDLI development, these can be done by students at IIT's by forming part of their project and students will bring in NEW ideas. On the contrary, if they are not technical roles, we have these rolled out for Interns permanently i.e. have interns from outside every 6 months.
2. Ministry of Education to help the Project team to get the required funds.
3. NDLI infrastructure reaching end-of-life and will need additional investment. This must be taken care/invested every 4 years. PI is recommended to write to Ministry of Education giving all the details on the current infrastructure, how it will be dispositioned and what would be needed in its place, latest date by which it would be needed to continue the show without any interruptions and how much it would cost.
4. Given that the project has met its objectives - has been awarded nationally and internationally, this project should be kept going to meet its unfinished tasks; it is also working with other initiatives like ESS to meet the requirement of 80 million count on the Digital Library (library content) , set by the Project team in the next 3 years.
5. Disaster Recovery System currently at Kolkata. But since Kolkata and Kharagpur are in the same Seismic Zone, it will be useful to have this in another part of the Country, like either in Southern India or Western India.
6. Making available regularly used text and reference books and learning contents for school and under-graduate students free through NDLI by national licensing of these contents.
7. We can also license this out to colleges/universities outside India for a fee as identified depending on country. This has been thought about with the potential to offer this in Afghanistan, Myanmar, SAARC countries, African countries etc. but this must be taken through Government of India authorities.
8. Providing "Compute" service whereby researchers can directly obtain results from the data repository of NDLI by running an algorithm chosen from the algorithm repository of NDLI.
9. Providing Medical Image Databank as a repository of research data and information for cancer research.

10. Providing service to the users through a “Hub-and-Spoke” by setting up NDLI Regional Centers across the country.
11. Semantic Search and Semantic metadata.
12. Medical research data and information, not just Cancer research but all types and kinds of illnesses. This is to be figured out by 2 mapping into 2 funding streams.
13. Organic Growth of NDLI and Service via Ministry of Education.
14. Requirements from all other partner institutes like TATA Medical Center for all other work to be hosted as part of NDLI.
15. It will be nice if NDLI also hosts available books/literature from Vedic period.
16. Connect with TATA Institute of Fundamental Research (TIFR) and check if NDLI could host Research work done at TIFR.
17. IIT-KGP project team already has a Process in place to host any literature like on emerging technologies like AI, Data Analytics, and Blockchain etc. For this, the interested parties must first send an email to NDLI, post which NDLI team will get all the necessary Approvals.
18. It is recommended that the ISO certification for NDLI be part of the broader goal to be a world class initiative.
19. Many departments and institutions including the National Museum, IGNC, MeITY, National Archives, IITK are also offering Digital Libraries. Awareness on this NDLI should be given wider publicity that all GoI & State Ministries & Departments benefit from the efficiency and services of NDLI. This would enable NDLI stands as single point Digital Library source.
20. "TERI _ The Energy and Resources Institute (formerly Tata Energy Resources institute) conducts annual Digital Library Conference -ICDL. NDLI should take lead).

H. PROJECT - INDIAN RESEARCH NETWORK INFORMATION SYSTEMS

IRINS is web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Centre in collaboration with the Central University of Punjab. The portal facilitates the academic, R&D organizations and faculty members, scientists to collect, curate and showcase the scholarly communication

activities and provide an opportunity to create the scholarly network. The IRINS is available as free software-as-a-service to the academic and R&D organizations in India.

Project Coordinator - INFLIBNET Centre

Project Implementer - INFLIBNET

Participating Institutions - Centrally funded institutes, State Universities, Private universities & Research Institutions

Operating Location - INFLIBNET Centre, Gandhinagar (GJ)

OBJECTIVES OF THE PROJECT

1. Allowing the vast research community in the country to showcase individual as well as institutional activity, accomplishments & expertise to peer groups and fellow scholars.
2. Facilitate the flow of research data within and across institutions while ensuring access to scholarly material.
3. Ensure institutions have knowledge of research activity and output of their own faculty and researchers.
4. Allowing local researchers exposure to the international community in order to increase funding opportunities from both national and international sources.
5. Gauging research efforts using bibliometric parameters such as publications, citations, H-index etc.
6. Serve as a strategic tool to analyze research progress, fund allocation, assessment of individual contributors and plan resource allocation.
7. Build networking & collaborative opportunities amongst the research community at both the national and international level.
8. Act as an instrument for local governments & policy makers to identify expertise, areas of research, research gaps and define policies on fund allotment

KEY FEATURES

- The IRINS system is an extension of the existing VIDWAN database and the process is therefore already well established
- Instance creation process for IRINS is smooth & structured.
- Curation of existing VIDWAN profiles & creation of new IRINS profiles are parallel activities
- Nodal officers are already in place for VIDWAN & are sensitized appropriately.

- IRINS team has prior experience in developing VIDWAN and is well equipped to sustain any future development.
- IT System offers end users a well-defined set of capabilities including dashboard, Academic Identity, Citations, Data Analytics, Social Media Metrics, Search & link to Institutional & domain specific repositories.
- IRINS allows for data integration & workflow with a myriad of data sources like Scopus, ORCID, Google Scholar, CrossRef, BASE Search, Dimension, Microsoft Academic Search and PubMed Central among others.
- The IRINS system can be integrated with existing campus management systems such as faculty profiles, institutional repositories and grant management systems etc.
- The IRINS system links individual identity at an institute level with relevant data - personal information & affiliation, research activity details (subject areas, projects & grants), achievements (honors & awards) and research output.
- IRINS makes research related metadata more discoverable, inter-operable and re-usable within the scholarly communication ecosystem.
- Exposure through IRINS has both individual & institutional impact with several national & international research resources including euroCRIS, NBA etc.
- IRINS helps drive individual, departmental & institutional growth as well as efficiently direct fund allocation & policy towards research.
- Future development of the system is in progress with improvements being added as required.
- Project funding is in good health with funds being released by Ministry of Education as and when required.
- IRINS has been successfully implemented at over 100+ institutes with instances having been created based on response with targeted approach to add institutes going as per plan.

FINANCIAL SUMMARY OF IRINS			
All amount in Cr.			
Financial Year	Approved Budget	Sanction Date	Funds Released
2017-18	NIL	NIL	NIL
2018-19	0.885	26.12.2018	0.885
2019-20	0.625	NIL	NIL
Total	1.510		0.885

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Well established process of evaluation
- Smooth structured creation of instances
- Established presence of NODAL officers at all levels to enable seamless interaction (as required)
- Experienced Team
- Connect with academic identities

WEAKNESSES

- Need for more staff
- Learnings to be passed on to the next gen users
- Less awareness

OPPORTUNITIES

- Regional level workshops for awareness
- Requests from Centrally funded technical institutes & Centrally funded universities to be tapped on priority
- Expansion to other Indian languages beyond English

THREATS

- Lack of popularity beyond educational circles may become a dampener
- Lack of helpdesk facility

DATA ANALYSIS

There were two major targets to be achieved by the IRINS project in Phase-I, namely, the development of RIM and deployment of IRINS, as cloud based services, to 145 Ministry of Education funded institutions. As per the data received from the INFLIBNET Centre, the development of RIM has been completed and the deployment has been done. The snapshot of the report received is as below.

VIDWAN-IRINS Project information		
Project deliverables/Target	Current Status	Remarks
Development of RIM	Completed	Additional add-on features are being incorporated.
Deployment of IRINS, as cloud based services, to the MHRD funded institutes (145) in phase-1	Deployed 194 instances	<ul style="list-style-type: none"> • MHRD funded Institutions: 126- (Deployed) + 36 Shown interest • Other Institutes: 68 (Deployed) + 109 shown interest

DEVELOPMENT OF RIM

As per the data received from the INFLIBNET Centre, though the development of RIM is complete, the additional features are being incorporated. This can be targeted in Phase-II of the project.

VIDWAN-IRINS : Financial Information		
Project Approved Fund: ₹ 151.00 (in Lakhs)		
Time	Funds received	Fund spent
FY (2018-2019)	₹ 88,55,000.00	₹ 19,232.00
FY (2019-2020)	NIL	₹ 40,75,161.00

FINANCIAL ANALYSIS

The financial data clearly shows that though the funds received were ₹88.55 lakhs, only ₹40.94393 lakhs have been spent. Considering the usage of funds actual costs incurred are significantly lesser than the estimated costs over the period.

PROJECT RECOMMENDATIONS

1. It is observed that profiles in the VIDWAN system and IRINS are both in existence with data migration between both applications an ongoing process. Since IRINS is designed to replace VIDWAN in the future, nodal officers at the institute level are presently contacted to collect & update existing user profiles before they are ported to IRINS. In order to streamline the process of IRINS sign-up it is recommended that users be allowed to log-into IRINS with their VIDWAN Id and directly update details on there (single sign-on). This will eliminate the need for the nodal officer to create new IRINS profiles for each individual VIDWAN account as well as dispel any confusion that end-users may have with respect to both existing systems.
2. Institute level nodal officers are the fulcrum for rolling out IRINS. There are currently regional level workshops & conferences conducted to identify officers. In addition to these efforts it is recommended that workshops, specific to nodal officer be conducted at suitable occasions to enable complete education on all IRINS related information. This will also result in useful feedback, fruitful interaction between fellow officers and overall buy-in into IRINS.
3. Promotional activities include regular conferences and workshops at both the national & regional level. The IRINS eco-system is also spread through word-of-mouth and interaction between researchers. It is recommended that these promotional activities be further designed with live demonstrations, user interactive sessions & impact showcases. These activities will also help in driving future system development & improvement.
4. It is observed that there is a good number of requests for IRINS coming from non CFTI & CFU institutes. On this basis, it is recommended that calendar based promotional schedule be developed for other schools and get them on board in a phased & orderly manner.
5. It is recommended that promotional activities and material be made available in selected regional languages. This helps make targeted users more comfortable with getting to know the system, since English may be difficult to fully embrace & grasp.
6. IRINS does not currently offer itself in a language other than English. To fully realize the potential of this initiative, it is recommended that a pilot project for a selected regional language (Hindi for example) be introduced to users.

I. PROJECT - PLAGIARISM DETECTION SOFTWARE

Plagiarism is one of the most critical aspects of academic and scientific research that cannot be ignored. It takes a dedicated effort to detect & prevent plagiarism while ensuring that only validated & verified efforts can be published. As part of the Ministry of Human Resource Development's 100 day agenda, a decision was taken to provide Plagiarism Detection Software to all Indian Universities & Institutions including Central Universities, State Universities, Deemed to be Universities, Private Universities, Centrally Funded Technical

Institutions (CFTIs), Institute of National importance (INIs) and Inter-University Centres of UGC (IUCs). Also known as Shodh Shuddhi, the scheme was officially launched in September 2019 by Dr Ramesh Pokhriyal, Honorable Ministry of Education Minister, Government of India

Project Coordinator - Prof J K Singh Jhooral

Project Implementer - INFLIBNET Centre

Participating Institutions – Centrally funded institutes, State Funded institutes

Operating Location - INFLIBNET Centre, Gandhinagar

OBJECTIVES OF THE PROJECT

1. Facilitate easy detection of plagiarized content in academic and research works including articles in journals and conference proceedings, chapters in books, theses, research reports, assignments, project works, lecture notes, e-text/e-content for MOOCs & LMS, etc.
2. Significantly help to improve the quality of research outcome by ensuring the originality of ideas and publication of the research scholars

KEY FEATURES

- The Plagiarism Detection Software tool compares submitted documents with a database of documents that is included within the software package.
- Faculty members and research scholars can cross-check plagiarized content by accessing a similarity report
- The Database includes subscription-based resources, open access resources, current & archived Internet web pages, web documents, student paper databases, newspapers, magazines, electronic books, periodical databases covering popular magazines, MOOCs content, business and professional contents, subject-specific handbooks and general encyclopaedia.
- The service is being executed, maintained & supported by the INFLIBNET Centre, an Inter University Centre (IUC) of the University Grants Commission (UGC) located in Gandhinagar, Gujarat.
- Target Profile includes 1000+ Universities & Institutions including Central Universities, State Universities, deemed to be Universities, Private Universities, Centrally Funded Technical Institutions (CFTIs), Institute of National importance (INIs) and Inter University Centres of UGC (IUCs)

FINANCIAL SUMMARY OF PDS

All amount in Cr.

Financial Year	Approved Budget	Sanction Date	Funds Released
2017-18	0.0	0.00	0.00
2018-19	0.00	0.00	0.00
2019-20	13.35	16.10.2019	13.35
Total	13.35		13.35

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- State of the art IT Systems
- Ease of access to end users
- Institutions in the know of the system (Good awareness)
- Free Access for a month (enables ease of use and acceptability)
- Customizable User Interface

WEAKNESSES

- No specific method to propagate

OPPORTUNITIES

- Analytics to administrator group that can expand user base

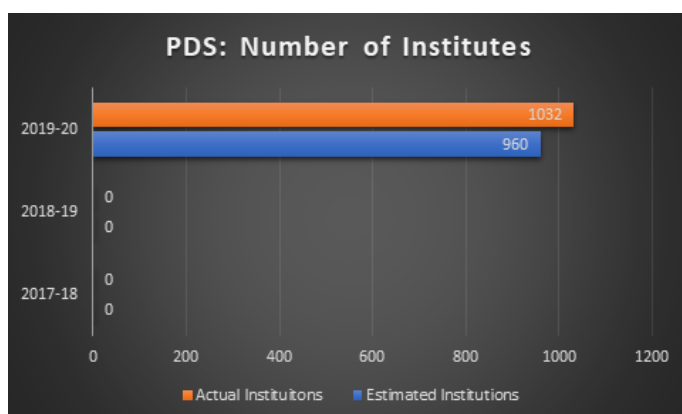
THREATS

- No mandate by Government for compulsory usage

DATA ANALYSIS

To meet the vision of PDS scheme, efforts are required to encourage original information by preventing plagiarism. It is truly essential that the Plagiarism Detection Software tool is adopted by as many targeted universities and institutions as possible. Thus, number of institutes where the software has been used is an important parameter to analyse the reach of the scheme.

PDS Data				
Financial Year	Physical		Financial (amount in crores)	
	Estimated Institutions	Actual Institutions	Estimated Cost	Actual Cost
2017-18	NA	NA	NA	NA
2018-19	NA	NA	NA	NA
2019-20	960	1032	₹13.75	₹9.12

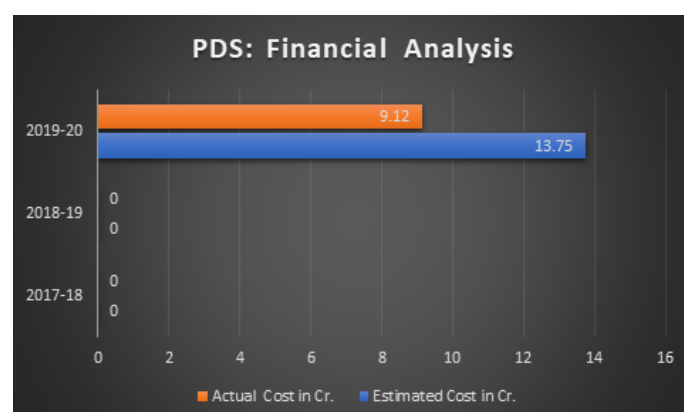


NUMBER OF INSTITUTES

For the year 2019-20, the number of institutes estimated to implement the software were 960. However, the software has actually been implemented at 1032 institutes. Though the project is fairly new and had less time to be implemented, the reach has been rising and shows a positive growth for the scheme.

FINANCIAL ANALYSIS

The financial data clearly shows that the actual costs incurred are significantly lesser than the estimated costs over the period. There has been a significant adaption of PDS since scheme launched in Sept 2019. However to ensure complete adaption across country, there is a need to work on a few strategies as mentioned below in the recommendations.



PROJECT RECOMMENDATIONS

1. In order to get them fully on-board, it is recommended that individual orientation programs be conducted at these institutes to create awareness & ensure total implementation. Since CFTI's form the bulk of quality education imparted nationwide, it is important for them to fully embrace PDS and set an example for less developed institutes.
2. It is recommended that registration for this service be linked with usage statistics in order to ensure usage i.e. a mandatory number of papers need to be submitted in a time period with subscription being rescinded if not complied with.
3. Nodal coordinators be contacted and utilized to collect end-user feedback in order to understand fully why PDS is so popular. Feedback can include points of evaluation like ease-of-use, research guide buy-in to PDS process, research paper impact and originality development
4. Current PDS system does not allow for regional language documents to be validated. It is recommended that data representing potential regional research papers be collected so that a like for like comparison option can be visualized for the future based on demand.
5. A Recommendation from the Government to enable all universities to be part of the ecosystem would not only enable larger participation, it would also enable researchers to choose their topics and know the status

3. PROJECT - SWAYAM

Swayam, the acronym for 'Study Webs of Active Learning for Young Aspiring Minds', is an initiative of Ministry of Education which provides an integrated platform for hosting a whole gamut of online courses catering to the learning needs of a wide range of students from the 9th standard to PG level. This is essentially the Indian chapter of Massive Open Online Courses (MOOC) and has been integrated to strengthening the NMEICT programme through extensive use of ICT. It envisages bridging the educational and digital divide by striving to provide quality education to the masses at economical costs through opportunities of life-long learning. It is a big step towards widening the reach and accessibility of knowledge and democratization of education.

Project Coordinator - 9 National Coordinators.
Prof Andrew Thangarajan

Project Implementer - SWAYAM Board (Chaired By Secretary HE), Chairperson UGC, Chairperson AICTE, 5 Bureau heads from the Ministry of HRD (ex-officio) looking after: Technical Education, Management Education, Higher Education, School Education, Open/ Distance Education, All National Coordinators of SWAYAM and SWAYAM PRABHA, JS&FA of MHRD, Mission Director NMEICT (Member Secretary)

Participating Institutions – 9 National Coordinators (CEC, UGC, NPTEL, IGNOU, IIM B, NITTTR, NCERT, NIOS, AICTE). NIT Trichy is inducted as new NC for Technology and Engineering Courses recently.

MOOCS Development: Different locations under 9 NC offices

SWAYAM Portal Development, Implementation & Operation: IIT Madras

OBJECTIVES OF THE PROJECT

- Swayam has components on education and technology. The technology component of Swayam was conceived as a one-stop platform for hosting all courses taught in classrooms from the 9th standard to PG level. While Microsoft was the service provider at Initial stages, the present version of Swayam, referred as Swayam 2.0 is on Google Cloud. The operations & management of Swayam is being done from IIT-Madras under the leadership and efforts of the NPTEL.
- The NPTEL (National Programme on Technology Enhanced Learning - NPTEL) was initiated by seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati and Roorkee) along with the Indian Institute of Science, Bangalore in 2003. Five core disciplines were identified, namely, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering and mechanical engineering and 235 courses in web/video format were developed in this phase.
- The main goal of NPTEL Phase II (2009-14) was to build on the engineering and core science courses launched previously in NPTEL Phase I. An additional 600 web and video courses were created in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level. Several improvements such as

indexing of all video and web courses and keyword search were implemented. As on date, NPTEL stands as the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects

- Under the educational domain, eight national coordinators (NCs) have been identified by Ministry of Education under the revised MOOC guidelines for ensuring best quality e-content, delivery of online courses and overseeing the assessment of courses. They are:
 - CEC for non-technology UG degree programmes
 - IGNOU for diplomas and certificates programmes
 - IIM Bangalore for management programmes
 - NCERT for school educational programmes from 9 to 12 standard
 - NIOS for out of school children educational programmes from 9 to 12 standard
 - NPTEL for technical/engineering UG and PG degree programmes
 - NTTR Chennai for teacher training programmes
 - UGC for non-technology PG degree programmes
- All courses are offered free of cost under this programme; however, fees are levied in case the learner requires a certificate

KEY FEATURES

- With more than 2929 courses (323 in July 2017, 285 in January 2018, 573 in July 2018, 514 in January 2019, 652 in July 2019, 582 in January 2020), 8.7 lakh examination registration and 388 future courses, this project is like a lifeline for aspirants to higher education.
- All IIT's have an NPTEL coordination centre, while the new & upcoming IITs are getting their centres established.
- Courses are being volunteered by institutes, to be offered through Swayam.
- The enrolment has around 19% of the registrations from faculty while 76% were from college students with 5% of from Industry.
- The initiative by institutes to transfer credits is one of the deciding factors for certain sect of student. However, credit transfer policy needs to be moderated to enable effective results for the students as well as the portal
- Enforcement for enrolment of students by colleges may lead to a gap between interested and uninterested students, leading to variation in success pattern
- Laudable efforts by Swayam include, workshops, conferences for their partnering groups.
- Initiative of walking though specific course
- Companies/firms alignment with NPTEL to conduct industry related courses
- Presently Swayam is operating as an umbrella system. It is evident from the fact that the Government of India (Ministry of External Affairs) has mooted a project named e-VBAB that runs with Swayam in the background. To address the requirements of eVBAB and the challenges in running Swayam, a considerable effort was observed to have been made by both MEA & Ministry of Education.

804290/2016-TEL
The Project intends to achieve the following:

- Develop 1350 new MOOCs (in addition to about 650 courses already running) with the help of the selected best teachers.
- Run atleast 6500 courses (some courses could be offered many times a year during the period).
- Make available as many courses as possible in the regional language; translation of atleast 275 MOOCs into 10 Indian languages with video subtitles.
- Maintain the portal and cloud infrastructure with State-of-the-Art facilities.
- Ensure that atleast 10 lakh students would be able to access courses simultaneously.
- Conduct of exams and award of certificates to participants having successfully completed the course.
- To popularize courses on SWAYAM, create SWAYAM local chapters in 10,000 institutions in the country so that faculty uses SWAYAM on blended mode, and thereby, improving their own performance.
- Have a media plan to reach out to potential students.

FINANCIAL SUMMARY

(all amounts are in Rs.)

Sr. No.	Institute Name		2017-18	2018-19	2019-20
1	UGC, New Delhi (NC)		-		
2	CEC, New Delhi (NC)		-		6,865,302.00
3	NPTEL, IIT Madras (NC)	MOOCs Creation & Delivery	310,000,000	694,490,000	587,235,000.00
		Translation of MOOCs IIT Madras		60,000,000	
		IIT Madras ASP		31,000,000	
		IIT Madras SWAYAM 2.0		58,500,000	132,000,000.00
		IIT Madras online vertical degree course			19,280,000.00
		Platform Maintenance			10,097,000.00
4	NIOS, (NC)		-		
5	NCERT, New Delhi (NC)		-		
6	IGNOU, New Delhi (NC)		-		27,280,000.00
7	NITTTR, Chennai, (NC)		-		1,500,000.00
8	IIM Bangalore, (NC)		1,950,000	6,230,000	16,040,000.00
9	AICTE (Platform Dev.+ Course Dev.+ others) (NC)	(Platform Dev.+ Course Dev.+ others)	318,833,240	238,570,000	28,832,946.00
		AICTE for ARPIT		69,090,000	52,900,000.00
		AICTE NTA		1,088,192	
10	NIT Trichy (NC)				
	Others				
10	DAVP(for adv. of SWAYAM)		-		
11	IIIT Hyderabad for translation of MOOCs			11,000,000	96,900,000.00
12	EdCIL for social media campaign			2,803,500	6,228,752.00
13	NITTTR Chandigarh(workshop)				1,000,000.00
Total			630,783,240	1,172,771,692	986,159,000
				Grand Total	2789713932

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Four content delivery models - video lecture, specially prepared reading material, self-assessment tests and an online discussion forum
- Guideline for developing online courses ensures standardization and quality
- High quality content developed by institutions including IITs and IIMs
- Select courses in local languages also
- Free of cost to the learners (certificates have a fee)
- UGC has already issued the UGC Regulation 2016 advising the universities to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM. AICTE has also put out gazette notification in 2016 and subsequently for adoption of these courses for credit transfer.
- Swayam platform is capable of hosting 2000 courses and 80000 hours of learning, covering school, under-graduate, post-graduate, engineering, law and other professional courses.

WEAKNESSES

- Basis a few user feedbacks on Facebook, Swayam needs to improve on:
 - Speed of mobile app – specifically loading of videos
 - Quality of content delivery by a few professors needs improvement – just reading the slides, poor spoken English, etc.
 - Duration of a few courses can be reduced
 - Users have challenges in examination scheduling
- Exam registrations as % of students enrolled is low – NPTEL courses seem to be better than the rest Course completions as % of enrolled students is not known and may be low

OPPORTUNITIES

- Digital native population would be fast adopters of online education
- Increasing unemployment rate in India (@ 7% as of Feb 2020)
- Shrinking shelf life of technology and emergence of new technologies
- Rise in acceptance of digital learning in developing nations like African countries

THREATS

- Lack of facilitators with high impact
- Changing e-learning models and pedagogy aligned to psychology of the target segment e.g. gamification and simulations

DATA ANALYSIS

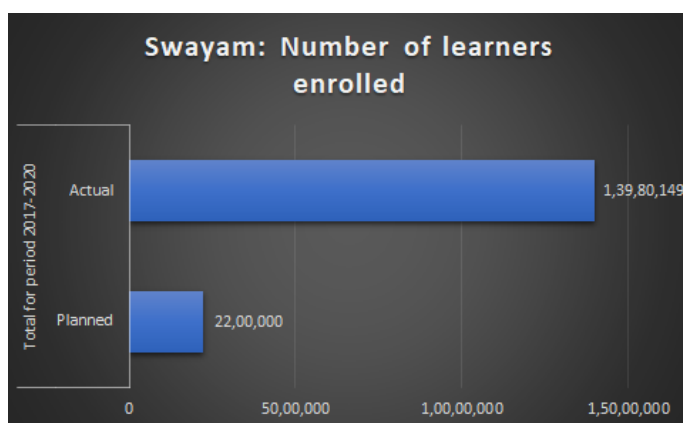
The parameters that were decided by the SFC committee to measure the outcomes of Swayam focused on the number of learners who enroll for the courses run on Swayam portal and the number of learners who take the examination and earn credits. These parameters have been used to conduct this analysis.

Details of Budget allocation under SWAYAM Scheme

Year	As per SFC allocation	Budget Estimate	Revised Estimate	Expenditure
2017-18	94,10,00,000	75,00,00,000	90,00,00,000	63,07,83,240
2018-19	2,06,50,00,000	90,00,00,000	1,30,00,00,000	1,17,27,71,692
2019-20	1,88,72,00,000	1,30,00,00,000	1,70,00,00,000	98,61,59,000
	4,89,32,00,000	2,95,00,00,000	3,90,00,00,000	2,78,97,13,932

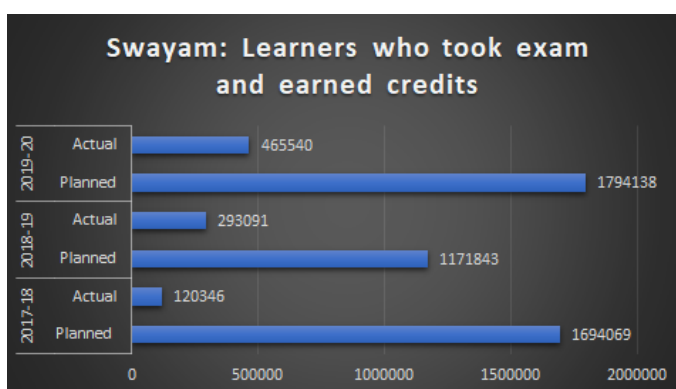
NUMBER OF LEARNERS ENROLLED

As per the SFC note, it was estimated that atleast 22 lakh learners will be enrolled on the Swayam Portal in the period 2017-2020. The data received shows that the actual number of learners enrolled in the period is 1,39,80,149 which is 535 % greater than the estimated value. This clearly indicates that the project has performed extremely better than the expectations in the given period. The number tells about the vast reach that the project has achieved.



NUMBER OF EXAM TAKERS WHO EARNED CREDITS

As per the SFC note, it was envisioned that Swayam should ensure at-least 1/3rd of the learners to take the examination and earn credits on successful completion of the course. Thus, for the planned number of learners who would take exam and earn credits in a particular year, 1/3 rd the actual learners enrolled for that year has been used,

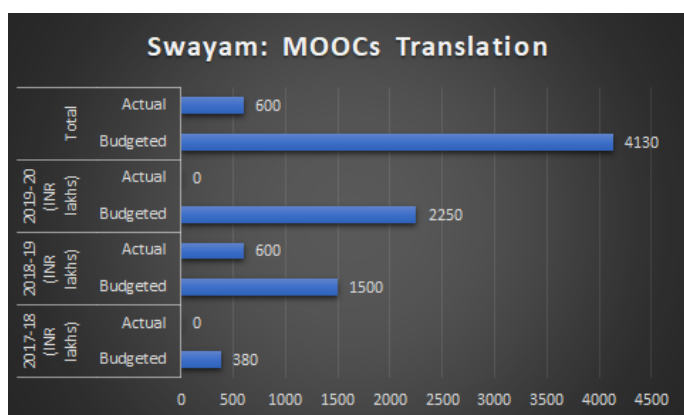
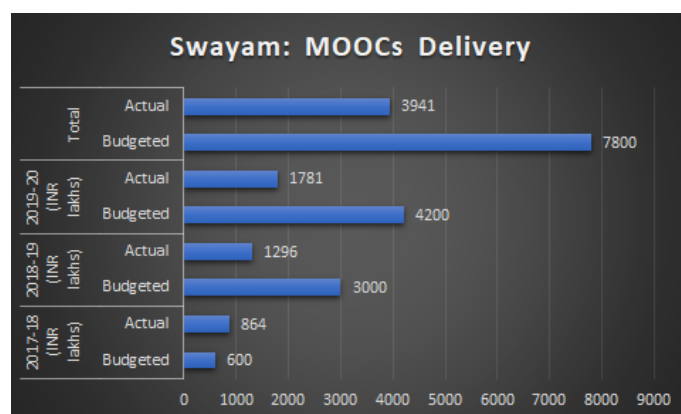
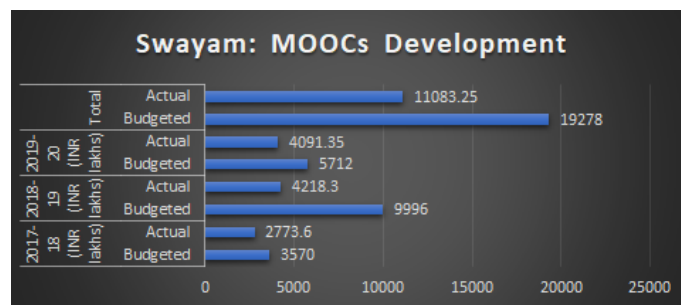


The data obtained shows that though in the year 2017-18, only 7% of the planned numbers were actually achieved, the subsequent years showed progress in the number of learners who earned credits. In the year 2018-19, 25% of the planned number of learners earned credits and in the year 2019-20, the percentage rose to 26%. Although the planned numbers have not been achieved, the growth in the number of test takers and certified learners indicate that the project can actually achieve a great progress if continued in the coming years.

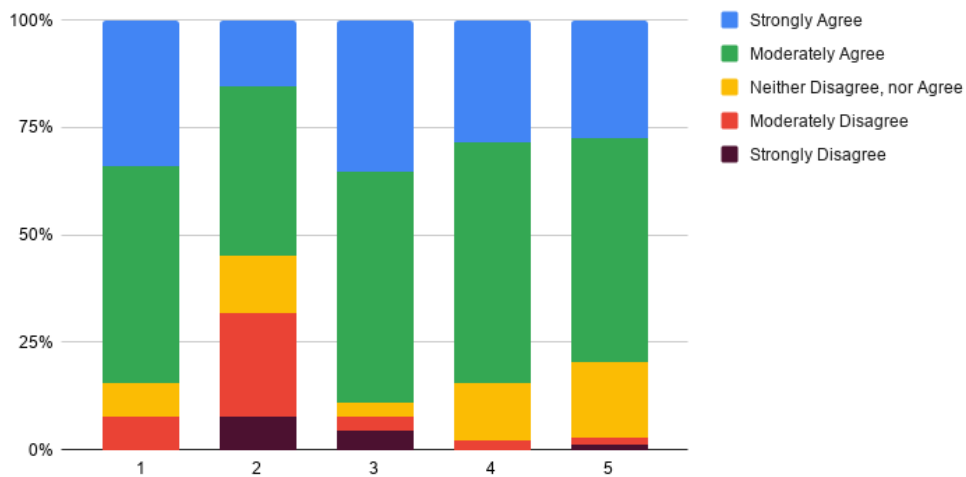
FINANCIAL ANALYSIS

As per SFC note, it was estimated to develop 1350 new courses and run 6500 courses during the project period. The costs were budgeted taking these targets into consideration. Though there has been a significant addition of new learners to the Swayam Scheme, the financial data clearly shows that the actual costs incurred for development of MOOC are 57% of the estimated costs over the period. Also, the costs for delivery of MOOC is just 51% of the estimated amount. It was estimated in the note that 275 MOOCs will be translated in video transcription and text files and the cost of translation was budgeted using the same number. The actual cost incurred for translation is just 15 % of the estimated value.

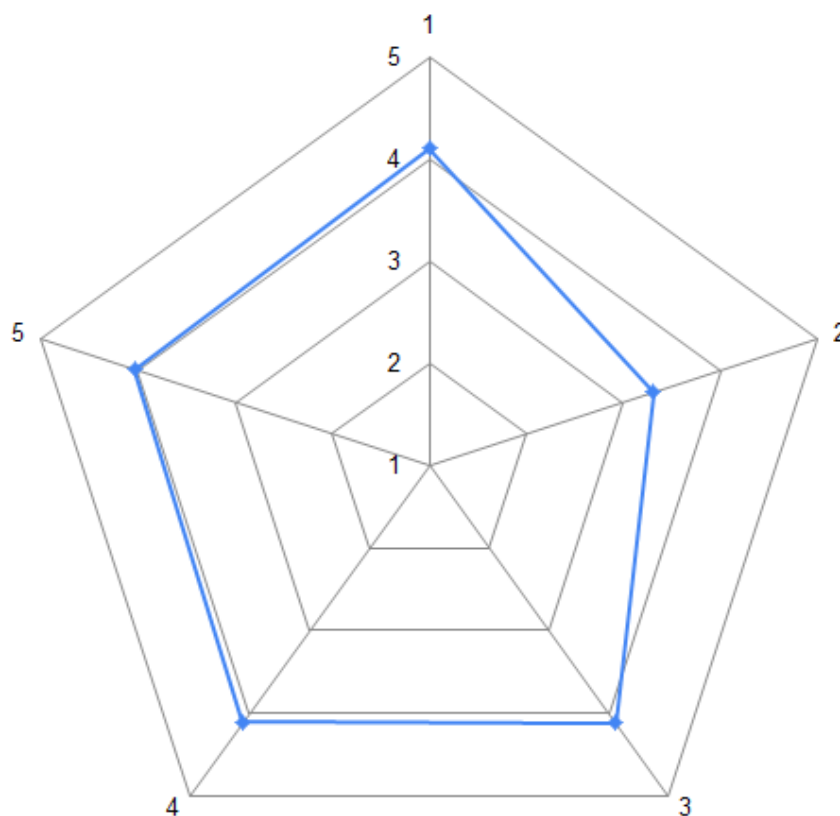
This analysis had been used to make the below recommendations.



SWAYAM



A	B	C	D	E	F	G
S.No.	Questions	Strongly Disagree	Moderately Disagree	Neither Disagree, nor Agree	Moderately Agree	Strongly Agree
1	Low completion rate is one of the biggest challenges for SWAYAM	0%	7.70%	7.70%	50.50%	34.10%
2	Course Coordinators had to struggle with technological hindrances	7.70%	24.20%	13.20%	39.60%	15.40%
3	SWAYAM is complementing & supplementing traditional way of teaching	4.40%	3.30%	3.30%	53.80%	35.20%
4	Courses can also be used flipped and blended teaching mode	0.00%	2.20%	13.20%	56.00%	28.60%
5	Online learning experience was good compared to classroom teaching	1.00%	1.70%	17.70%	52.00%	27.60%



SWAYAM - Radar Chart

PROJECT RECOMMENDATIONS

1. Swayam has been the most successful model. The learning needs to be shared with other partnering agencies of Swayam such as UGC, CEC, etc.
2. Unplanned expenditure areas (as below) have led to the need for increased funds:
 - a. Many workshops, conferences, study tours and training programmes that were conducted are supplementary to the core project but necessary, are being managed by the team from internal funds
 - b. Swayam is being managed by the same set of IT group that manages NPTEL. It is critical to retain the manpower and to compensate for the extra efforts being put by the NPTEL team
 - c. Local Chapters contribute to the success & sustainability of the project and incur expenses towards consumables like printing, scanning and internet
 - d. Considerable effort is being made on re-running of the existing learning content, the actual effort, time and cost incurred for re-run is more than planned
3. Apart from the Ministry of Education funding, the only source of funds is the certification fee. We recommend a revenue model should be re-looked. Business model of successful e-learning businesses like Khan Academy and Byju's should be understood to make Swayam a scalable and self-sustaining model.
4. To optimize the costs and consolidate the overall funding, all e-learning initiatives under NMEICT could be consolidated under one initiative. For e.g. MATLAB is a sought-after course on the Swayam platform. However, the FOSSEE initiative has also created a tool like SCILAB
5. The initiative of National Digital Library should also be linked to Swayam for users to be able to get access to the digital books for relevant courses
6. Data suggests that most users log onto Swayam to support their learnings while in school or college. Hence there is a limited impact of Swayam in employment generation. We suggest the following to increase the impact of Swayam and improve employability in India:
 - a. Align and restructure the online courses to lead to a diploma in various streams such as management or offer certificate courses in IT like courses offered by institutions such as NIIT

- b. Combine virtual labs and Swayam courses to package a e-Diploma in certain engineering streams like electrical or electronics
 - c. Recognize certificates/diploma issued through Swayam for permanent or temporary jobs in central & state governments
7. Swayam to focus on delivery pedagogy and develop capabilities in gamification and simulation-based e-learning. In addition, verbal & non-verbal communication and facilitation skills of the professors needs to be evaluated and improved.
8. There is a need to invest into detailed website analytics (of Swayam) to gather user level and his/her journey to be able to make strategic decisions around the future of Swayam.

K. PROJECT - SWAYAM PRABHA

Swayam Prabha, officially launched on July 9, 2017, has been conceived as a group of 32 DTH channels devoted to telecasting of high-quality educational programmes on 24×7 basis using the GSAT-15 satellite. These channels have a wide range of programmes which will cater to the needs of students from the 9th standard to PG level, life-long learners and teachers as well. In addition, Swayam Prabha also has a channel IIT-PAL to assist learning of students aspiring to join IITs and premier medical institutions of India.

Project Coordinator - Prof Mangal Sunder

Project Implementer - IIT Madras

Participating Institutions – IIT Madras & BISAG

Operating Location - IIT Madras & BISAG

OBJECTIVES OF THE PROJECT

1. Some of the content of Swayam Prabha is repurposed from the content already developed for Swayam and by linking it with DTH channels, the aim is to broaden the access of Swayam MOOC programmes to remote rural locations of the country where internet connectivity is still poor. Analogous to Swayam, the contents of Swayam Prabha are provided by NPTEL, IITs, UGC, CEC, IGNOU, NCERT and NIOS.
2. Swayam Prabha was conceived and completed within three months with active participation from ECIL, BISAG, INFLIBNET and Department of Space. At the technology end, channels are uplinked from the station at BISAG, Gandhinagar, while Department of Space has allocated two transponders in GSAT-15 satellite for launching 32 Educational DTH channels. The INFLIBNET Centre maintains the web portal

KEY FEATURES

- It is an ongoing programme which was officially launched on July 9, 2017. The program's popularity is visible from the subscriptions, no method is available to assess the actual impact gained for the programmes through direct broadcast.
- At the broad level, the programme is well aligned with the new educational system which constitutes both academics & technology thereby enabled democratization of education.
- At all fronts, the programme has surpassed the defined targets. There is ample scope for upgradation of the Swayam Prabha portal from the users' perspective.
- Swayam Prabha reaches the public through multiple channels, apart from regular DTH. While public broadcast is difficult to assess the consumption from end users. However, broadcast through digital modes of mobile subscriptions like the JIO-APP, throws details of subscription & consumption data. These details are exclusive to the 32 DTC channels of Swayam Prabha.

Jul 17 - May 20

Total views: 3,38,16,074

Total subscribers: 6,00,959

Unique videos: 56,169

Videos running Hours: 37,093 Hours

Average Daily hits since lockdown: 50,000

FINANCIAL SUMMARY

(all amounts are in Rs. Lacs)

An amount of Rs.12,80,00,000 has been released to BISAC towards maintenance of Channels for the period April 2019 till December 2019

F. Y.	Approved budget by SFC	Sanction Date	Fund Released
2017-18	₹ 2,200	22.06.2017	₹ 4,60
		30.12.2017	₹ 11,40
		30.12.2017	₹ 16,00
		30.03.2018	₹ 31,43
		Total	₹ 63,43
2018-19	₹ 5,200	29.09.2018	₹ 7,78
		22.01.2019	₹ 3,89
		11.03.2019	₹ 389.40
		29.09.2018	₹ 640
		20.02.2019	₹ 320
		11.03.2019	₹ 320
		Total	₹ 2,836.40
2019-20	₹ 5,200	28.06.2019	₹ 389.40
		23.09.2019	₹ 389.40
		11.11.2019	₹ 389.40
		09.12.2019	₹ 960
		Total	₹ 21,28,20,000
	12,600		₹ 11,307.60
Total amount released till date			₹ 11,307.60

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Completely free for students
- Wide reach through YouTube and DD & Dish TV DTH
- SWAYAM Prabha offers video lectures taken from SWAYAM

WEAKNESSES

- Viewership & impact through TV cannot be estimated
- This limited pedagogy is not as effective as other e-learning models

OPPORTUNITIES

- 70 percent of DTH subscribers are from villages and small towns in India
- Enable technology like Spoken Tutorial to transcribe & translate content as sub-titles to improve effectiveness for non-English medium students

THREATS

- Rise of over-the-top (OTT) media service through private mobile service providers like Reliance Jio

DATA ANALYSIS

SWAYAM Prabha has been conceived as the project for telecasting high quality educational programs through 32 DTH channels on 24x7 basis. It was envisioned that the videos developed as part of MOOC in the SWAYAM project would be used in SWAYAM PRABHA DTH Channels. The additional videos that would be required to meet the objective of 4 hours of fresh content per day for the 32 Channels would be developed under this scheme. Thus, as per the SFC committee, one of the important parameters to measure the outcomes of Swayam Prabha is the number of hours of content created. Along with this, for the financial analysis, the actual costs incurred have been compared with the estimated costs.

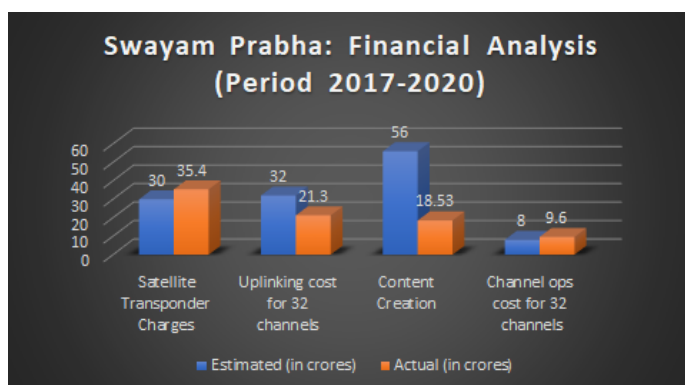
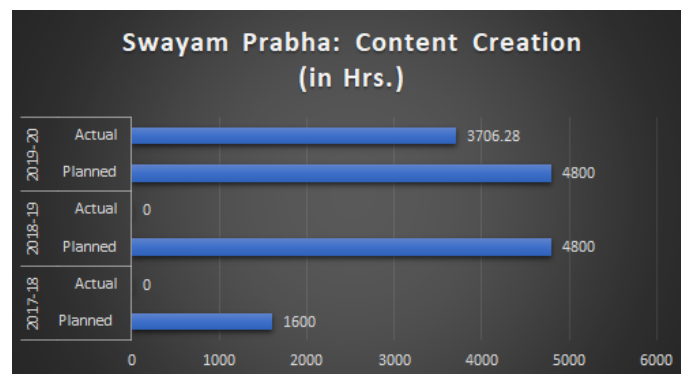
Swayam Prabha Data (Period 2017-2020)						
Physical						
Outcome	2017-18		2018-19		2019-20	
	Planned	Actual	Planned	Actual	Planned	Actual
Content Created (Number of hours)	1600	0	4800	0	4800	3706.28

Swayam Prabha Data (Period 2017-2020)		
Financial		
	Estimated Cost (in crores)	Actual Cost (in crores)
Satellite Transponder Charges	30	35.4
Up linking cost for 32 channels	32	21.3
Content Creation (in Hrs.)	56	18.53
Channel ops cost for 32 channels	8	9.6

CONTENT CREATION

The estimated costs for the physical and the financial analysis have been taken from the SFC note. As per SFC note, it was estimated that a total of 11,200 hours of content will be created in the period 2018-2020, estimating around 1700 hours of content to be developed in the first year and almost 4800 hours of content in the each of the last 2 years. The data collected shows that in the whole period 3706.28 hours of content has been created. And, this content was majorly telecast in the last year. For the first two years, the content already available was used for telecast purpose.

Thus, going ahead, other mediums of content can be explored as explained in the recommendations.



FINANCIAL ANALYSIS

As per SFC note, the costs were estimated under four major heads, namely Satellite Transponder Charges, Up linking cost for 32 channels, Content Creation and Channel Operations Cost. The Satellite Transponder charges were estimated to be around 30 crores for the period 2018-2020. But, the actual costs incurred under this head is 35.4 crores which is marginally greater than the estimates. On the contrary, though the up linking costs for 32 channels was estimated to be 32 crores for the period of the project, the actual costs incurred for the same at 21.3 crores are significantly lower.

The channel operations costs for 32 channels was estimated at 8 crores, which has been exceeded to 9.6 crores in actual costs incurred. Excluding the costs of the content creation, the overall costs for the remaining 3 fields have been approximately as per the estimated costs. The content creation costs are less than the estimated values, subjecting to the lesser number of hours of content created with respect to the estimated values. Let us make recommendations on the basis of this overall analysis.

PROJECT RECOMMENDATIONS

1. A few suggestions that could increase the impact of Swayam Prabha:
 - a. Translation & Subtitles: While the channels are available in English & to some extent in other languages, technology initiatives from NPTEL be leveraged for the Swayam Prabha to enable machine aided translation to be available for the content being broadcast.
 - b. The remote universities, colleges and higher education schools could download the video content on the set-top box. The professors & teachers could use the downloaded content to supplement their classroom teaching. In addition, given the quality of the knowledge, their professors and teachers could also use this for self-improvement.
 - c. The downloaded content can be made available to students post normal hours as refresher sessions
2. The videos can also be presented through a video based learning management system that could add opportunities to drive interactions for increase of effectiveness
3. Citizens are facing challenges with getting dish antennae. Swayam Prabha may leverage the CSC's (common service centres) facilities. With 2.75 lakh centres across the country, CSCs can be leveraged to enable SWAYAM PRABHA reach all locations.

L. PROJECT - E-SHODH SINDHU

University Library & Information Centers are playing a prominent role in the procurement, organization & preservation of resources while providing access to research scholars. These centers are the primary source of information or documents to students, research scholars and faculty in universities. Libraries strive to provide all required resources but are unable to reach this goal in spite of being budgeted for. Moreover, factors like cost escalations of resources, shrinking library budgets and ever-increasing user demand is posing constant challenges to librarians.

Project Coordinator - Prof J P Singh Jhooral

Project Implementer - INFLIBNET Center

Participating Institutions – 217 universities, 97 CFTIs and 3200 colleges

Operating Location - INFLIBNET

OBJECTIVES OF THE PROJECT

1. Setting-up E-Shodh Sindhu (ESS): Consortia for Higher Education E-Resources by augmenting and strengthening activities and services offered by three Ministry of Education funded Consortia.
2. Develop a formidable collection of e-journals, e-journal archives and e-books on a perpetual access basis.
3. Monitor and promote usage of e-resources in higher educational institutions in India and bridge the digital divide through awareness and training programmes.
4. Provide access to subscription-based scholarly information (e-books and e-journals) to all educational institutions available for open access through subject portals and subject gateways.
5. Provide access to selected e-resources to additional institutions including open universities and Ministry of Education funded institutions that are not covered under existing consortia
6. Take-up additional activities and services that require collaborative platform and are not being performed by existing Consortia
7. Move towards developing a National Electronic Library with electronic journals and electronic books as its major building blocks.

KEY FEATURES

- Exhaustive list of articles available for end users for reference
- INFLIBNET is the prime source to offer metadata for majority of the sources.

- E-Shodh Sindhu has a specific goal to ensure extensive outreach and exhaustive access.
- ESS has achieved a saving of INR 30.55 Crores. Lead educational institutions like the NITs and IITs have access to IEEE at Level II.
- Close to 2510 institutions have registered (as of November 2019)

FINANCIAL SUMMARY

<u>E Shodh Sindhu</u>		<u>(Rs. In crores)</u>		
	BE	RE	As per SFC allocation	Released
FY 2017-18	240	240	179.47	145.1231
FY 2018-19	180	200	170.43	199.57
FY 2019-20	242	-	142.17	227.66

SWOT ANALYSIS OF THE PROJECT

STRENGTHS

- Single point source for resource material
- Efficiency of system to assess and avoid duplications
- Serves as guide to researchers

WEAKNESSES

- Limited membership
- Reduction in downloads in 2019
- Lack of awareness of the project at multiple levels including research institutions
- Continuous funding requirements

OPPORTUNITIES

- Success of freemium business models like researchgate.net and academia.edu
- Ministry of Education funding for various research projects in India
- Inclusion of NLP/Local language for ease of use at regional institutions
- Human psychology – need for recognition and rewards

THREATS

- Emerging similar private sector businesses with innovative revenue models
- Availability of funds for the project

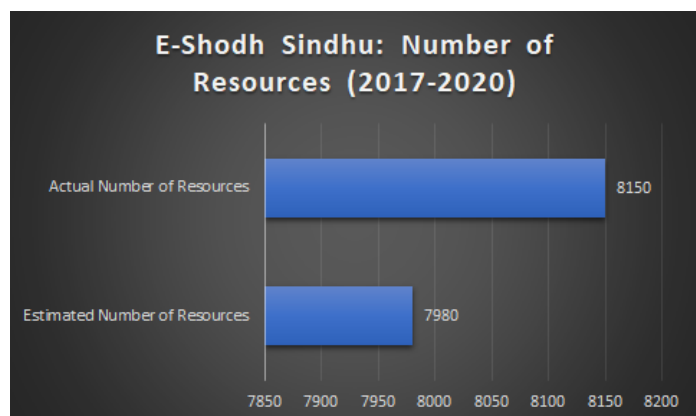
DATA ANALYSIS

E-Shodh Sindhu has been evaluated using 3 parameters namely, number of resources available, number of institutes opted, and the financial analysis. Since the estimated costs were not received in the data made available by INFLIBNET, the estimated costs given in Standing Finance Committee note have been used.

E-Shodh Sindhu Data		
Resource Name	Journals	
Date	1.4.17	1.4.20
No. of resources	7497	8150

E-Shodh Sindhu Data			
Type of institutes	Universities	CFTI	Colleges
Number of institutes	217	97	3200

E-Shodh Sindhu Data		
Financial Year	Financial	
	Budgeted Cost in Cr.	Actual Cost in Cr.
2017-18	₹179.47	₹175.97
2018-19	₹170.43	₹169.84
2019-20	₹142.17	₹208.31



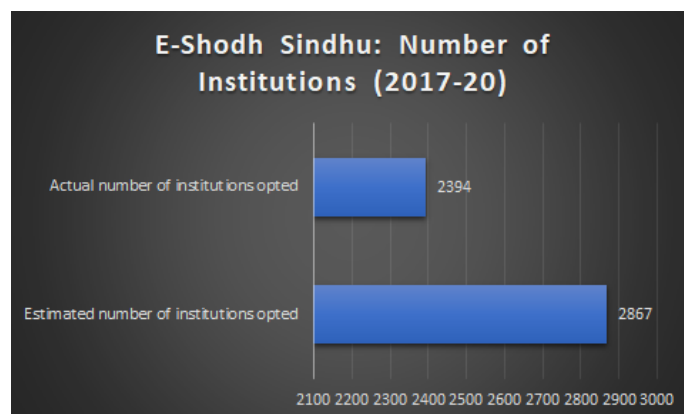
NUMBER OF RESOURCES

As per SFC note, for the period 2017-20, the number of resources estimated to be available under E-Shodh Sindhu was 7980.

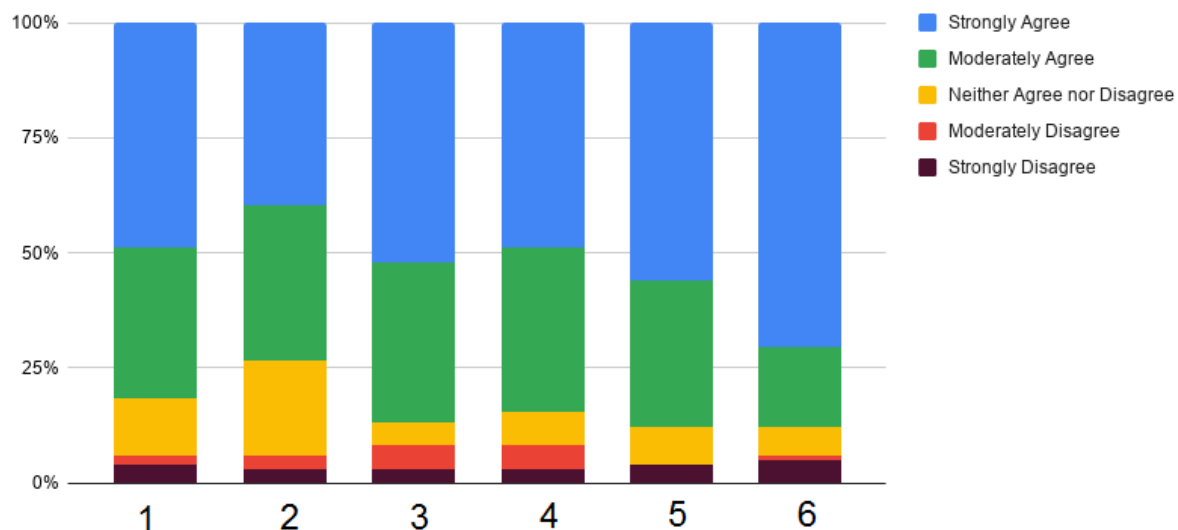
However the scheme has performed very well by making 8150 resources available to the institutions in this period. The data mentioned under column 1.4.2020 from the table provided by INFLIBNET Centre has been used for this analysis.

NUMBER OF INSTITUTIONS

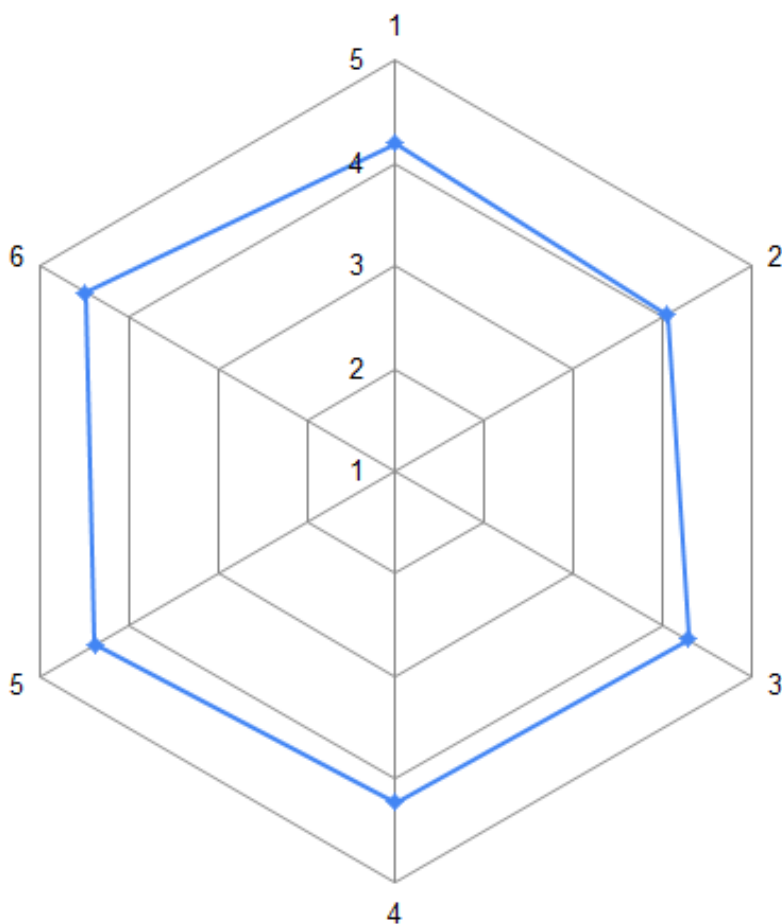
From the data made available by INFLIBNET Centre, the number of institutions mentioned for the date 1.4.2020 i.e number of institutions opted for 2021 subscription year as per the survey done in January 2020 has been considered to do this analysis. The data shows that the actual number of institutions is less than the number estimated in SFC report.



E-Shodh Sindhu



S.No	Question	Strongly Disagree	Moderately Disagree	Neither Disagree, nor Agree	Moderately Agree	Strongly Agree
1	I was able to find relevant research papers	4.1%	2.0%	12.2%	32.7%	49.0%
2	I'm satisfied with the quantity of research papers available	3.1%	3.1%	20.4%	33.7%	39.8%
3	The interface of E-Shodh Sindhu is user friendly	3.1%	5.1%	5.1%	34.7%	52.0%
4	I'm satisfied with the server responsiveness of E-Shodh Sindhu	3.1%	5.1%	7.1%	35.7%	49.0%
5	I find E-Shodh Sindhu useful for my future research projects	4.1%	0.0%	8.2%	31.6%	56.1%
6	I would recommend E-Shodh Sindhu to my colleagues and friends	5.1%	1.0%	6.1%	17.3%	70.4%



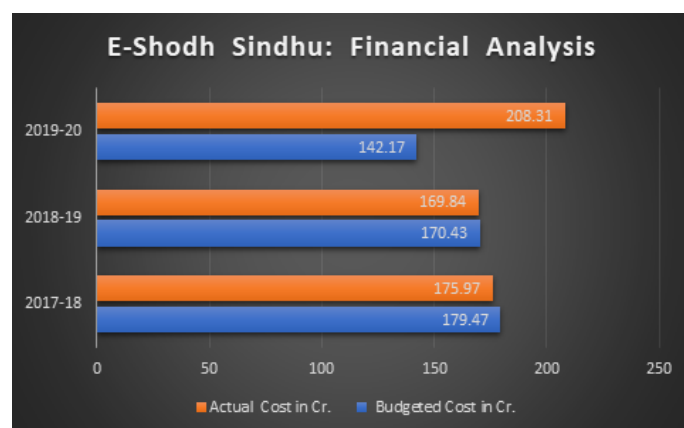
E-Shodh Sindhu - Radar Chart

USER COMMENTS & TESTIMONIALS

- "Relevant research articles are available for the research students."
- "We need constant support of E-Shodh Sindhu for our future academic requirements too."
- "E-Shodh Shindu is the backbone of Indian Universities and Higher Academic Research Institutions for Research teaching and research point of view."
- "This site is very useful to all faculty members and the research scholars. As a Librarian, I motivate and download in the beginning of their academic work."
- "Thanks ESS for making librarian's job easier."
- "ESS has written its own success story."
- "Overall is very good and very cooperative and efficient staff members."
- "Please do continue free of cost service."

FINANCIAL ANALYSIS

The financial data clearly shows that the actual costs incurred during the period 2017-2020 have exceeded the estimated costs by around ₹62 crores.



PROJECT RECOMMENDATIONS

1. The new model of e-SS based on NIRF Ranking 2018 with enhanced access to e-resources for 2019 and 2020 was submitted to Ministry of Education. The proposal could be cleared by Ministry of Expenditure. The National Steering Committee (NSC) of eSS has recommended to Ministry of Education to take up this new model (enhanced Access to e-resources) again for the year 2021 – 2024.
2. Ministry of Education should critically discuss the business model and analyze the revenue model of Researchgate.net (16 million scientists) and Academia.edu (120,688,116 Academics and Researchers) that have successfully built research resources
3. For research initiatives funded by the government, a percent of the funding could be made subject to uploading of the final version of the research paper on ESS
4. ESS should invest in digital and social media marketing to promote researchers and their papers to build the brand
5. Ministry of Education may propose to setup a committee in the lines to NOBEL committee, comprising of experts in different fields of Sciences (including Mathematics), Economics, Engineering, Arts and Literature. The primary responsibility of this committee would be to review all the Research work ongoing in the country and highlight any seminal work undertaken in the different fields and offers able guidance so that the researcher puts in appropriate efforts for the best outcome possible.
6. Inlibnet may maintain and publish a HALL OF FAME to highlight seminal publications or publications which according to the committee above are path breaking and thereby educate all the researchers on the Inspirational work ongoing in the country.

ANNEXURE

Virtual Labs - Questionnaire

Virtual Labs - Questionnaire

* Required

Email address *

Your email

Name *

Your answer

Institution *

Your answer

1. The Virtual Lab experience was similar to that of a real lab *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

2. The Virtual Labs interface was easy to use *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

3. Virtual Labs has sufficient amount of experiments to perform *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

4. It is easy to learn on Virtual Labs. *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

5. The required study material is available in the Virtual Labs *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

6. The results generated in Virtual Labs via experiments is acceptable *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

7. I feel excited to conduct experiments on Virtual Labs *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

8. My area of interest is available on Virtual Labs *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

9. The server responsiveness of Virtual Labs is satisfactory *

1

2

3

4

5

Strongly Disagree

☐

☐

☐

☐

☐

Strongly Agree

Any other feedback

Your answer

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E-Yantra - Questionnaire

E-Yantra Questionnaire

* Required

Email address *

Your email

Name *

Your answer

Institution *

Your answer

The equipment and instruments provided to us function properly and efficiently *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The instruments provided are up to date *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The learning process is engaging and exciting *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The mentors possess the required knowledge and are well-versed with their subjects *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The competitions are healthy and encouraging *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Sufficient time is provided regarding the preparation for competitions and projects *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The evaluation is continuous and timely *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Any other feedback

Your answer

Submit

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National Digital Library - Questionnaire

National Digital Library

*** Required**

Email address *

Your email

Name *

Your answer

Profession *

Your answer

The material available on National Digital Library is satisfactory *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

National Digital Library has books available in various languages *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The interface of National Digital Library is simple and easy to use *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

National Digital Library is easily accessible *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The servers of National Digital Library are responsive enough *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The material available on National Digital Library is useful for me *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

I'm satisfied with the variety of material available on National Digital Library *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Any other feedback

Your answer

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Swayam - Questionnaire

*** Required**

Email address *

Name *

Profession *

Low completion rate is one of the biggest challenges for SWAYAM *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Course Coordinators had to struggle with technological hindrances *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

SWAYAM is complementing & supplementing traditional way of teaching *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Courses can also be used flipped and blended teaching mode *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Online learning experience was good compared to classroom teaching *

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Any other feedback

Submit

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E-Shodh Sindhu - Questionnaire

*** Required**

Email address *

Your email

Name *

Your answer

Profession *

Your answer

I was able to find relevant research papers *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

I'm satisfied with the quantity of research papers available *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

The interface of E-Shodh Sindhu is user friendly *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

I'm satisfied with the server responsiveness of E-Shodh Sindhu *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

I find E-Shodh Sindhu useful for my future research projects *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

I would recommend E-Shodh Sindhu to my colleagues and friends *

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

Any other feedback

Your answer

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